Goschen Mineral Sands and Rare Earths Project

Minister's Assessment under Environment Effects Act 1978

December 2024

Acknowledgement


The Victorian Government acknowledges Aboriginal and Torres Strait Islander people as the Traditional Custodians of the land and acknowledges and pays respect to their Elders, past and present.

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List of abbreviations

CFA	Country Fire Authority
CGE	Computable General Equilibrium
CHMP	Cultural heritage management plan
dB	Decibels
DEECA	Department of Energy, Environment and Climate Action
DELWP	Department of Environment, Land, Water and Planning
DTP	Department of Transport and Planning
DCCEEW	Commonwealth Department of Climate Change, Energy, the Environment and Water
EES	Environment effects statement
EMF	Environmental management framework
EPA	Environment Protection Authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cth)
EVC	Ecological Vegetation Class
FFG Act	*Flora and Fauna Guarantee Act 1988* (Vic)
GSC	Gannawarra Shire Council
GP	General Practitioner
HMC	Heavy mineral concentrate
ha	Hectares
IAC	Inquiry and Advisory Committee
MFMF	Mine Free Malee Farms
MLA	Mining Licence Area
MNES	Matters of national environmental significance
MRSD Act	*Mineral Resources (Sustainable Development) Act 1990* (Vic)
Mt	Million tonnes
Project	Goschen Mineral Sands Project
PSA	Planning Scheme Amendment
ROM	Run of Mine
SHRCC	Swan Hill Rural City Council
TRG	Technical reference group
VBA	Victorian Biodiversity Atlas
VHM	VHM Limited

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Executive summary

Following receipt of a referral from VHM Ltd, in October 2018 the former Minister for Planning decided that under the *Environment Effects Act 1978* an environment effects statement (EES) was required for the Goschen Mineral Sands (mine) Project. VHM prepared an EES, which I authorised for public exhibition. The EES was exhibited for public comment from 20 November 2023 to 17 January 2024.

I appointed an inquiry under the Environment Effects Act to consider the project's environmental effects and submissions received on the exhibited EES. The inquiry was also appointed as an advisory committee under the *Planning and Environment Act 1987* to consider the draft planning scheme amendment. Planning Panels Victoria received 182 submissions on the exhibited EES. The inquiry and advisory committee (IAC) held a public hearing for 21 days across six weeks between 25 March 2024 and 30 April 2024. The IAC's report, EES, submissions and documents tabled at the hearing, have informed the preparation of my assessment of the environmental effects of the project, as set out here. My assessment will be considered by statutory decision makers as they contemplate the project's approvals.

The project is a controlled action under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) due to potential impacts on matters of national environmental significance (MNES). As the EES is an accredited assessment for the EPBC Act, my assessment examines impacts on MNES and is provided to the Commonwealth Minister for the Environment and Water to inform the decision about whether and under what conditions EPBC Act approval should be granted.

It is my assessment that, on balance, the project has merit and potential for economic benefits for the region and Victoria but comes with some environmental effects that need to be mitigated and, in some cases, offset. I support the findings of the IAC that none of the environmental effects could or should prevent the project proceeding, provided the mitigation measures recommended by my assessment are implemented.

Consistent with the IAC, I find there is residual uncertainty about the exact extent of some effects on biodiversity values along some roads and intersections. There remains potential for threatened ecological values to be impacted without appropriate mitigation. Therefore, my assessment includes recommendations to address this through specific survey work for certain ecological values, to resolve the residual uncertainty and ensure avoidance and mitigation is effective. I have also recommended the proponent prepare a design management document to demonstrate how the siting and design of the proposed pipeline, road and intersection upgrades would account for the further survey work and appropriately apply the avoid and minimise approach the proponent has committed to. I have made similar recommendations for selected areas along roads within the mining licence area where there is some residual uncertainty and there may be opportunities to further avoid and minimise effects. I am satisfied that with these recommendations being implemented, potential impacts to biodiversity matters will be avoided and minimised to acceptable levels.

It is my assessment that residual impacts on MNES protected under the EPBC Act are unlikely to be significant, providing sound implementation of my recommendations, including the mitigation measures as amended by the IAC and my assessment. Residual impacts on Ramsar wetlands, listed species and communities and other environmental values associated with the whole-of-environment assessment are not considered to be significant and can be acceptably managed through implementation of the mitigation measures, as refined through my assessment.

I have been greatly assisted in this assessment by the efforts of the IAC, the various parties who made submissions to the IAC and gave evidence in its hearings, and the work of my department.

1. Introduction

In October 2018 VHM Limited (VHM) referred the Goschen Mineral Sands and Rare Earths Project to the Minister for Planning for a decision on the need for an environment effects statement (EES) for the project.

In light of the potential for significant environmental effects, on 10 October 2018 the Minister for Planning determined under the *Environment Effects Act 1978* that VHM should prepare an EES for the proposed project.

The procedures and requirements for the EES specified that the EES was to document the investigation and avoidance of potential environmental effects of the proposed project, including for any relevant alternatives (such as for the mining extent, methods for mining and processing, water supply and transport of mining outputs), as well as associated environmental mitigation and management measures. In particular the EES was to address:

- effects on biodiversity and ecological values within and near the site, and associated with adjacent road reserves, including: native vegetation; listed threatened ecological communities and species of flora and fauna; and other habitats values;
- effects on surface water environments, including local waterways and the broader catchment, as well as groundwater resources (hydrology, quality, uses and dependent ecosystems);
- effects on the land uses and landscape values of the site and surrounding areas, including the implications for agricultural productivity;
- effects on land stability, erosion and soil productivity associated with the construction and operation of the project, including progressive rehabilitation works;
- effects on Aboriginal and non-Aboriginal cultural heritage values;
- effects of project construction and operation on air quality and noise on nearby sensitive receptors (in particular residences);
- both positive and adverse socio-economic effects, at local and regional scales, potentially generated by the project, including increased traffic movement and indirect effects of the project construction workforce on the capacity of local community infrastructure; and
- solid and liquid waste that might be generated by the project during construction and operation.

The proponent prepared an EES which was publicly exhibited for 40 business days from 20 November 2023 to 17 January 2024. A draft planning scheme amendment (PSA; GC218), draft work plan, and EPA development licence application (APP026623) were also published with the exhibited EES.

In accordance with terms of reference dated 7 August 2023, I appointed a joint inquiry and advisory committee (IAC) to consider the EES and the draft PSA. Planning Panels Victoria received 182 submissions on the exhibited EES and the draft PSA. The IAC held a public hearing over 21 days between 25 March 2024 and 30 April 2024; 282 documents were tabled at the hearing. The IAC provided its report to me on 27 June 2024. The report, along with the EES, its supporting technical reports, public submissions, tabled documents and relevant legislation, policy and guidelines have informed my assessment of the environmental effects of the project under the Environment Effects Act.

1.1. Purpose of this document

This is my assessment of the environmental effects of the project under the Environment Effects Act. This assessment finalises the EES process and provides authoritative advice to decision-makers, the proponent and all other stakeholders on the likely environmental effects of the project, their acceptability and how the effects are to be addressed in relevant statutory decisions and the delivery of the project.

This assessment will inform the decisions required under Victorian law for the proposal to proceed. The EES process has been accredited for the assessment purposes of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). My assessment will also inform the decision to be made by the Commonwealth Minister for the Environment and Water under the EPBC Act about whether, and under what conditions, the project will be approved.

1.2. Structure of the assessment

The structure of my assessment is as follows:

- Chapter 2 provides a brief description of the project;
- Chapter 3 refers to key relevant legislation;
- Chapter 4 examines the project's environmental assessment and management framework, planning controls, other approval mechanisms and governance arrangements;
- Chapter 5 assesses the environmental effects of the project in relation to the evaluation objectives by environmental discipline;
- Chapter 6 presents my conclusions, including responses to the recommendations of the IAC;
- Appendix A contains my recommendations about the mitigation measures; and
- Appendix B contains a consolidated assessment of impacts on matters of national environmental significance.

2. Project Description

The proponent proposes to develop the Goschen Mineral Sands and Rare Earths Project approximately 20 km south of Swan Hill in northwest Victoria to produce a mixed heavy mineral concentrate (HMC), zircon concentrate, rutile, leucoxene, ilmenite, as well as rare earth mineral products (Figure 1). The ore body will be mined within two areas (Area 1 and Area 3). Area 1 would have a mine life of approximately eight to ten years at 5 Mtpa Run of Mine (ROM) throughput. Area 3 has an expected mine life of approximately 12-15 years, after the conclusion of mining in Area 1.

Mine products are proposed to be transported by road to an intermodal freight terminal at Ultima and then by rail to the Port of Melbourne for export. Transport by road to Port of Melbourne is the contingency transport option in the event the rail line is closed for maintenance or unplanned events. The project's water supply would be pumped by a new water intake pump on the bank of Kangaroo Lake through a new 38 km pipeline to the MLA.

Mining is proposed to occur 24 hours a day, 365 days a year. The mine life includes approximately one year for construction of the Phase 1 process plant which would allow mining to commence, 20 to 25 years of active mining followed by decommissioning and closure. Rehabilitation would be undertaken progressively over the life of the mine.

The proposed mining method involves strip mining, the removal of overburden prior to the mining of the underlying ore deposits. The mine is proposed to occur progressively in mining blocks, with each block approximately 500 m in length and varying in width depending on ground conditions. Mining would be undertaken using conventional heavy earth moving methods and equipment. Mining blocks would be progressively rehabilitated as the mine advances through the mining area. Mining is expected to be to depths of 20 to 40 m below ground level and above the regional groundwater table.

The project includes:

- development and progressive rehabilitation of a mineral sands mine in areas 1 and 3;
- development and operation of mining unit plants;
- development and operation of ore processing plants including mining unit plant, feed preparation plant, rare earth mineral concentrate plant, hydrometallurgical plant, wet concentrator plant, flotation and other circuits including wet high intensity magnetic separation circuit, non-magnetic heavy mineral concentrate upgrade circuit, mineral separation plant and a hydromet facility;
- construction and operation of a water supply pipeline between the project and Kangaroo Lake;
- development of a 3km service corridor between the two mining areas;
- power generation;
- sewage treatment plant; and
- additional site facilities and infrastructure (such as a site office, warehouse, workshops, fuel storage, chemical and reagent storage, water storage ponds, etc.).

The EES addresses the effects of mining and processing mineral sands to produce the mine products and of transporting the mine products for overseas export from the Port of Melbourne, with Port of Geelong as an alternative.

The extent of the project's proposed mining licence area (MLA) is approximately 1,479 ha across Area 1, Area 3 and the connecting services corridor between these two areas. Mining would occur progressively throughout 76 different cells across approximately 750 ha of the MLA. Up to eight mining cells would be open at any given time for mining excavations, tailings deposition and rehabilitation. Land within the MLA is currently used for broadacre agriculture. The proponent has entered into voluntary contracts with landholders to purchase the land required for the project.

The project location and project area for the proposal assessed in the EES process are shown in Figure 1. The project is described in more detail in Chapter 3 of the EES. Section 4.3 of this assessment discusses project alternatives.

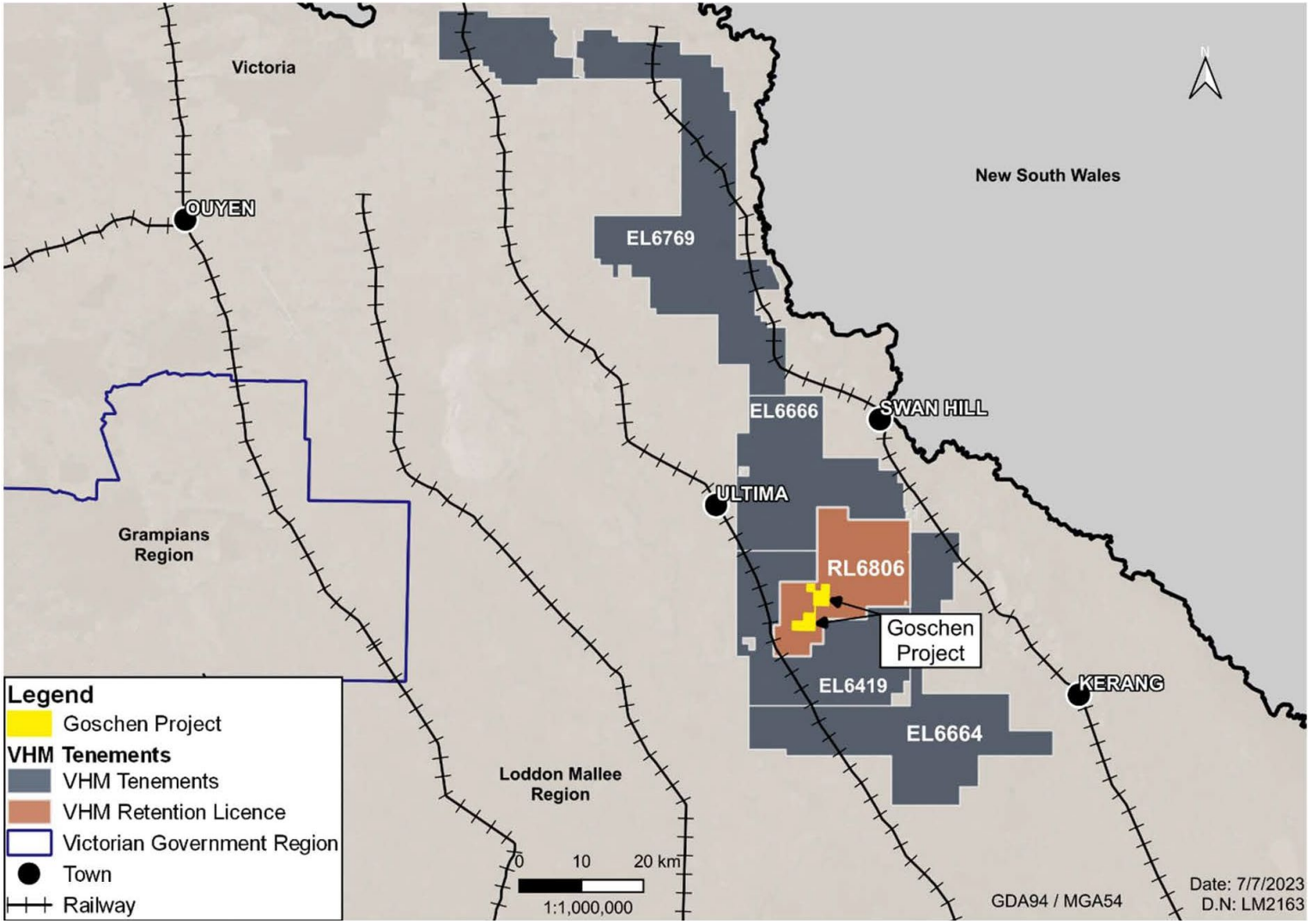

Figure 1 Project location and project area (Source: EES Chapter 3, VHM Ltd.).

3. Statutory processes

This section refers to key legislation that are relevant to my assessment and delivery of the project. VHM Ltd require a variety of statutory approvals under Victorian and Commonwealth law before they can proceed with the project. My assessment under the Environment Effects Act will inform approval decisions under the *Mineral Resources (Sustainable Development) Act 1990* (MRSD Act), *Planning and Environment Act 1987* and the *Aboriginal Heritage Act 2006* as well as a range of other permits and consents. The project is also a controlled action requiring approval under the EPBC Act.

3.1. Environment Effects Act

The Environment Effects Act provides for assessment of proposed projects that are capable of having a significant effect on the environment. Section 8C of the Environment Effects Act provides that approvals decisions for the project may not be made until my assessment is completed and has been considered by the decision-makers who have been given notice.

Draft scoping requirements were exhibited for public comment between April and May 2019 and 11 submissions were received. In May 2019 the Minister for Planning issued final scoping requirements specifying the range of matters to be addressed in the EES. The former Department of Environment, Land, Water and Planning (DELWP) convened a technical reference group (TRG) for the project in accordance with standard EES practice to provide advice to the proponent and the former DELWP on the preparation of the EES.

The EES was prepared by the proponent and placed on public exhibition for 40 business days from 20 November 2023 to 17 January 2023. A draft planning scheme amendment, development licence application and draft work plan were also published with the exhibited EES. The EES attracted 182 submissions. Three of the submissions on the EES were from state and local government bodies.

As the decision to be made about the draft planning scheme amendment must be informed by this assessment, all matters raised in submissions have been taken into account in this assessment.

On 11 August 2023 I appointed an inquiry under section 9(1) of the Environment Effects Act and an advisory committee under part 7, section 151(1) of the Planning and Environment Act. The IAC was appointed to review submissions and inquire into the environmental effects of the proposal, in accordance with its published terms of reference, which I approved on 7 August 2023.

The IAC held a directions hearing on 13 February 2024, followed by public hearings, which were held from 25 March to 30 April 2024. The IAC provided its report to me on 27 June 2024.

The IAC report, along with the EES, its supporting technical reports, public submissions, tabled documents and relevant legislation, policy and guidelines, has informed the preparation of this assessment of the environmental effects under the Environment Effects Act.

This assessment is the final step under the Environment Effects Act. It summarises the environmental effects of the project for statutory decision-makers under Victorian law. Decision-makers must then consider this assessment before deciding whether and how the proposal should proceed. This assessment will inform approval decisions under the Victorian and Commonwealth legislation outlined below.

3.2. Victorian statutory approvals

The project requires a number of Victorian statutory approvals, including:

- an approved work plan and mining licence under the MRSD Act;
- an amendment to the Gannawarra and Swan Hill Planning Schemes to regulate the use and development of the project components outside of the MLA;

- a development licence under the Environment Protection Act for the on-site power plant and sewage plant; and
- an approved cultural heritage management plan under the Aboriginal Heritage Act.

Mineral Resources (Sustainable Development) Act

An approved work plan and mining licence are required under the MRSD Act before commencing works associated with the project. A draft work plan was exhibited as Attachment I to the EES. The draft work plan describes the project, environmental values and risks and sets out how the project risks would be managed and regulated. The draft work plan applies to the project components located within the mining licence area.

Section 42(7) of the MRSD Act provides that a planning permit is not required for mining works and activities within the mining licence area if the proposal has been assessed through the EES process. Decisions about approving the work plan will be made under the MRSD Act following consideration of this assessment.

Planning and Environment Act

The Planning and Environment Act sets out processes for the amendment of Victorian planning schemes. An amendment to the Gannawarra and Swan Hill Planning Schemes is proposed to allow for the development and use of land outside the mining licence area by introducing an incorporated document into the planning scheme and applying the Specific Control Overlay (SCO) to project infrastructure land including road works, water pipeline and the Kangaroo Lake pump station. The draft planning scheme amendment (GC218) was included with the exhibited EES as Attachment III. This provided an opportunity for the community and other stakeholders to comment on the draft planning controls. The advisory committee I appointed under the Planning and Environment Act considered the draft planning scheme amendment.

Environment Protection Act

A development licence application (APP026623) under the Environment Protection Act was received by the EPA. The development licence application was jointly advertised as Attachment II of the EES, in accordance with section 70A of the Environment Protection Act. The development licence application applies to the sewage treatment and operation of a power station components of the project.

Aboriginal Heritage Act

The Aboriginal Heritage Act stipulates that an approved cultural heritage management plan (CHMP) must be prepared for works for which an EES is required. There is no Registered Aboriginal Party (RAP) under the Aboriginal Heritage Act for the land on which the project is located. A draft CHMP (no. 17848) has been prepared for the project. The CHMP will be evaluated by Department of Premier and Cabinet, First Peoples – State Relations.

3.3 Other Victorian statutory approvals

The project also requires a range of consents and permits including but not limited to:

- permit to discharge or deposit waste to an aquifer (A18 permit) under the *Environment Protection Act 2017* and associated *Environment Protection Regulations 2021*;
- licence under the *Radiation Act 2005* and approval of a number of radiation management plans;
- licences to take and use surface water and extract groundwater and consents for works on or over waterways under the *Water Act 1989*;
- permit to remove listed flora and fauna from public land under the *Flora and Fauna Guarantee Act 1988*; and
- consent to undertake works on roads under the *Road Management Act 2004*.

3.3. Commonwealth statutory approval

In October 2018, VHM Exploration Limited referred the project to the Commonwealth (referral 2018/8291) for a determination on whether the project was a controlled action under the EPBC Act.

On 19 December 2018, the project was determined to be a controlled action requiring assessment and approval under the EPBC Act because of its potential impacts on matters of national environmental significance (MNES): Ramsar wetlands (sections 16 & 17B); listed threatened species and communities (sections 18 and 18A) and nuclear actions (s21

and s22A). The Commonwealth determined that the project's impacts on MNES were to be assessed under the bilateral agreement made between the Australian and Victorian governments under section 45 of the EPBC Act. The EES process is therefore serving the assessment purposes of the EPBC Act, with the decisions about whether, and under what conditions, to approve the project to be made after consideration of this assessment.

As the nuclear action controlling provision is triggered, a whole of environment assessment is applied to the entire action, so the impacts of all potential project activities on the whole of the environment will be considered. The Commonwealth Minister for the Environment and Water will need to consider all impacts in Section 5 of my assessment, not just impacts occurring from radiation.

My assessment of the potential impacts on MNES is provided in Appendix B.

4. Environmental assessment and management framework

My assessment has been informed by consideration of the EES, public submissions, evidence tabled to the IAC, information and submissions presented at the IAC hearing and the IAC's report. Legislation, policy, strategies and guidelines and the objectives and principles of ecologically sustainable development contextualise my assessment.

This part of my assessment:

- summarises my approach to assessing the environmental effects of the project;
- explains relevant aspects of the regulatory framework and proposed environmental control regime that have informed my assessment; and
- sets out my analysis and findings on the project's effects.

4.1. Assessment evaluation objectives

To provide an integrated structure for this assessment, key aspects of legislation and statutory policy are reflected in evaluation objectives that were set out in the EES scoping requirements. My assessment has been made in reference to these evaluation objectives (Table 1).

These objectives are derived from the evaluation objectives included in the scoping requirements for the EES and used by the proponent in its assessment of environmental effects within the EES. The IAC also considered the project's effects having regard to the evaluation objectives.

Table 1: Assessment evaluation objectives

Evaluation objective	Relevant section of this report
Resource development – ***To achieve the best use of available mineral sands resources, in an economic and environmentally sustainable way, including while maintaining the viability of local industries.***	**5.4, 5.9, 5.10**
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.***	**5.1, Appendix B**
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.***	**5.2, 5.3**
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.***	**5.5, 5.6, 5.7, 5.8**
Social, land use and infrastructure – ***To minimise potential adverse social and land use effects, including on agriculture and transport infrastructure.***	**5.4, 5.5, 5.9**
Cultural heritage – ***To avoid or minimise adverse effects on Aboriginal and historic cultural heritage values.***	**5.11**
Landscape and visual – ***To minimise adverse effects on landscape and visual amenity associated with the environs of the project site.***	**5.11**

4.2. Management of environmental effects

A sound regulatory framework and environmental control regime is needed to ensure that adverse effects of the projects are effectively mitigated and managed. I have considered key elements of that regime, described below, when assessing the project's environmental effects.

This section describes the statutory controls and environmental governance arrangements proposed for the project and my findings in relation to these. The EES proposes an environmental management regime to be given statutory effect for elements within the mining licence through risk treatment plans within an approved work plan, and via conditions attached to a development licence approval for the power plant and sewage treatment plant. Works outside the mining licence area would be governed by bespoke planning controls embedded within the Swan Hill and Gannawarra planning schemes via an incorporated document.

Environmental management framework

Chapter 21 of the EES presented an environmental management framework (EMF) to demonstrate the overarching environmental management and statutory approach to managing the environmental effects of the project. The proponent outlined that the EMF was not prepared as a standalone, enforceable document. During the hearing, and in response to submissions, the proponent updated Clause 4.2.2 of the Day 3 version of the incorporated document to tie the management plans required in the incorporated document to be generally consistent with the EMF and noted that similar conditions could be included on the mining licence or as a condition of approval of the work plan for mining activities. EPA submitted alternative methods for giving statutory weight to the EMF during the hearing including making compliance with the EMF a condition of the incorporated document.

The IAC was satisfied that the EMF would provide an appropriate framework for the environmental management and performance of the design, construction and operation of the project and noted that the proponent responded to submissions and evidence presented during the hearing, to edit and improve the EMF significantly since it was exhibited. The IAC responded to the proponent's Day 3 version of the incorporated document, as well as EPA's submission recommending that clause 4.2.2 of the incorporated document require plans (to be prepared under the incorporated document) to address and "be consistent" with the EMF. The IAC asserted that this clause should refer to the EMF rather than solely the mitigation measure and monitoring plan tables within the EMF to ensure that all relevant elements of the EMF are considered in the preparation of these plans.

I support the recommendation of the IAC and note the submission from the EPA about the alternative approach for giving statutory weight to the EMF. It is my assessment that this represents an approach that is commensurate with the level of environmental risk associated with the proposed works outside of the MLA. However, for a final EMF to be referenced by the relevant decision-makers, there needs to be a final endorsed version of the document made available to those decision-makers.

It is for this reason that I recommend that a condition be included in the Incorporated Document for a final version of the EMF to be submitted and endorsed by me. This endorsed EMF should be made available on the proponent's website for decision makers to refer to when considering their approvals for the project. I concur with the IAC that there are options available to ERR under the MRSD Act for how the EMF is reflected in conditions of the work plan and or the mining licence, and to EPA under the EP Act for how the EMF is reflected in conditions within the development licence.

The IAC made numerous recommendations for the revision of the EMF and proposed mitigation measures and monitoring requirements for the project. These are addressed further in sections 5 and 6 of my assessment.

Requirements for the mining licence area

As outlined in section 3.2, the project requires a mining licence and an approved workplan (or equivalent under the new duty-based system) under the MRSD Act. The mitigation measures that form part of the EMF that relate to the mining licence area to be given statutory weight through the work plan, including various risk treatment plans, and mining licence or equivalent approval documents should the new MRSD Act duty-based system apply to this project.

A draft work plan (Attachment I) and draft rehabilitation plan (Technical Report P) were exhibited with the EES. The IAC noted some submissions were critical of the lack of detail provided in the draft work plan and rehabilitation plan. However, the proponent advised that these plans were prepared as drafts to inform the EES process. They were intended to provide a basis for recommendations in respect of the appropriate management and mitigation measures to inform the final work plan submitted under the MRSD Act for approval. The IAC noted broadly the updates that would be required to the draft work plan and made recommendations for changes to the EMF to clarify its role and outline the revisions and additional material required. I support these recommendations.

The project also requires a development licence under the EP Act to operate and regulate discharges from the power plant and sewage treatment plant. The mitigation measures that form part of the EMF that relate to the management of these facilities will be given statutory weight through conditions of the development licence. A development licence application (Attachment II) was exhibited with the EES. The IAC did not make any specific findings or recommendations about the development licence for sewage treatment. As discussed further in section 5.7 of my assessment, the IAC made recommendations for further modelling to account for changes to the physical dimensions of the power plant (i.e. increased stack height) and/or the use of alternative fuels or emission control devices to reduce the concentration of emissions off-site. I support the recommendations of the IAC for this additional work to refine the modelling and inform EPA's consideration of the development licence application.

The project will require an A18 permit under the EP Act for the discharge or depositing of waste to an aquifer (e.g. for deposition of tailings material within the mine pit). Potential effects to groundwater are discussed further in section 5.2. The IAC recommended the proponent engage an environmental auditor experienced in groundwater assessment, to review the available data and assist in guiding the further information required to inform the development of the A18 permit which would be required prior to commencing operations. I support this recommendation, noting that while further information is required to inform the consideration of an A18 permit, I have adequate information before me to consider the significance and acceptability of the environmental effects of the project on groundwater.

Permits under the FFG Act will also be required to remove any protected or listed species under the MLA. My recommendations for further biodiversity work within the MLA should be used to inform these applications, except where indicated in this assessment.

Planning controls outside the mining licence area

An amendment to the Swan Hill and Gannawarra planning schemes is proposed to facilitate the project outside of the MLA, using an incorporated document to provide bespoke statutory planning controls for infrastructure and works associated with the pipeline, road and intersection upgrades.

A draft PSA (Amendment GC218) was prepared by the proponent in consultation with the relevant agencies and included with the exhibited EES (Attachment III). The proposed amendment would introduce an incorporated document through a schedule to a specific controls overlay (SCO). The SCO would apply to works on land outside of the MLA to facilitate the development of the proposed pump station, water pipeline and road and intersection upgrades, without the need for planning permits to be sought. The councils are proposed to be the responsible authorities under the draft PSA.

The IAC was appointed as both an inquiry under the Environment Effects Act to assess the environmental effects of the project and as an advisory committee under the Planning and Environment Act to provide me with advice as to the content and structure of the proposed amendment.

This assessment will form part of the consideration of the amendment, at a later stage, when the proponent submits the final form of the PSA for formal consideration and decision-making under the Planning and Environment Act. The IAC has made recommendations on the draft PSA. I have considered those recommendations in the context of this assessment of the environmental effects of the proposed project, and the manner in which those environmental effects should be managed.

To account for the potential use of the water supply option A2, the IAC recommended that the SCO schedule 4 mapping be extended over the water supply pipeline option A2 in order to give the proponent flexibility in which pipeline option they proceed with, so that potential impacts to the critically endangered Natural Grasslands of the Murray Valley Plain are avoided. I agree with the IAC that impacts to this community along the pipeline need to be avoided. However, I note that the proponent prefers the water supply pipeline option A3 and notes that there is potential to avoid impacts through alternative construction methods. I have recommended in section 5.1 of my assessment that the proponent prepare a design management document to the satisfaction of the Secretary of DEECA, prior to my consideration of the PSA, to demonstrate how they will avoid and minimise impacts to native vegetation for project components outside of the MLA. It is my recommendation that instead, the SCO mapping be revised following the endorsement of the design management document to account for any revisions to the project component areas that arise out of that process. To ensure this occurs I recommend that the Incorporated Document include a clause that requires an approved design management document to have been prepared to the satisfaction of DEECA.

The IAC found that the use of the SCO and incorporated document are an appropriate use of the Victorian Planning provisions and the draft PSA including the recommended changes to the incorporated document and revised mapping, would appropriately facilitate the development and implementation of project infrastructure outside of the MLA. I support

the findings and recommendations of the IAC, accounting for my additional recommendations contained within this assessment.

Further investigations

While I am satisfied that the environmental effects of the project have been adequately identified and assessed through the EES, IAC report and documents tabled at the hearing, there are residual uncertainties for specific matters. The IAC made recommendations for further biodiversity survey work which I have refined through my assessment and in some instances, recommended additional biodiversity surveys. The IAC has also made recommendations for collection of additional data and/or modelling for groundwater, air quality and radiation to support approvals processes and the adaptive management of potential effects during the implementation of the project.

I am satisfied that these further surveys/ investigations are not needed to inform this assessment under the Environment Effects Act on the acceptability of the project's environmental effects as outlined in section 5 of this assessment. However, they should inform relevant approvals and refine mitigations and secondary consents required for the project and the ongoing adaptive management of the project to ensure that the effects of the project are minimised during project implementation.

In concur with the IAC that this further work and surveys will help ensure the environmental performance of the project is improved and sound, including to refine particular mitigation measures and controls. They are not necessary to establish acceptability of effects and whether the project should proceed.

Independent technical review

In its submission, the EPA noted an independent technical reviewer (or auditor) could be appointed for the project to review detailed design documents for the project and to monitor and audit compliance with statutory approvals. The proponent did not support this approach and noted the auditing requirements that were already outlined in the EMF within the EES. The IAC found that the auditing requirements outlined within the EMF and the subsequent approvals processes required for the project negate the need for an independent technical reviewer.

I agree with the findings of the IAC and note that much of the additional information required is to support further detail that will be required to inform various approvals processes. For the residual uncertainties for some aspects of biodiversity, there is a clear framework outlined through the recommendations of the IAC and this assessment for how this information is to be collected and scrutinised prior to consideration of final approvals for the project.

4.3. Consideration of project alternatives

As set out in the scoping requirements and the EES procedures and requirements issued by the Minister under the Environment Effects Act, this EES was required to describe and assess effects of project alternatives. This needed to include comparative assessment of environmental effects of relevant feasible alternatives, as well as explain why the preferred alternative was selected.

Chapter 4 of the EES discussed project alternatives considered for the mine site development, mining and processing methods and tailings management, transport and haulage, waste management, power and water supply, rehabilitation and closure and workforce accommodation. It also included discussion of the implications of the project not proceeding.

The key project alternative discussed by the IAC related to the different water supply pipeline options (A2 and A3) largely with regard to the extent of removal required of listed threatened vegetation communities. The IAC found that either of these alternatives may provide a suitable alignment, so long as impacts to Natural Grasslands of the Murray Valley Plains threatened ecological community could be avoided. As outlined in section 5.1 of my assessment, this finding is supported with specific recommendations for how further work is conducted to determine which alternative is ultimately put forward for the project.

Section 5 of my assessment focuses on the preferred project as presented in the EES.

Potential for expansion of the project

The initial project referred under the Environment Effects Act included five potential areas of mineralisation suitable for development (Mining Areas 1- 5). The EES noted that VHM was unaware that historical exploration data was not optimal in all of these areas nor had they considered in detail, at the time, land access requirements, impacts to native vegetation or the scale and viability of the broader area.

The EES noted that the project development went through a subsequent refinement process that broadly considered the environmental effects of the other mining areas and the state of knowledge about the viability of the different mining areas and ultimately decided to proceed with Mining Areas 1 and 3 as proposed within the EES.

The IAC heard submissions that were concerned about the potential of the project to expand into other areas within the retention licence area or adjacent exploration licence areas held by VHM. The IAC noted the concerns of submitters but found that they could only consider the project as proposed in the EES, noting that future expansions of the project, should it proceed, would require further approvals, and likely referral under the Environment Effects Act.

I note the *Ministerial Guidelines for Assessment of Environmental Effects* outline that a project should be considered in its entirety wherever possible, including ancillary works or later project stages essential to the project's operation. It is not uncommon in mining projects for other areas of mineralisation to occur in nearby areas that may be able to support future development depending on the market conditions and the outcomes of investigations to determine whether extraction of those resources is feasible. I note in this case that the consideration of other areas of mineralisation within the retention licence area and exploration licence areas are not essential for the project's operation. The assessment has examined the stand-alone project put forward within the EES, which has a project life of 20-25 years.

I agree with the IAC that potential future expansion of the project would require approvals and potentially referral and assessment under the Environment Effects Act.

5. Assessment of environmental effects

It is my assessment that, on balance, the environmental effects of the project have been properly identified and carefully considered in the EES and IAC processes. Having reviewed the IAC report, EES submissions and documents tabled through the public hearings it is my assessment that the project can meet the EES evaluation objectives, and have acceptable environmental effects, subject to project refinements recommended in this assessment and implementation of the mitigation measures endorsed by the IAC and refined through my assessment.

My finding on the environmental acceptability of the project is based on changes to the proposed mitigation measures and avoidance, as outlined in section 5.1 of this assessment, which will need to be informed by the completion of further survey work for some specific threatened flora and fauna species and communities. This includes confirming avoidance of some specific biodiversity values in the MLA, along the water supply pipeline and potential haul road and intersection upgrades. I also recommend that the proponent develop a design management document to demonstrate how the siting and design of infrastructure and construction works outside of the MLA meet the amended mitigation measures, and continue to demonstrate the avoidance and minimisation principles applied by the project to ensure acceptable environmental outcomes are achieved.

There will be a temporary change in land use from agriculture to mining, progressively across the MLA which has the potential to give rise to different environmental effects. I consider that on balance, the implementation of the mitigation measures as set out in Appendix A of my assessment, provide a sound framework for managing these effects.

The IAC made several findings and recommendation in relation to the project and its effects. My response to the IAC's findings and recommendation, along with my assessment of the environmental effects of the project are detailed in the sections below.

Section 6 of my assessment provides my main conclusions and recommendations about the environmental effects of the project and responds to the IAC's key recommendations. Appendix A summarises my recommendation for the EMMs. My findings in relation to MNES are provided in Appendix B of this assessment.

5.1. Biodiversity

Evaluation objective

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.

Assessment context

Biodiversity effects are addressed in technical reports A and A1 (Native Vegetation and Flora Assessment and Addendum Flora Ecology), B (Vertebrate Fauna) and Chapter 7 (Terrestrial and Aquatic Ecology) and Chapter 20 (MNES) of the EES. The IAC addressed potential effects to flora and fauna in Chapters 3 and 4 of their report respectively.

A number of potential impacts of the projects for terrestrial biodiversity values were examined through the EES and IAC process, in particular:

- loss or degradation of native vegetation and/or habitat for terrestrial fauna and flora species, due to clearance of significant amounts of native vegetation;
- direct and indirect impacts on threatened communities and species listed under the EPBC Act and FFG Act, including potential disturbance effects from construction activity and project operations (e.g. noise and light emissions, habitat fragmentation, loss of connectivity, fauna entrapment, impingement, and collision with vehicles);
- disturbance effects from changes in hydrology (including surface and groundwater changes), water quality, contaminants and pollutants, and environmental weeds; and
- adverse effects on the ecological character and biodiversity values of the Kangaroo Lake Ramsar site.

Discussion

Native Vegetation

Mining Licence Area, Road and Intersection Upgrades

The EES outlined the proponent's approach to avoiding and minimising effects on native vegetation within the MLA. The EES described that about 4.1 ha (and 11 scattered trees) and 2.7 ha[1] (and 40 scattered trees) of native vegetation would need to be removed in Mining Areas 1 and 3 respectively. The IAC accepted that the proponent had appropriately avoided and minimised impacts to native vegetation within the MLA and noting that the proponent was retaining patches of native vegetation totalling approximately 14 ha in Mine Area 1 and 21.8 ha in Mine Area 3. I support the IAC's findings that the project has appropriately avoided and minimised native vegetation removal within the MLA and find that the impacts of the project on native vegetation within the MLA can be acceptably managed in accordance with the recommendations of the IAC and accounting for the recommendations of my assessment.

The IAC noted the exception to this was the roadside reserves, where some roads within the MLA may require upgrades and encroachment into areas of native vegetation along roadside reserves that had not been assessed as requiring removal within the proponent's EES.

The EES found that 0.28 ha of native vegetation removal was expected to be required for the widening of up to eight intersections along the transport route, however this did not account for potential road upgrades / widening that may be required for mine vehicle and haulage movements which required further consultation with road authorities to confirm the exact requirements.

The IAC heard submissions from Swan Hill Rural City Council in particular on concerns that native vegetation removal had not been assessed for road upgrades. The value of roadside vegetation was emphasised by both Swan Hill Rural City Council and Gannawarra Shire Council as last remnants of native vegetation in the vicinity of the project area and providing connectivity between larger patches of vegetation and habitat and so are important for the movement of fauna.

The proponent's traffic expert, Mr Warfe, provided evidence at the hearing that the EES considered the need to upgrade and seal all site access roads as preferred operational access to the site had not been confirmed at that time[2]. The evidence described noted that Bennett's Road was the proponent's preferred primary site access and would need to be upgraded and sealed. Mr Warfe's evidence also noted the potential requirement for upgrades to Bish, Jobling and Shepherds Roads to support alternative site access movements or as local temporary traffic diversion routes[3]. The proponent submitted in closing at the hearing that road upgrades are not expected to be required for Bish and Jobling Roads for the movement of mine vehicles between the two mining areas[4]. The IAC was concerned about the opportunity to consider further opportunities for avoidance and minimisation through the MLA for potential upgrades to roads and the opportunity for these to be located instead on cleared agricultural land within the MLA. The proponent's expert witness agreed that it would be a shame if the opportunity for consideration of other alternatives were lost to consider the avoidance and minimisation of native vegetation clearance within the MLA associated with the upgrades of Bennett, Bish, Jobling and Sheperd Roads.

The IAC made recommendations for a new mitigation measure (MM-BD07) that prior to detail design of the project, the proponent should investigate, in consultation with the relevant road authorities, feasible road haulage options or alternative road alignments, such as the potential use of adjacent cleared land within the MLA, that will avoid and minimise impacts to remnant roadside vegetation and fauna habitat.

I support the IAC's recommendations however consider that different treatments are needed for the potential upgrades required within the MLA compared with those required outside of the MLA, where planning approval through the proposed PSA would be required. For the areas outside of the MLA, I support the proposed recommendation of the IAC. However, it is my recommendation that this work is completed within a design management document prior to my consideration of the proposed PSA, as the avoidance and minimisation of impacts to native vegetation needs to be sufficient, in accordance with state policy, as part of the planning process for those components of the project outside of the MLA.

[1] Reported native vegetation removal extents excluded area of removal associated with scattered trees.

[2] Tabled Document 121.

[3] Tabled Document 121.

[4] Tabled Document 264.

It is my recommendation that for road upgrades required within the MLA that the proponent undertake the work outlined in MM-BD-07, and in support of the MRSD Act work plan documentation and the approvals required under the FFG Act, investigate opportunities to further minimise impacts to roadside vegetation, including siting of the roads within cleared areas of agricultural land. It is my recommendation that the assessments within the MLA must be completed to inform the final work plan submitted for approval, and that appropriate offsets would need to be identified to account for any changes in native vegetation removal.

I note the proponent's closing submission identified that they did not believe upgrades for Bish and Jobling Roads were required as there would not need to be any mining vehicle movements between the two mining areas. As this is the proponent's position, it is my recommendation that for road upgrades for the purposes of intra-site vehicle movements within the MLA, native vegetation removal along Bish and Jobling Roads should be avoided.

In response to submissions by Swan Hill Rural City Council and evidence provided by the proponent's expert Dr Callister, the IAC made recommended changes to the wording of mitigation measures MM-BD01 and MM-BD02 respectively that micro-siting and revegetation should apply to any works in road reserves and for an arborist survey be undertaken to support swept path design and construction techniques for the intersection upgrades. I support the intent of these mitigation measures. It is my recommendation that this design and survey work is completed as part of the design and management document, recommended in this assessment, and for it to be completed prior to my consideration of the proposed PSA, to enable me to understand how final design has fully addressed the avoid and minimise principles.

The IAC noted that revegetation should not replace the requirement to avoid, minimise and offset native vegetation removal, rather that revegetation of native vegetation along the roadsides should be encouraged. The IAC therefore recommended a new mitigation measure MM-BD06 to capture the revegetation measures put forward by the proponent's witness, Dr Callister, within the MLA and the pipeline route. I support the inclusion of this mitigation measure. It is my recommendation that this mitigation measure is strengthened to require a revegetation plan be developed prior to support the work plan and the environmental management plan required for works outside of the MLA. The revegetation plan should include details on the feasibility, cost and specifics of the proposed extent of revegetation works and key actions associated with the proposed progressive rehabilitation. This plan should be developed in consultation with relevant stakeholders (e.g. DEECA and ERR) and landholders. The revegetation plan should also outline key agreements and commitments, along with the required monitoring and adaptive management measures to be implemented if the plan does not achieve its objectives within set timeframes.

Pipeline Route

The EES presented three alternative alignments (A1, A2 and A3) for the underground water pipeline route connecting the MLA with Kangaroo Lake. The initial pipeline route A1 was assessed as needing to remove up to 1,844 trees, the two alternative pipeline routes (A2 and A3) were both assessed within the EES as needing to remove up to 61 trees. Option A3 was identified as the proponent's preferred alignment for the water pipeline given that no trees would be lost from construction of the pipeline route along Lookout and Teagues Road and after consideration of impacts associated with other constraints such as waterways and channels along the alignments.

The pipeline is proposed to be constructed beneath the trafficked roadway, rather than in the roadside reserves, to minimise effects to native vegetation within the road reserve. The pipeline was assessed as being constructed within a one metre wide trench, in the centre of the road. The EES noted that trenchless construction may need to be investigated for a number of crossings including the Swan Hill railway line at Mystic Park, the Avoca siphon channel crossing, and channel crossings along Mystic Park-Beauchamp road.

The results of further surveys (commissioned by the proponent after the EES exhibition) were provided during the public hearing through Dr Callister's evidence. The further surveys were undertaken to assess habitat zones for which the proponent had previously relied on modelled condition scores from DEECA. As a result, areas of the EPBC Act listed Natural Grasslands of the Murray Valley Plain community (critically endangered) were identified for removal along pipeline option A3 on Lookout Road. The effect of the removal of these patches of the grasslands community was considered to represent a significant impact under the EPBC Act. Dr Callister preferred option A2 for the pipeline route on the basis that impacts to this community would be avoided. The proponent noted that the effects of the two pipeline options were comparable, as long as impacts to the grasslands community could be avoided along rout A3 via alternative construction methods and sought to retain flexibility in the delivery of the pipeline via alignment within either options A2 or A3. The IAC agreed and found that the effects of the pipeline route on native vegetation would be acceptable if impacts to the EPBC Act listed Natural Grasslands of the Murray Valley Plains community were avoided.

I agree with the IAC that flexibility in the delivery of the pipeline via either option A2 or A3 is appropriate, providing impacts can indeed be avoided as discussed with the IAC. The exact approach to avoidance and minimisation of these impacts on native vegetation and the EPBC Act listed Natural Grasslands of the Murray Valley Plain community in particular, can be worked through via the design management document recommended by my assessment, in the context of the recommended survey work to address residual uncertainties about the extent of significant biodiversity values that need to be avoided. This could include consideration of directional drilling and other construction methods and micro-alignments. The accommodation of both pipeline options within the Incorporated Document is addressed further in the land use and planning section of my assessment (Section 5.4).

Listed Flora Communities and Species

The EES proposed the removal of up to 14.36 ha of native vegetation which included up to 11.37 ha of the EPBC Act listed community Plains Mallee Box Woodland and the removal of a number of listed species under the *Flora and Fauna Guarantee Act 1988*, see Table 2. The Plains Mallee Box Woodland community was listed after the Goschen project was declared a controlled action, so impacts to this listed community are not required to be approved or offset under the EPBC Act for this particular action. The IAC heard submissions that it would be best practice for the proponent to rehabilitate or offset areas of removal for the listed Plains Mallee Box Woodlands community. The IAC considered that this would represent best practice and that the proponent should make further inquiries about how impacts to this listed community can be further mitigated through seeking offsets and / or rehabilitating areas that are impacted. I encourage the proponent to make and follow through on such enquiries around offsetting. However I acknowledge that there is no statutory basis to require this, and support the IAC's proposed mitigation measure about native vegetation revegetation, accounted for in my earlier recommendation.

The EPBC Act listed Buloke Woodlands of the Riverina and Murray Darling Depression Bioregions, and associated FFG Act listed Semi-arid Shrubby Pine-Buloke Woodlands Community, were identified in the study area but the project has avoided impacts to these listed communities. I note the commitment within the EES to avoid impacts to this community and recommend MM-BD08 is updated to demonstrate that direct and indirect impacts to this community can be avoided, to the satisfaction of DCCEEW.

Two EPBC Act listed communities (Plains Mallee Box Woodland of the Murray Darling Depression and Riverina Bioregions and Mallee Bird Community of Murray Darling Depression Bioregion) were identified as potentially occurring within the project area. These communities were listed after controlled action decision for the project, and as such formal assessment and approval of impacts to these species are not required under the EPBC Act for this action. However, the proponent's EES has considered impacts to particular listed species and ecological vegetation classes that form part of these communities, and considered avoid and minimise approaches that apply to these areas. The further work recommended through the IAC and my assessment to address residual uncertainties and improve avoidance of biodiversity effects, will assist in further minimising impacts to these EPBC listed communities.

After exhibition of the EES the further surveys commissioned by the proponent identified areas of the EPBC listed Natural Grasslands of the Murray Valley Plains within the alignment of pipeline route option A3. The extent of potential removal was considered to represent a significant impact on the listed community. As discussed earlier, the proponent proposes to avoid the impact via using pipeline route option A2 or by using alternative construction methods to avoid impacts to the listed communities.

There is also potential for further impacts to native vegetation and listed flora species through the potential requirement to upgrade roads along roadsides. Dr Callister acknowledged that further surveys for the EPBC listed Natural Grasslands of the Murray Valley Plains should be undertaken on intersections where upgrades are required and the community has the potential to occur. I support this recommendation from the IAC and consider that these surveys and demonstration of avoidance and mitigation of any further values that may be identified by DEECA should be undertaken as part of the design management document that should be prepared to the satisfaction of DEECA and DCCEEW to demonstrate how impacts to this community are avoided.

I note that the Conservation Advice for the Natural Grasslands of the Murray Valley Plains[5] recommends a buffer zone of at least 30 m be maintained from the outer edge of a remnant patch of the ecological community. A smaller buffer between the edge of disturbance may be justifiable, however given the uncertainty of the presence / absence of the vegetation community in certain areas of the project, it is my recommendation that the new mitigation measure including a

[5] Department of Sustainability, Environment, Water, Population and Communities (2012) Natural Grasslands of the Murray Valley Plains Conservation Advice.

requirement to ensure that there is an adequate buffer to protect the grasslands community from direct and indirect impacts associated with works to the satisfaction of DEECA and DCCEEW (should the proposed buffer be less than 30 m).

A number of flora species were identified within the project area and are proposed to be removed as part of the project. The EES identified the potential removal of the species outlined in Table 2 of this assessment, the assessment was considered to be a worst-case scenario as it considers all species within the construction footprint to be lost and the trees along the pipeline routes, which would have their tree protection zones impacted, to remain in-situ. During the hearings, results of the additional surveys commissioned by the proponent were presented and a further 55 individuals of the FFG listed Small burr-grass (*Tragus australianus*) were identified in areas of native vegetation proposed to be removed. I acknowledge that further requirements for limited removal of some listed species may be assessed as needing removal, in particular for the road upgrades required for the project. I am satisfied that the recommended further assessment to resolve residual uncertainties and work that will need to be undertaken to the satisfaction of DEECA, sets out an appropriate process, to ensure that the avoidance, minimisation and offsetting of likely impacts to listed flora species would ensure an acceptable environmental outcome.

The EES presented an offset strategy for the project and identified that offsets are available for the native vegetation to be removed for the project, acknowledging that offsets are not required for the EPBC listed Plains Mallee Box Woodlands community and that impacts to the EPBC listed Natural Grasslands of the Murray Valley Plains are proposed to be avoided. I acknowledge that the offsets required for the project will need to be updated to reflect the outcomes of further survey work and assessment of native vegetation removal requirements for the project elements that had not been finalised at the time the EES was exhibited, e.g. road upgrades.

Table 2. Project's proposed extent of removal of native vegetation, adapted from Table 3 of the IAC's report.

Aspect	EES	Callister Evidence Document D28	Final Assessment D223
Project's Impacts			
Large trees (total)	568	671 A3 or A2	684
Native vegetation (ha)	14.36	16.409 A3 or 14.720 A2	16.296 A3
Project's Impacts Threatened species and communities			
EPBC listed Plains Mallee Box Woodland (ha)	11.37	6.993 A3	9.566 A3
EPBC listed Natural Grasslands community (ha)		1.689 A3	
FFG listed flora species (no. of individuals)	Bush Minuria *Minuria cunninghamii* (FFG: Vulnerable)(18)	As per EES, plus Small burr-grass *Tragus australianus* (FFG: Vulnerable) (55)	Unchanged
	Dwarf myall *Acacia ancistrophylla* var. *lissophylla* (FFG: Endangered) (1)		
	Fragrant saltbush *Rhagodia parabolica* (FFG: Vulnerable) (11)		
	Frosted goosefoot *Chenopodium desertorum* subsp. *desertorum* (FFG: Endangered) (54)		
	Umbrella wattle *Acacia oswaldii* (FFG: Critically Endangered) (353)		
	Yarran *Acacia melvillei* (FFG: Critically Endangered) (17)		

Notes: GHU: Greater Habitat Units, A2: for project with pipeline option A2; A3: for project as exhibited with pipeline option A3; where no option is specified impacts are for A3.

Yarran

The EES noted that Yarran, listed as Critically Endangered under the FFG Act, was known to occur within the project area, predominately within roadside vegetation in Bennett Road and Thompson Road. The EES considered removal of

17 individuals was unlikely to result in a significant impact to the species, however noted that the impacts to Yarran and other FFG listed species in the roadsides should be avoided where possible, and the listed species should be used in rehabilitation and revegetation processes for the project.

The threatened species assessment for Yarran[6] noted that the habitat for the species has been extensively cleared and developed for agriculture and is estimated to experience a population reduction of 90-100% within the next 100 years. The threatened species assessment further notes that there is an estimated 120 to 250 mature individuals remaining.

Based on these figures, I consider the removal of 17 individuals to be a significant impact to the species. I note that the EES stated that impacts to Yarran, and also Bush Minuria, are to be avoided where possible. In line with the EES, it is my recommendation that the mitigation measures requiring the preparation of a design management document for areas outside the MLA and the further assessment of opportunities to avoid potential impacts to roadside vegetation within the MLA should include a focus on further avoidance of potential impacts to Yarran and Bush Minuria. For example, the siting of upgraded roads on cleared agricultural land and use of alternative pipeline construction techniques will be enable reduction in impacts to these species.

Umbrella Wattle

The EES noted that Umbrella Wattle, listed as Critically Endangered under the FFG Act, was known to occur within the project area, predominately within roadside vegetation in Bennett Road and Thompson Road. The EES considered removal of 353 individuals was unlikely to result in a significant impact to the species, noting that the species is locally common and impacts are not likely to impact the persistence of local population. Further, the EES noted that impacts under the proposed project will affect less than 1% of the local population but considered that the species should be used in rehabilitation and revegetation processes for the project.

The EES does not provide clear evidence on the number of Umbrella Wattle in the local area, to definitively support the claim that the project will impact less than 1% of the local population. This species is Critically Endangered, and there is little guidance on the known population of Umbrella Wattle within Victoria, with the threatened species assessment for Umbrella Wattle inferring a population of mature individuals of between 2,000 and 40,000[7]. Therefore, there is the possibility that the removal of 353 individuals would result in a significant impact to the species.

Given the potential for the loss of up to 353 Umbrella Wattle species and the potential for this to represent a significant impact on a critically endangered FFG species, it is my recommendation that the mitigation measures require a focus on further avoidance of potential impacts to Umbrella Wattle. This should be incorporated into the preparation of the design management document for areas outside the MLA, and the further assessment of opportunities to avoid potential impacts to roadside vegetation within the MLA. For example, avoidance of clearing some of this species can be achieved through siting of some upgraded roads on cleared agricultural land and through the use of alternative pipeline construction techniques.

I consider the impacts to threatened flora from the project will be significant. However, I consider that these impacts will be acceptable, subject to the effective implementation of the relevant mitigation measures (including MM-BD07) and refinements to the project footprint ensuring further avoidance and minimisations through the design management process.

Listed Fauna and Habitat

The EES set out the targeted surveys were conducted for Corben's Long-eared Bat[8] and Plains-wanderer, while surveys were undertaken to detect presence of threatened and non-threatened birds, reptiles and mammals. The EES recorded the presence of a number of threatened species within the project area (Table 3). The EES noted limitations of some of the EES surveys efforts, including for cryptic species such as Plain-wanderer, and that the absence of detection during surveys should not be assumed to be absence from the local landscape.

The EES found that the project would result in some habitat loss including the availability of nesting, hollows and foraging resources for a range of fauna species. Changes were not expected to the baseline conditions of the ecological character of Kangaroo Lake as a result of the construction and operation of the pumping station for water supply to the project. The EES concluded that the project would not impact on habitat critical to the survival of any EPBC Act or FFG listed fauna species. The EES proposed a number of mitigation measures, such as fauna salvage protocols and an approach to further avoid impacts to habitat in order to minimise impacts to fauna. The EES also proposed habitat

[6] Department of Environment, Land, Water and Planning 2021 - Threatened Species Assessment Yarran Taxon ID 500069

[7] Department of Environment, Land, Water and Planning - Threatened Species Assessment *Acacia oswaldii* Umbrella Watte. Taxon ID 500070

[8] Classified within the EES as having a low-likelihood of occurrence in the project area.

enhancement strategies such as translocation of hollow branches, woody debris and leaf litter. I support the intent outlined in MM-FE01 to create habitat enhancement to assist in minimising the project's impacts on habitat fauna. It is my recommendation that this mitigation measure is strengthened to ensure a more strategic approach to fauna enhancement that includes the development of a fauna habitat enhancement plan by a suitably qualified ecologist in consultation with DEECA ahead of the commencement of works.

I note that while fauna salvage is proposed (MM-FE01) where fauna habitat is proposed to be removed. Given the potential for species of conservation significance to be present in the project area, I recommend that pre-clearance surveys for species of conservation significance that are likely to be present in areas are undertaken by a suitably qualified ecologist, and in consultation with DEECA, for areas within the MLA and where native vegetation removal may be required for road and intersection upgrades.

Indirect effects to fauna, for example through vehicle collisions, lighting or contamination, were also considered in the EES. The EES noted that the potential for these effects could not be eliminated however proposed a number of measures such as speed limits, salvage, noise and light inhibitors to reduce and mitigate these potential effects.

A number of submitters were concerned about the potential for fauna to be attracted to and then exposed to contaminants through process water ponds. The IAC explored this through the public hearing. The proponent's expert witness proposed installing bird deterrent disks at low levels and close intervals over the process pond to reduce bird landing sites on the ponds, with monitoring and adaptive management emphasised to ensure the implemented mitigation measures are effective. The IAC supported the proponent's proposed approach and emphasised the importance of monitoring and adaptive management to ensure the effectiveness of the mitigation measures. I support the proposed mitigation measure as outlined in MM-FE03 and the IAC's recommended adaptive management clause in the monitoring condition for monitoring fauna accessing the process water pond and in pit tailings. I discuss the project's potential effects on species of particular concern in further detail below.

Table 3: EPBC and/or FFG Act listed fauna with a medium or higher likelihood of occurrence in the study area[9].

Species	Conservation Status		Likelihood of Occurrence in Project Area
	EPBC Act	FFG Act	
Birds			
Curlew Sandpiper (*Calidris ferruginea*)	Critically endangered	Critically endangered	Medium
Eastern Great Egret (*Ardea modesta*)	-	Vulnerable	Recorded
Freckled Duck (*Stictonetta naevosa*)	-	Endangered	High
Australasian Bittern (*Botaurus poiciloptilus*)	Endangered	Critically endangered	Recorded
Superb Parrot (*Polytelis swainsoni*)	Vulnerable	Endangered	Recorded
Regent Parrot (eastern) (*Polytelis anthopeplus monarchoides*)	Vulnerable	Vulnerable	Medium
Painted Honeyeater (*Grantiella picta*)	Vulnerable	Vulnerable	Medium
Australian Bustard (*Ardeotis australis*)	-	Critically endangered	Medium
Grey-crowned Babbler (*Pomastostomus temporalis temporalis*)	-	Vulnerable	Medium
Bush Stone-curlew (*Burhinus grallarius*)	-	Critically endangered	Medium
Ground Cuckoo-shrike (*Coracina maxima*)	-	Endangered	Medium

[9] Adapted from the EES Technical Report B – VHM Ltd Goschen Vertebrate Fauna Technical Report 2023

Black Falcon (*Falco subniger*)	-	Critically endangered	Recorded
Diamond Firetail (Stagonopleura guttata)	-	Vulnerable	High
Hooded Robin (*Melanodryas cucullate*)	-	Vulnerable	Medium
Reptiles			
Samphire Skink (*Morethia adelaidensis*)	-	Endangered	Medium
Hooded Scaly-foot (*Pygopus schraderi*)	-	Critically endangered	Medium
Carpet Python (*Morelia spilota metcalfei*)	-	Endangered	Medium
Eastern Bearded Dragon (*Pogona barbata*)	-	Vulnerable	Recorded
Murray River Turtle (*Emydura macquarii*)	-	Critically endangered	Likely present
Amphibians			
Growling Grass Frog (*Litoria raniformis*)	Vulnerable	Vulnerable	Medium
Fish[10]			
Southern Purple-Spotted Gudgeon (*Mogurnda adspersa*)	-	Critically endangered	Known to occur
Murray Cod (*Maccullochella peelii*)	Vulnerable	Endangered	Known to occur
Silver Perch (*Bidyanus bidyanus*)	Critically endangered	Endangered	Likely present
Murray Hardyhead (*Craterocephalus fluviatilis*)	Endangered	Critically endangered	Possibly present

My detailed assessment in relation to all relevant MNES for this project is provided in Appendix B. Threatened species under the EPBC and FFG Acts which are considered to be potentially significantly impacted by the project are also discussed below.

Superb Parrot

The EES described the project area as lacking the preferred habitat for Superb Parrot for both feeding and foraging habitat and that habitat which is considered important for the species is found in the Barmah Forest area and areas along the Murray River. In spite of this, the surveys undertaken to support the EES identified a juvenile individual within the project area. The individual was considered to be a vagrant or dispersing individual moving to more suitable habitat located outside of the project area. The EES assessed the project against the Matters of National Environmental Significance Significant Impact Guidelines and concluded that the project would not result in a significant impact on the species.

I accept the findings outlined in the EES and note that the proposed mitigation measures, as recommended by the IAC and my assessment (such as MM-BD07), will serve to further avoid and minimise potential effects to potential fauna movement corridors, ensure that pre-clearance surveys are undertaken to confirm the project's understanding of potential effects and ensure a more strategic approach to fauna habitat enhancement works undertaken by the project.

Regent Parrot

Similar to the Superb Parrot, the EES described the Regent Parrot as relying on River Red Gum forests and woodland for breeding. The project area was described as not containing suitable habitat for breeding and being beyond the reported

[10] Sourced from Technical Report B Appendix Goschen Mineral Sands and Rare Earth Project Pahe 1 Desktop Aquatic Ecology Assessment of Kangaroo Lake 2023

100 km flight distances from breeding areas for foraging. Mallee woodlands, within 20 km and ideally within 5 km of nest sites for foraging are important to support breeding parrots, as well has having treed flight corridors between breeding and foraging habitats. Relatively little is known about Regent Parrot habitat, although they are thought to remain in the Murray Darling Basin throughout the year. However, during the non-breeding season some birds will use Mallee woodlands for foraging up to 100 km from the river throughout the year.[11] Loss of flyways (e.g. vegetated roadside corridors) and clearing of Mallee woodland are identified as key threats to the species.

No public records of the species occurring within the project area were identified and the species was not recorded as being present during surveys, although individuals have been recorded about 30 km from the site. The EES concluded that the project would not result in a significant impact on the species given the lack of records, the distance of the project area from known breeding sites and the lack of contiguous roadside vegetation providing for flight corridors between breeding sites and the project area.

I accept the findings in the EES and note that the proposed mitigation measures, as recommended by the IAC and my assessment. In particular the further avoidance and minimisation of impacts to roadside vegetation, will serve to further avoid and minimise potential effects to potential Regent Parrot flyway corridors, ensure that pre-clearance surveys are undertaken to confirm the project's understanding of potential effects and ensure a more strategic approach to fauna habitat enhancement works undertaken by the project. It is my assessment that the project is unlikely to have a significant impact on the Regent Parrot, however any habitat that cannot be avoided during the further design work must be offset in accordance with Commonwealth offset requirements, should this be considered by DCCEEW to be appropriate, during the decision on whether the approve the proposed action under the EPBC Act.

Plains-wanderer

The EES outlined the surveys and the results of surveys undertaken for Plains-wanderer within the project area. The EES noted the presence of potential predators and the high density of prey sources, e.g. mice and active mice nests, for predators of the Plains-wanderer in the project area. The EES also described the agricultural practices within the project area and noted that Plains-wanderer has not been recorded in similar area where continuous cycles of cropping and soil improvement occur. Plains-wanderer were not detected in the project area during the targeted surveys, however the EES noted that for this cryptic species with low detection rates that absence of evidence is not evidence of absence. The EES concluded that the project was unlikely to have a significant impact on the Plains-wanderer.

I accept the findings outlined in the EES and note that the proposed mitigation measures, as recommended by the IAC and my assessment, will serve to further avoid and minimise potential effects to potential fauna movement corridors, ensure that pre-clearance surveys are undertaken to confirm the project's understanding of potential effects and ensure a more strategic approach to fauna habitat enhancement works undertaken by the project

Southern Purple-Spotted Gudgeon

The EES presented the results of an assessment of the likely presence of Southern Purple-Spotted Gudgeon in Kangaroo Lake concluding that while the species is known to occur in Kangaroo Lake it preferentially likely to occur in areas with denser and more complex aquatic flora than the area of the proposed pump station in Kangaroo Lake. The EES made a number of recommendations including that targeted surveys be undertaken in the vicinity of the proposed pump station to determine whether they utilise the area.

The proponent produced the results of the targeted surveys for Southern Purple-Spotted Gudgeon during the public hearings[12]. Southern Purple-Spotted Gudgeon were not detected during the surveys, although the listed Murray Cod species, which is stocked by the Victorian Fisheries Authority in Kangaroo Lake, was recorded. The proponent updated the proposed monitoring and contingency measures during the hearing to accommodate the potential outcome that should the pump inlet fish screens prove inadequate for excluding larvae, that water offtake would be avoided during periods were fish larvae were likely to be present.

The IAC accepted the proponent's conclusions that the project is unlikely to have a significant impact on aquatic fauna. The IAC considered that the mitigation measures MM-FE02, MM-FE04 and MM-FE05 be revised to reflect the relevant recommendations that were included in Appendix F of the EES Technical Report B which relate to specific recommendations about the design of a fish screen for the pump inlet and the presence and availability of a suitably qualified ecologist to respond to aquatic fauna salvage during vegetation clearing / earthworks in the water and

[11] National Recovery Plan for the Regent Parrot (eastern subspecies) *Polytelis anthopeplus monarchoides*

[12] Tabled Document 197

construction of the pump station. I support the IAC recommendation and consider that impacts to aquatic fauna as a result of the project are likely to be acceptable with the implementation of these measures.

Ramsar Wetlands

The EES concluded that the construction of a pumping station and water extraction from Kangaroo Lake would not constitute a significant impact on the ecological character of Kangaroo Lake, which is part of the Kerang Ramsar wetlands. The EES set out that Kangaroo Lake is an artificial lake system, managed by Goulburn Murray Water who are responsible for maintaining lake levels for water supply in the region and to maintain environmental values. The EES proposed a number of measures during construction and operations to minimise effects to water quality and then the potential take of fish larvae, including appropriate screening and monitoring of the pump intake screens. The EES also explored hydrological connection between the project area and the Kerang Lakes Ramsar sites and concluded that there was no connection between the MLA and the Kerang Lakes Ramsar site.

I accept the findings of the IAC that it is unlikely the project would have a significant impact on the Kerang Lakes Ramsar site given the lack of connection between the MLA and the Kerang Lakes system and that Goulburn Murray Water are and will continue to be responsible for artificially managing the conditions within Kangaroo Lake, including to maintain lake levels such that they are protective of environmental values. The impacts associated with the construction and operation of the pump station within Kangaroo Lake would be acceptable if managed in accordance with the mitigation measures presented in the EES and adapted through the IAC hearing and my assessment.

Assessment

It is my assessment that the project's effects on the biodiversity values of the area are likely to be acceptable, subject to the project refinements and implementation of mitigation measures, consistent with the recommendations of the IAC and my assessment. This includes further work to address residual uncertainties to help ensure avoidance and mitigation presented in the EES are effective. Key recommendations of my assessment include:

- The proponent prepare a design management document to assess the impacts of the project on native vegetation, listed communities, flora and fauna values and investigate further opportunities to avoid and minimise the effects of the project along the pipeline alignment and road and intersection upgrades outside of the MLA to the satisfaction of DEECA and prior to my consideration of the PSA.
- The project should avoid impacts to the EPBC listed Natural Grasslands of the Murray Valley Plains, further surveys to the satisfaction of DEECA and DCCEEW should be undertaken to confirm how the project can avoid impacts to this community where the community occurs.
- Minor changes to the IAC's proposed mitigation measure MM-BD07 to ensure that these measures capture opportunities to avoid and minimise impacts to Umbrella Wattle, Yarram and Bush Minuria within the MLA.
- Minor changes to the IAC's proposed mitigation measure MM-BD06 to strengthen the approach to employ a more strategic approach to native vegetation revegetation.
- Minor changes to MM-FE01 to require pre-clearance surveys for species of conservation significance that are likely to occur within potential habitat within the project area and that fauna enhancement proposed in MM-FE01 should be developed in consultation with DEECA.

5.2. Groundwater

Evaluation objective

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.

Assessment context

Groundwater effects are addressed in Chapter 14 and Technical Appendix I of the EES and in Chapter 11 of the IAC Report. The proponent and their experts submitted additional information through the IAC hearings, including two technical notes relating to groundwater[13] in response to IAC queries. The proponent's expert witness for groundwater, Dr Fawcett, tabled new information related to geochemical characterisation of mine tailings[14] during the IAC hearing. Several submitters raised concerns about groundwater mounding, groundwater quality, tailings geochemistry and

[13] Tabled Documents 95 and 145

[14] Tabled Document 27

contamination. VHM has proposed five mitigation measures to deal with groundwater effects and three have been the subject of recommendations by the IAC.

A number of potential effects of the project for groundwater values were examined through the EES and IAC hearing, in particular the:

- impacts and management of groundwater mounding resulting from tailings seepage;
- impacts to groundwater quality (and use) as a result of seepage from tailings and or process water; and
- impacts to groundwater dependent ecosystems as a result of changes to groundwater levels and / or quality.

Discussion

The EES noted that all construction activities associated with the project are above the groundwater table and that potential effects to groundwater associated with this phase of the project were not identified. The IAC did not discuss potential effects to groundwater associated with construction. Mitigations measures have been proposed through the EES addressing the storage and handling of hazardous materials and management of spills, which would be protective of groundwater quality and minimise potential impacts during the construction phase.

It is my assessment that groundwater effects associated with construction would be acceptable if the project is implemented in accordance with the EMF and the mitigation measures recommended in my assessment.

Groundwater Mounding

The EES presented the results of predictive modelling of groundwater levels during the operation of the project, which indicated that groundwater mounding, as a result of the back-fill of partially saturated tailings material within the mine void, would reach a maximum of about 22 m above existing groundwater levels at year 8 of mining and remain elevated over the proposed life of the mine. The EES predicted that groundwater levels would gradually decline post-mining as the groundwater spread laterally through the aquifer. The EES noted that predicted seepage rates from tailings material and therefore predicted groundwater mounding levels, was likely to be conservative as it assumed no seepage interception and dewatering would occur.

The EES characterised the groundwater from the aquifer as highly saline and did not identify any users of groundwater within 10 km of the MLA. No groundwater dependent ecosystems (GDEs) were identified within the project area or within 10 km of the project area. The EES did note the presence of smaller wetland features closer to the project area, however the depth to groundwater was expected to be greater than 10 m below ground level in these areas and the groundwater highly saline.

The IAC considered additional material about seepage rates and groundwater mounding in particular from the proponent, MFMF and submissions from the EPA. The IAC largely accepted the evidence of Dr Macumber about the regional aquifer system and likely higher hydraulic conductivity of the Loxton Parilla sands aquifer. The IAC noted that Dr Fawcett agreed at the groundwater conclave that higher regional conductivity is possible which would lead to a lower groundwater mound and faster transport of the groundwater plume and noted that the predicted seepage rates and groundwater mounding are conservative.

EPA submitted that further baseline characterisation of groundwater properties was required to input and provide confidence in groundwater modelling. The IAC supported EPA's position and included recommended changes to groundwater mitigation measures (MM-GW04) that the groundwater management plan be updated to account for further baseline groundwater monitoring and modelling.

The IAC found that the extent of predicted groundwater mounding is likely to be conservative and may be less than predicted in the model. This means that groundwater transport and potential contaminant load transport from the site faster could be faster than predicted in the EES, I address groundwater quality impacts in the next sub-section of my assessment.

The IAC found that the EES had provided a conservative assessment of the potential for a groundwater mound and then effects could be acceptably managed through the implementation of their recommended mitigation measures and the EMF. The IAC to this end recommended additional monitoring to inform the development of an improved groundwater model to understand the groundwater environment during and post-mining (MP-GW01, GW03 and CP-GW02 and MM GW04A). The IAC also recommended that mitigation measures be amended to include trigger levels for when groundwater contingency measures such as interception, extraction and containment of impacted groundwater or alternative tailings management and disposal options should be considered.

It is my assessment that effects of groundwater mounding are acceptable and likely to be less than predicted by the EES given the conservative assumptions of the predictive modelling undertaken in the EES. I support the IAC's recommended changes to mitigation and monitoring measures as these will strengthen the proponent's and regulators' understanding of baseline conditions and the ability to implement contingency measures should effects be greater than predicted.

Tailings geochemistry and Seepage Quality

The EES presented leachate results for tailings material to provide an indication of the potential seepage water quality from the tailings material during the life of the project. The leachate was characterised as non-acidic, low salinity and marginally elevated in some metals and metalloids when compared with background groundwater quality. The EES predicted that water quality of the leachate entering groundwater would initially be similar to the quality of the leachate, however would mix with the background groundwater and trend towards being indistinguishable from background groundwater quality within 2 km of tailings cells.

The proponent's expert, Dr Fawcett, included further information on the test results on the tailings leachate quality during the hearing. The IAC considered the submissions from EPA, MFMF and the proponent, regarding a comparison of the information within the EES and the further information provided during the hearing[15], and found that both the information in the EES and the new information presented in the hearings was useful to form a view on potential tailings leachate quality and noted the data was not dissimilar.

The IAC noted that the leachate quality testwork had not yet been undertaken with the water from Kangaroo Lake, which the project would seek to use during operations, and the effect of rainwater seepage through deposited tailings had not been investigated. The IAC recommended that this be incorporated into the Tailings Management Plan (MM-GW01), and I support the recommendation for this further work.

In response to a request from the IAC, the proponent also tabled evidence about the proposed use of flocculants for the project to aid in thickening the tailings material and water recovery[16]. The proponent proposed through the hearing to include acrylamide in their testing programs, in response to concerns about contaminants and breakdown products associated with the proposed use of polyacrylamide flocculants. The IAC supported the inclusion of monitoring of flocculants in and their decomposition products and the setting of trigger values based on the ERS in the mitigation measures (MM-GW04), which I also support.

The IAC asked that the proponent prepare a comparison of the leachate quality results against the relevant ERS indicator level for the chemical indicators that were potential contaminants of concern[17]. The results showed that in some of the leachate samples total arsenic and iron values exceeded the health and / or aesthetic criteria, the concentrations are within the background concentrations of these metal / metalloids from the regional groundwater sampling. The IAC noted that aluminium concentrations in some of the leachate samples exceeded the aesthetic criterion in the ERS, however did not identify this as of particular concern given that the criteria are for aesthetic reasons rather than health and the quality of the background groundwater is not suitable for consumption given the salinity levels.

The IAC also recommended that mitigation measures be amended to include trigger levels for when groundwater contingency measures such as interception, extraction and containment of impacted groundwater or alternative tailings management and disposal options should be considered.

It is my assessment that the predicted effects on groundwater are not likely to be significant and can be managed to acceptable levels. I concur with the submission of the EPA that the regional groundwater system, while not of a quality to support a wide range of uses, is still a receptor with environmental values. I acknowledge and support the further work that the proponent will need undertake to satisfy the EPA to grant an A18 permit and to ensure that the project meets its requirements under the GED, although I note that this work is not necessary for me to form conclusions on the acceptability of effects of the project on groundwater.

Assessment

It is my assessment that the project's effects on groundwater can be managed to acceptable levels, with the project being implemented in accordance with the EMF and the recommendations of the IAC and my assessment. I support the following recommendations of the IAC about changes to the proposed mitigation measures related to groundwater management including:

[15] Technical Document 145

[16] Tabled Document 95

[17] Tabled Document 145

- Changes to MM-GW04 to include that the groundwater management plan be updated to account for further baseline groundwater monitoring and modelling and reflect the requirements for any A18 permit that may be issued by the EPA.
- Changes to MM-GW-04 be amended to include trigger levels for when groundwater contingency measures such as interception, extraction and containment of impacted groundwater or alternative tailings management and disposal options should be considered.
- Additional monitoring to inform the development of an improved groundwater model to understand the groundwater environment during and post-mining (MP-GW01, GW03 and CP-GW02 and MM GW04A).
- Changes to MM-GW05 that set out the proponent employ an adaptive management approach that responds to changing risks during the life of the project.
- Changes MM-GW01 to account for some additional testing of tailings material including the use of Kangaroo Lake water and rainfall infiltration on tailings leachate and an adaptive management approach to be built into the Tailings Management Plan.

5.3. Surface Water

Evaluation objective

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.

Assessment context

Surface water effects are addressed in Chapter 13 and Technical Appendix H1 (surface water) and H2 (mine site surface water) of the EES and in Chapter 10 of the IAC Report. VHM proposed eight mitigation measures to deal with surface water effects, one of which has been the subject of recommendations by the IAC. Several submitters raised concerns about flooding, mine water management, contamination and water availability.

A number of potential effects of the project for surface water values were examined through the EES and IAC process, in particular the:

- impacts of the project on flooding and surface water management within the region;
- impacts on surface water quality associated with project works and potential for contamination; and
- volume of water required for the project and impact on water availability.

Discussion

The project surface water catchment was described in the EES as being located on the top of the Cannie ridgeline, in an area of generally flat topography with low rainfall, high evaporation and low erosion risk. There are no flow paths from the MLA to the Murray or Avoca floodplains or the Kerang Lakes Wetlands Ramsar site. The EES outlined how the project intends to retain all surface water run-off from disturbed areas on the site through detention ponds and water management basins. Stormwater infrastructure would be designed to retain run-off from 5% annual exceedance probability (AEP) rainfall events, with run-off to be directed to mine pits to contain higher rainfall events, up to 1% AEP, 72-hour design storm event.

The EES outlined the project's approach to storage, management and use of hazardous chemicals which is proposed to be in line with the relevant standards. In response to a request from the IAC, the proponent produced list of chemicals (including storage volume and method) proposed to be stored and used at site[18].

The IAC heard submissions about how surface water behaves over their properties during periods of high rainfall. The IAC was aided by these showing evidence of stormwater inundation on their properties. The IAC concluded that the proponent's strategy of constructing drains, bunds and water management basins would be effective in preventing off-site discharge of surface water flows from processing areas, stockpile areas and the mine.

The IAC considered that the performance of surface water infrastructure should be verified during the project operations and that the monitoring program must be capable of providing confidence the surface water management plan systems are functioning properly, and the quality of the water and any discharge is acceptable. To this end the IAC recommended that the proposed surface water management plan reflect statutory requirements and with flexibility to respond appropriately to the results of monitoring. I support the IAC's recommendations about updates to the wording of the

[18] Tabled Document 94

mitigation measure requiring the preparation of a surface water management plan to reflect statutory requirements and respond to the results of the surface water monitoring program (MM-SW01).

It is my assessment that the project's potential effects on flooding and offsite surface water transport of potentially contaminated run-off can be managed to an acceptable level if the project is implemented in accordance with the EMF and mitigation measures recommended by the IAC and my assessment.

The EES described that the project would require up to 4.5 GL of water a year for the commencement of the project, with generally annually water demand for operations between 2.9 and 3.1 GL. Water is proposed to be sourced from Kangaroo Lake via the open market by water deed with Goulburn Murray Water. The EES described how Goulburn Murray Water manages the inflows to and water allocations from Kangaroo Lake, maintaining lake levels generally above 36 GL.

The IAC did not report on the effects of water use for the project. I note that Kangaroo Lake is an artificially management water system and is managed by Goulburn Murray Water and that the project will require a water deed with Goulburn Murray Water for the supply of water. Under the *Water Act 1989*, GMW are required to balance the competing needs for water, including allowance for environmental flows. It is my assessment that the effects of the project on water availability will be acceptable should the project be implemented in accordance with the EMF and water is accessed from Goulburn Murray Water in the context of the state's water entitlements framework.

Assessment

It is my assessment that the project's effects on surface water would be acceptable, with the project being implemented in accordance with the EMF and the recommendations of the IAC and my assessment. I support the following recommendations of the IAC about changes to the proposed mitigation measure MM-SW01 including:

- Ensuring the surface water management plan be updated during the life of the project reflect statutory requirements, monitoring results, community complaints, audit findings and opportunities for continuous improvement.

5.4. Land use and planning

Evaluation objective

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

Assessment context

Land use and planning effects are addressed in Chapter 15 and Technical Appendix K of the EES and in Chapter 12 of the IAC Report. VHM has proposed one EMM to deal with land use effects and this has not been the subject of recommendations by the IAC. The draft planning scheme amendment (PSA) was included as Attachment III of the EES and is addressed in Chapter 17.2 of the IAC report. The IAC's recommended version of the incorporated document is included as Appendix F of the IAC report. The incorporated document was the subject of submissions and five parties each submitted recommended changes to the incorporated document during the hearing, which has informed the IAC's recommended version of the incorporated document.

The EES described the relevant planning provisions, including the Gannawarra and Swan Hill Municipal Planning Strategies, Planning Policy Framework, zones and overlays. The report concluded there is broad planning policy support for the project, as it would diversify the local economy by providing new employment opportunities, while the EES concluded the project would not result in a permanent loss of agricultural land or productivity.

Potential effects related to land use and planning were examined through the EES and by the IAC, and include:

- Consistency with planning policy; and
- Land use effects, including impacts on agricultural production and fire risks.

A bushfire management plan, MM-LU01, is proposed as a mitigation measure in the EES.

Discussion

Land use planning and amenity

Most submissions regarding land use effects were related to the loss of productive agricultural land and whether the project aligns with planning policy. Clauses 14.01 and 35.07 of the Gannawarra and Swan Hill Planning Schemes

encourage the production and protection of agricultural land. The project broadly aligns with these clauses as agricultural production losses are proposed to be temporary, and limited in extent, provided the proposed mitigation measures are effectively implemented and the land mined within the MLA is progressively returned to agricultural production. The project's potential effects on agricultural land are discussed in further detail in chapter 5.11 of this assessment.

State planning policy on earth and energy resources at Clause 14.03 and the purpose of the particular provision at Clause 52.08 which applies to earth and energy resources industry in the Gannawarra and Swan Hill Planning Schemes, aim to encourage exploration and extraction of energy and earth resources. I support the IAC's finding that the project achieves an adequate balance between planning policies, provided the recommended mitigation measures are applied, allowing for limited and temporary losses of agricultural land while mining progresses. It is my assessment that the project aligns, and is not in conflict, with any planning policies.

Agricultural impacts are discussed in further detail in section 5.10 of this Minister's assessment.

Bendigo and District Environment Council (BDEC) submitted that cumulative impacts of lost agricultural land in the region from other proposed mineral sands projects needed to be considered. I acknowledge these concerns as cumulative impacts are an important consideration, however, I am satisfied that this has been considered adequately, for the purpose of the project, within Technical Report K of the EES. The IAC noted no approvals for new mines had been issued within the local area and potential new proposals would go through further assessments and approvals processes which would also take cumulative impacts into consideration. I note VHM has an exploration licence and retention licence for a larger area beyond the proposed project being considered in this Minister's Assessment. I support the IAC's position that if in the future VHM decides to propose to expand or commence other mine operations, that these will be required to go through their own assessment and approvals processes, where cumulative impacts will be need to be assessed. I consider these assessment and necessary approvals processes will investigate and mitigate or minimise potential cumulative loss of agricultural land within the region, in consultation with stakeholders. I also note that progressive rehabilitation of this mine site is intended to progressively return mined areas of agricultural land back to productive land uses.

Some submitters, including Mr Fox, raised concerns regarding bushfire risks and pressures on local Country Fire Authority resources. Technical Report K of the exhibited EES considered bushfire risks associated with the project. Bushfire risks associated with the MLA will be assessed and managed through the work plan. The entire project area lies within a designated bushfire prone area, as mapped under the building system, therefore the proposed mitigation measure MM-LU01 was introduced to address bushfire risk. MM-LU01 requires a bushfire management plan, alongside ongoing consultation with relevant authorities including the CFA. I am generally satisfied that proposed mitigation measures will adequately address bushfire risk.

The EES stated that various amenity impacts will be avoided due to the two closest dwellings not being occupied during stages of the project. Amenity impacts were raised by some submitters, and these are addressed in Noise and Vibration, Air Quality and Transport sections of this assessment. The IAC noted that the extent of potential amenity impacts would be limited due to the low number of sensitive receptors. I support the IAC's finding that recommended mitigation measures, as amended by the IAC and recommendations of my assessment, from the EES can adequately address amenity impacts.

Draft planning scheme amendment and incorporated document

The proponent proposed various changes to the exhibited incorporated document in response to submissions and the IAC hearings. I support the finding of the IAC that the Specific Controls Overlay and incorporated document are appropriate planning tools to manage and facilitate project activities outside the MLA. In due course I will need to consider the proposed final form of the PSA under the Planning and Environment Act.

I note the IAC's recommendations to extend the SCO mapping to include alternative pipeline route A2, as well as the revised phrasing of the incorporated document. I note the SCO, as proposed, includes areas intended for road upgrades, with the SCO lying exclusively within the existing road reserve, therefore restricting laydown areas and works to only occur within the road reserve. The biodiversity survey work recommended in this assessment to address residual uncertainties to inform further avoidance and minimisation of potential effects is to be captured within a design management document to be prepared to the satisfaction of DEECA. This will include a requirement to avoid impacts to certain environmental values by either selecting alignment A2 which avoids these impacts or investigating the feasibility of alternative construction methods that could also achieve avoidance of impacts. I have recommended the inclusion of a clause in the Incorporated Document to require a design management document to have been prepared to the satisfaction of DEECA, prior to my consideration of the PSA. For this reason, I recommend that the IAC's

recommendation to extend the SCO mapping to also include pipeline route A2 be amended to extend the SCO mapping to reflect the changes that arise out of the design management document.

Native vegetation removal is discussed in section 5.1 of this assessment, however the incorporated document is to act as the planning control for native vegetation removal within the project infrastructure land (PIL). Provided the recommendations of this assessment are incorporated into the EMP, I consider that the biodiversity impacts of works within the PIL can be minimised to acceptable levels and be adequately managed in accordance with Victoria's native vegetation management framework.

I accept, as did the IAC, that the councils would be specified in the Schedule to Clause 72.01 as the responsible authorities for the administration and enforcement of the proposed planning scheme amendment. I note that under Clause 52.08 of the planning schemes, planning permission is not required for elements of the project that are regulated by the *Mineral Resources (Sustainable Development) Act 1990*.

Assessment

It is my assessment that:

- Land use and planning impacts can be minimised to acceptable levels and can be adequately managed through the implementation of mitigation measures, including changes recommended by the IAC;
- I generally support the revised phrasing of the Incorporated document by the IAC as outlined in Appendix F of their report with my recommended changes outlined below:
    - I recommend a clause be added to the Incorporated Document to include the need for a Design Management Document for the project to have been prepared to the satisfaction of the Secretary of DEECA.
    - I recommend that the SCO mapping be amended, as required, to include changes required out of the preparation of the Design Management Document.

5.5. Traffic and transport

Evaluation objective

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

Assessment context

Traffic and transport effects are addressed in Chapter 10 and Technical Appendix E of the EES and in Chapter 7 of the IAC Report. In the exhibited EES, VHM proposed seven EMMs to address traffic and transport impacts. Traffic and road impacts have been the subject of recommendations by the IAC.

The EES noted that all product container delivery would be during daylight hours, 12 twenty-foot equivalent units would be filled and shipped each day and the haulage fleet would consist of A-double trailers. The mine product would preferably be hauled to an intermodal terminal at Ultima followed by rail freight to the Port of Melbourne or Port of Geelong, from where the mine products would be exported. The project workforce is proposed to access site most likely via light vehicles, with provision for buses and carpooling if feasible.

Potential effects related to traffic and transport were examined through the EES and by the IAC, and include:

- adequacy of local road network and intersection accessibility for heavy vehicles;
- traffic impacts during road/ lane closures during construction and operation;
- emergency access and potential peak agricultural period interruptions for landowners;
- adequacy of road network infrastructure to accommodate operations traffic along haulage and commuter routes; and
- suitability and safety of the preferred intermodal terminal and rail freight lines for accommodating shipment of mine products.

Mitigation measures presented in the EES can be summarised as:

- minimising adverse social effects through consultation and development of a Traffic Management Plan (TMP);
- minimising land use effects from transport infrastructure by conducting road safety audits;

- development of a site access strategy;
- heavy vehicle and transport route assessments; and
- sub-TMPs developed for contractors and specific work activities.

The EES concluded that residual impacts would be managed sufficiently with the implementation of recommended mitigation measures.

Discussion

Road adequacy, upgrades, closures and access

The IAC report investigated several aspects of the project which would result in short or long-term closure to roads both during construction and operation of the project.

Several submitters raised concerns regarding the responsibilities of ongoing road maintenance, upgrades and conditions including Gannawarra Shire Council, Sustainable Living in the Mallee and Mine Free Mallee Farms Inc. Through the hearing process, the proponent confirmed their financial responsibility for road inspections, upgrades and maintenance along both haulage and commuter routes and included this requirement in the proposed Incorporated Document. The IAC found that responsibility for road maintenance and upgrade impacts have been adequately clarified and can be acceptably mitigated through the recommended EMF and Incorporated Document. I support the findings of the IAC and am satisfied that the raised issues can be addressed through the implementation of the EMF and proposed incorporated document.

The EES outlined that short term partial road closures, diversions or limited access for some roads would be required both during road and intersection upgrades works, as well as during the eight-months construction period for the proposed water pipeline route A2. Submitters and landowners were concerned about road closures and their restrictions on access to property by landowners, emergency services, school bus stop and constraints to farm activities, particularly during peak agricultural periods. The IAC found that closures would be limited in duration and can be appropriately mitigated through consultation, MM-TP01, both with landowners and emergency service providers through the development of the TMP MM-TP02, and Sub TMPs, MM-TP07. I support the IAC's revision of MM-TP01 to require consultation with emergency service providers. As such, I am generally satisfied that the traffic and transport associated impacts from both road upgrade works and pipeline construction can be effectively managed through the implementation of the EMF.

Haulage, intermodal terminal and rail freight

The IAC report investigated key issues related to the transport of mining product from the MLA.

The EES committed through MM-TP02 that the TMP would include a commitment for the movement of ore / product would occur during daylight hours. The EPA submitted the off-site movement of ore should be restricted to the 'day period' as defined in the Environment Protection Regulations, 7:00 am to 6:00pm. The IAC revised MM-TP02 to both include the recommendations of the TN06 as well as specifying daylight hours however the IAC recommended that this be extended from the EPA definition to include Sundays which better reflected the commitment in the EES. I support the revision of the MM-TP02 in line with the IAC's recommendation. Additionally, MM-TP07, as described in the EES, outlined Sub TMPs would be completed by relevant contractors, and need to consider and reference back to MM-TP02. The IAC revised the tense of MM-TP07. I support the revision MM-TP07, as recommended by the IAC.

Submitters including the SHRCC and the Fox family expressed concerns regarding the safety and amenity impacts of the proposed haulage route. The IAC report found the safety and amenity impacts generated by additional traffic associated with haulage routes will likely be managed through the associated approvals of the A-Double route, road upgrades through the TMP and effective consultation with landowners as outlined in the EMF including MM-TP01. I support the conclusions of the IAC that the haulage route is appropriate, providing the implementation of the EMF according to the IAC's recommendations.

The proponent submitted that the Ultima Terminal and rail line have capacity to service the project and advised that contingency haulage options involving the movement of mine product to Port of Melbourne via B-Double and A-Double vehicles would not lead to significant impacts. The IAC found that Ultima Terminal has the capacity to safely provide for the shipment of mine product and found the contingency haulage options would not lead to significant effects. However, the IAC did not form a definitive conclusion regarding the rail line's capacity to accommodate the additional rail traffic resulting from shipment of the project's mine product as evidence of this was not provided. The proponent will need to conduct further investigations to confirm the capacity in the rail network, however I am satisfied that the effects of the

transport of the mine products would be acceptable if managed in accordance with the proposed mitigation measures, accounting for the recommendations of the IAC.

Assessment

It is my assessment that traffic and transport impacts will be acceptable if they are managed through the implementation of the IAC's recommended version of the EMF and Incorporated Document. I support the recommendations of the IAC regarding the phrasing of mitigation measures MM-TP01, MM-TP02 and MM-TP07.

5.6. Noise and vibration

Evaluation objective

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.

Assessment context

Noise and vibration effects are addressed in Chapter 11 Noise and Technical Report F of the EES and in Chapter 8 of the IAC Report. VHM proposed eight mitigation measures to deal with noise and vibration effects and three mitigation measures have been the subject of recommendations by the IAC.

The project will generate noise and vibration of varying magnitudes at different times during construction and operation of the fixed plant components and mobile plant components associated with mining and processing; transport logistics; and closure and rehabilitation of the project. Noise and vibration can impact the amenity of nearby receptors and the health and wellbeing of residents and local communities.

The IAC has identified the following key issues relevant to the assessment of noise and vibration effects:

- Construction noise and vibration impacts for project components such as the processing plant, water supply pipeline and water pump station.
- Operational noise and vibration from the project, including from fixed plant components and mobile plant components such as haul trucks, excavators, scrapers, dozers, etc.
- Other noise impacts, which encompass low frequency noise from mine traffic and pump station, affecting residence and natural areas in proximity to the mine site and ancillary infrastructures.

Discussion

Construction noise

The EES assessed noise generated from the construction of the mine infrastructure, specifically the processing plant, water supply pipeline and water pump station, which was predicted to be below ambient background noise levels at most receptors; the EES noted one receiver would experience construction noise associated with the processing plant at an elevated level compared with ambient background, but still below what would be the noise limit for the daytime operation of the processing plant.

A small number of receptors are expected to experience construction noise above ambient background noise levels associated with the construction of the water supply pipeline. The elevated construction noise impacts at these receptors are expected to be short in duration as works progress along the pipeline alignment, expected to last in the order of 1 to 2 days, and would only occur during daytime hours. These impacts are predicted to comply with the requirements of the *Civil construction, building and demolition guide* (EPA Publication 1834). VHM's noise expert, Mr Antonopoulos, noted that VHM will rely on the implementation of the Noise Management Plan in the Work Plan and Construction Noise and Vibration Management Plan in the Construction Environmental Management Plan (CEMP) to manage construction noise impacts in these areas. This will be coupled with consultation with the community and relevant bodies during the development of these documents to ensure they are fit for purpose. The IAC endorsed these approaches, which I also support.

EPA made a recommendation on mitigation measure MM-NV02, requiring an independent environmental auditor to verify any works proposed outside of EPA normal working hours to ensure the noise amenity of residents is not significantly impacted. In response, VHM's noise expert gave evidence highlighting that VHM will adopt a risk-based approach, outlined in the EPA's construction guidelines, to manage construction noise impacts to accord with GED obligations. The IAC considered EPA's recommendation unnecessary and deemed the proponent's wording within MM-NV02 as fit-for-purpose,

given the sufficient distance separation between the mine site and sensitive receptors, and the relatively short duration of construction noise impacts. I support the IAC's view and reasoning in reaching this conclusion.

I would like to emphasise that the principle of reducing impacts as far as practicable still applies, and it is expected that the proponent will keep construction activities within normal working hours where possible, as stated in mitigation measure MM-NV02, consistent with EPA Publication 1834.

The proponent has also noted that two water supply pipeline route options (A2 and A3) have been assessed, of which only one will be selected for construction. In terms of noise impacts generated from the construction of the water supply pipeline, the IAC has considered that there is little difference between the noise impacts from the pipeline route options A2 and A3, although A3 would provide a marginal benefit.

Operational noise

Operational noise modelling was conducted using data collected from a background noise monitoring programme at four locations around the project area over approximately four weeks in October 2018, coupled with modelled noise data of four mine operating scenarios, as outlined under Table 8 of the IAC Report. The IAC considered submissions concerned about the exceedance of the night-time noise limit and the robustness of the noise model.

As indicated by the noise modelling, mining activities undertaken at night in Area 1 and Area 3 are expected to generate noise that could exceed night-time noise limits at receptors R12, R13 and R7. The most significant source of noise predicted to come from the processing area was from the power station plant. Mitigation measures proposed for the power plant included housing the diesel generator within a building, placing each engine within 'drop over' acoustic enclosures, and installing high performance exhaust silencers. The mining fleet operating in the mine areas was identified as the primary source for both overall noise levels and low frequency noise and contributed to the potential exceedance of night-time noise limits. In contrast to the power station plant and mining fleet, the diesel generated pump station at the Kangaroo Lake offtake is expected to adhere with noise limits after the installation of an acoustic enclosure.

The EES and the proponent's noise expert described that truck transport of product offsite is not expected to occur at night. The night-time noise concerns are primarily associated with the mining fleet within the mine areas. The processing plant is likely to add to cumulative noise levels. However, its noise impact is expected to be further mitigated through the implementation of noise suppression measures on the processing plant building.

The MFMF's and proponent's noise experts agreed that mining activities at night should not be undertaken if night-time noise limits are modelled to be exceeded, unless the proponent can demonstrate certainty in achieving compliance with the night time limits. The EPA reiterated that the proponent should prioritise undertaking mining activities during daytime and any proposed night-time mining activities are subject to adhering with the night-time noise limits at specific sites within the project area, which aligns with the IAC's view. All parties appeared to be in consensus that mining operations should not proceed during night-time if they are expected to exceed the night-time limits.

As detailed under MM-NV06 in the Noise Management Plan within the Work Plan, if noise modelling or if onsite monitoring finds that any noise limit is exceeded for a particular operating time period, the operation is to cease and not be undertaken during that operating time period. The EPA suggested appointing an independent and qualified environmental auditor to review and verify all noise modelling before any mining activities are proposed in areas where sensitive receptors could be at risk of exceeding noise limits. The IAC found EPA's suggestion appropriate and recommended amendments to MM-NV06 to reflect this. I agree with this approach as it increases the level of independence to ensure that decisions regarding mitigation of noise from mining activities' adhere with noise limits.

The robustness of the noise model was a point of contention. MFMF's noise expert suggested that a 3 dB margin should be added to the model output, and a ground absorbative factor of G=0 should be adopted to ensure a suitably conservative assessment. Conversely, the proponent's noise expert pointed out that the worst-case scenario has been adopted in the modelling, hence it is unnecessary and excessive to add a 3 dB margin to the model output. He further explained that the ground absorbative factor of G=1 was supposed to be used in the model, as G=1 is listed for farmland, which is the suitable land use category of the Project area. However, G=0.6 was adopted instead as a conservative measure.

I understand that a conservative approach to noise modelling is essential for minimising noise impacts. However, if the model is overly conservative, it could compromise the reliability of the noise model. Based on the EES and IAC report, I believe the proponent has adequately factored in a conservative approach in the noise model, as did the IAC. Furthermore, the IAC stressed the need for continued refinement and reassessment when new information such as equipment selection becomes available as the project develops. The IAC also recommended revision of MM-NV09 to

require the Noise Management Plan be based on the updated modelling and the results of noise monitoring, which I support.

Other operational noise issues including low frequency noise, noise associated with transportation and impacts on natural areas were the key residual noise concerns raised during the IAC hearing.

Submitters raised concern about low frequency noise during the operational phase at the mining area and at the Kangaroo Lake pump station. The EES assessed low frequency noise against the LFN Guidelines, EPA publication 1996 and identified some exceedances at a small number of receptors under modelled scenarios within the mining area, and at the Kangaroo Lake pump station. The IAC noted that the noise expert conclave agreed that with appropriate silencing it would be possible to manage low frequency noise and that the experts agreed the sound power of the power plant should be specified below 63 Hertz to ensure the final installed plant would comply with limits. The IAC accepted the evidence of the noise experts that it would be possible to manage low frequency noise. I agree with the findings of the IAC.

The EES assessed modelled traffic noise to be below ERS targets, and the EMF restricts ore products to being transported to the Ultima Terminal during daytime only, in an effort to protect the night-time wellbeing of residents in proximity to the transport routes. The IAC found that this would be a sensible and effective way of minimising the impacts of traffic noise on local roads, which I also support.

The primary sources of noise on natural areas are considered to be the construction and installation of the water pipeline and operational mining noise.

There was a disagreement between the proponent and the EPA on the ERS Land Use classification for the five natural areas identified in the EES. The natural areas are the Talgitcha Bushland Reserve, Lalbert Recreation Reserve, Mystic Park Bushland Reserve, Forest Plantation East Road and the small reserve adjacent to Kangaroo Lake and Murray Valley Highway. In the ERS, Category V is ranked higher than Category IV in terms of biodiversity, landscape and social values, which necessitates a distinct acoustic objective of ensuring a sound quality that is conducive to human tranquillity and enjoyment while having regard to the ambient natural soundscape. The indicator for Category V is qualitative with no specific noise levels specified. In contrast, the objective and indicator for Category IV is quantitative, which sets noise limits at 40 dBa during the day and 35 dBa at night. In the EES, the proponent classed all five natural areas as Category IV, however during the IAC closing submissions, the EPA submitted that Mystic Park Bushland Reserve, Talgitcha Bushland Reserve and the reserve adjacent to Kangaroo Lake and Murray Valley highway should be classed as Category V, with the remaining areas classified as Category IV. The proponent's noise expert contested EPA's submission and noted that DEECA, Parks Victoria or another authority should be consulted for the purpose of categorising natural areas, as the EPA may not be the most suitable authority to decide on this matter.

The IAC considered it was not in the position to ascribe an ERS Land Use classification to the five natural areas. Based on available information to date, I believe the assessment of the appropriate ERS Land Use classification needs to be prioritised so that a basis can be established before further assessment can be adequately undertaken. I agree with the proponent that DEECA and Parks Victoria should be consulted for further advice. The IAC revised MM-NV09 to require consideration of land use categories specified in the ERS during the development of the NMP, which I support.

Overall, the IAC found that the EES has appropriately assessed the residual noise impacts and that the impacts can be suitably managed through the EMF, NMP and TMP. I am generally in agreement with the IAC's view, subject to the proponent adopting my above suggestions and recommendations made by the IAC in the IAC report.

Vibration

Chapter 11 and Technical Report F of the EES characterise the ambient vibration environment in the project area to be very low, below the threshold of perception. The occasional and very localised sources of vibration are vehicular movement from farming and domestic related activity.

The proponent's noise expert has stated that given the large distances involved between the mining activities and the sensitive receivers, vibration impacts generated from the project would be imperceptible at sensitive receivers. Mining activities would primarily be undertaken using excavators and trucks without the need for drilling and/or blasting. Both the proponent's and MFMF's noise experts agreed that as no vibratory roller was proposed to be used during construction of the water supply pipeline, vibration was not assessed as part of the construction impact assessment for the pipeline.

After assessing the information on vibration impacts available to date, I believe the potential for vibration impacts of the project is low and can be adequately managed through standard management protocols identified in the proposed mitigation measures which would be captured in the CEMP and Work Plan.

Assessment

It is my assessment that noise and vibration impacts will be acceptable if the project is undertaken in accordance with the proposed EMF and mitigation measures as refined by the IAC and my assessment.

5.7. Air quality

Evaluation objective

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 and standards.

Assessment context

Air quality effects are addressed in Chapter 12 Air Quality and Technical Report G of the EES and in Chapter 9 of the IAC Report. VHM proposed seven mitigation measures to deal with air quality effects and four of the proposed mitigation measures, and one new mitigation measure, have been the subject of recommendations by the IAC. The project will generate air emissions during construction and operational phases of the project, which include dust generation and nitrogen dioxide (NO2) emissions.

The key issues relevant to the assessment of the air quality effects are the following:

- Dust generated during the construction phase of the project, which includes the construction of the pipeline and processing plant.
- Dust generated during the operation phase of the project, which includes wheel generated dust from haulage and stockpile of topsoil, overburden and ore.
- The spread of airborne heavy metals and silica in the form of dust, due to the handling of mineralised ore.
- Other emissions (e.g. NO2) during the operation phase of the project, which includes emissions from the processing plant, power station and pump station.

Discussion

Construction

The EES assessed that construction of the water supply pipeline would potentially expose sensitive receptors to dust emissions for up to one to two days, as dust is expected to be generated along the route as construction progresses linearly. The IAC considered the dust impact assessment conducted for pipeline construction to be applicable to both route options A2 and A3. I share the same view, noting the only difference between the two proposed pipeline route options is that option A2 is expected to impact an additional residence. Given the short duration of impact, the EES found that the risk of dust impact from pipeline construction is low to negligible, which both the IAC and I agree with.

The EES undertook a risk-based qualitative assessment of dust and health impacts from the construction of the processing plant and considered that the impacts would be low and very short in duration, with the implementation of proposed mitigation measures. There is also a reasonable distance of 900 m between the construction site boundary and the closest receptor.

The IAC was satisfied that the potential air quality impacts associated with construction had been appropriately considered. It is my assessment that the potential dust impacts associated with the construction of the pipeline and processing plant would be acceptable with the implementation of the EMF and associated mitigation measures.

Operations – Dust emissions

The EES assessed that during operation of the project dust would be generated in areas of disturbance within the MLA, with the primary contributor being from vehicles associated with haulage of topsoil, overburden and ore. This dust source is proposed to be minimised by applying water, maintaining road surfaces, monitoring and re-application of suppressants, as well as managing travel speeds during conditions when higher dust levels are observed.

The IAC considered submissions and evidence on the proposed controls to manage predicted dust emissions. The IAC found that the approach proposed to mitigate dust through application of water and other suppressants, and use of real-time monitoring to guide implementation of additional contingency measures, was consistent with ‘taking all practicable measures’ to avoid and minimise impacts.

The IAC recommended, in response to questioning and agreement from Dr Shepherd (proponent’s expert witness), that limiting the silt content of the surface of internal haul roads would also be a good measure to reduce dust level for this project. The IAC referenced that the *NPI Estimation Manual for Mines* refers to a default value for surface material silt

content of 10%, with the ability to review this subject to a higher silt loading based on still achieving a satisfactory outcome and addressed this within MM-AQ02. The IAC noted that the silt content of the top one metre of project site's soils ranged between 1 to 27% and that the EES assessed dust emissions from haul roads based on a surface silt content of 4.8%. I note the *NPI Estimation Manual for Mines* considers that 10% silt content is fairly typical conditions for an Australian mine, so I support the IAC recommendation for setting 10% as a preliminary upper limit, while recognising there is scope to satisfy ERR that higher silt loading could still achieve acceptable environmental impacts.

The EPA submitted that on public roads, vehicle speeds should be limited to 50 km/h and should reduce to 20 km/h within 500 m of sensitive receptors on sealed and unsealed roads. Dr Shepherd asserted during the hearings that these speeds may not be practicable from an operational perspective. There are multiple avenues documented in the EES for the project to minimise vehicle generated dust, including reducing speed, which is addressed in the existing mitigation measure (MM-AQ02). I note that MM-AQ01 also includes a requirement for speed restrictions across the site and on public unsealed roads and that the Dust Environmental Management and Monitoring Plan will require additional measures to be considered to manage dust emissions should requirements not be achieved. Setting a speed limit now may not be practical for the project and the adaptive management approach in the EES is a sufficient means of addressing vehicle generated dust emissions, which will be able to manage dust to acceptable levels.

The EES noted that the dust produced during the operational phase of the project would contain airborne heavy metals and silica due to the handling of mineralised ore, which could travel offsite as airborne dust. The EES proposed to control potential dust emissions from stockpiles through compaction of stockpile batters to reduce wind erosion, application of emulsions and polymers to stockpile surfaces and locating product stockpiles within roofed and three-sided shelters.

The IAC heard numerous submissions that were concerned about the impact of airborne dust on health and amenity, including potential deposition of dust within rainwater tanks. During the IAC hearing, MFMF's air quality expert pointed out that lead levels in rainwater tank could reach up to 0.0084 mg/L, which is 84% of the Australian Drinking Water Guidelines (ADWG) for lead. Dr Shepherd acknowledged that, based on conservative modelling, lead and mercury levels in rainwater tank at the most impacted receptor could potentially approach the ADWG, though are not likely not exceed it. In the EES and as detailed under MM-AQ07 in the EMF, the proponent proposed a sampling program of rainwater tank to all residents of dwellings within 1km of the mine site boundary, with subsequent corrective actions in the event of any exceedances of the ADWG. I support this measure. The IAC also adopted the suggestions of a submitter to extend the range of testing based on results of the sampling program which is captured in the IAC's revised version of MM-AQ07. I support this recommendation.

The IAC noted that in his oral evidence, Dr Shepherd described the storage of product from the mine in sheds that would be enclosed on three sides, with doors on the fourth side to allow for the movement of people in and out of the shed. To this end and in the spirit of minimising potential dust emissions from stored product that would dry within the sheds, the IAC recommended changes to MM-AQ03 to require doors of product storage sheds to be closed unless plant or people are entering or leaving the building. I support this recommendation from the IAC.

Operation – power station and pump station

The EES examined the operation of the power station and pump station, predicting emissions likely to be generated, including NO_2. Worst-case scenario modelling was used to assess NO_2 emissions. For the power station, the modelling in the EES predicted exceedance of the 1-hour average NO_2 concentration APAC to about 700 m beyond the project boundaries, and an exceedance of the annual average APAC relating to terrestrial vegetation beyond the project boundary, covering an area of approximately 2.5 ha., Modelling in the EES showed NO_2 levels would exceed the 1-hour average NO_2 concentration APAC to about 15 m from the shed for the water pump station at Kangaroo Lake.

The proponent proposed to implement emission reduction technology such as selective catalytic reduction (e.g. use AdBlue) or use LNG/LPG on the diesel generators in the power station and pump station (MM-AQ06). However, the worst-case scenario modelling conducted when assessing the power station and pump station emissions was based on no emission controls, which is inconsistent with MM-AQ06. As noted by the IAC, the proponent's development licence application stated that 'selective catalytic reduction is an advanced emissions control technology that reduces NO_2 emissions by approximately 90%. In response to a series of queries from the IAC due to such inconsistencies in the exhibited material, Dr Shepherd confirmed that the predicted emissions of NO_2 from the power station and pump station were rather conservative and would definitely be lower if the EES' modelling had factored in emission controls.

During the IAC hearing, the Proponent's air quality expert agreed with the IAC's proposition that raising the height of the discharge points for the generators to at least 3m above the roof line of the power station would further reduce the levels of NO_2 near the site boundary.

I agree with the IAC's finding that by combining the implementation of emission reduction technologies and raising the exhaust stack height, the extent and magnitude of the currently modelled exceedance of the NO_2 APAC would be significantly reduced. I agree with the IAC that NO_2 emissions should undergo AEMOD remodelling once the proponent demonstrates an all-practicable measures approach to reducing emissions and improving dispersion.

The IAC recommends that the proponent provide further information to clarify its K01 (Power generation) development license application, including confirmation of the dimensions of the power station and pump station, along with nearby structures, confirmation that stack heights are adequate to ensure good dispersion, and confirmation of the intention expressed in section 8.1.2 of the exhibited development license application that emissions from the power station and pump station have been minimised as far as reasonably practicable by using emissions reduction technologies. Subject to the proponent's adoption of the IAC's recommendations, I am confident that the air quality impacts of the power station and pump station can be suitably managed to acceptable levels through the EMF and the recommended mitigation measures.

Operation – other sources of air emissions

Several submissions raised concerns that the EES assessment did not capture all potential air emissions due to limited information on detailed design during the preparation of the EES. This issue was highlighted by the MFMF air quality expert Mr. Ramsay during the IAC hearing, using the processing plant and MUP as examples.

In response to the IAC's query on this matter, the proponent provided additional information describing the features and functions of the processing plant including the kiln and dryer which would be powered by natural gas. Calculations on the expected rate of NO_2 emissions from the power station (24 g/s) compared with the kiln and dryer (0.1 g/s) were also provided. The IAC noted that the magnitude of NO_2 emissions from the kiln and dryer are not of a magnitude that would require their inclusion in a licence under the *Environment Protection Act*. The IAC proposed a new mitigation measure MM-AQ08 to require all air emissions from the processing plant to be confirmed and recommended a revision for MM-AQ01 to require the air quality management plan have regard to MM-AQ08. Additionally, the IAC advised the EPA to review air emissions from the processing plant to ensure the adequacy of the prescribed exemptions. I support the IAC's recommendations.

I am satisfied that I sufficiently understand the significance of the project's effects on air quality and it is my assessment that these can be adequately managed to acceptable levels through the mitigation measures and adaptive management approach, set out in the EMF and as refined through the IAC's recommendations and this assessment.

Assessment

It is my assessment that that the potential air quality impacts associated with the project are acceptable, and can be readily mitigated with the implementation of the management measures recommended by the IAC and as refined through this assessment. I support the recommendations made by the IAC.

5.8. Radiation

Evaluation objective

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.

Assessment context

Radiation effects are addressed in Chapter 17 Radiation and Technical Report N of the EES and in Chapter 14 of the IAC Report. VHM has proposed five mitigation measures to deal with potential radiation effects and three have been the subject of recommendations by the IAC, with the IAC proposing a new mitigation measure be included.

The EES explained that radiation exists at differing levels within the natural environment and that mineral sands contain naturally occurring radioactive material. The EES set out the stringent regulatory framework under the *Radiation Act 2005* in Victoria for managing radioactive materials and assessed:

- Background radiation levels;
- Radioactive content of the mineral sands and other materials; and
- Potential radiation exposures within and outside of the MLA associated with various aspects of the mine's operations.

Discussion

The EES established background radiation levels within a five- kilometre radius of the project including background gamma radiation levels, radon concentrations, and the radionuclide content in soil, dust and groundwater. The IAC noted that submissions on the EES questioned the extent or findings of the background radiation studies. The IAC found that further baseline sampling should be conducted and proposed a new mitigation measure (MR-ADM03) to account for the natural variability in soils and to include sampling of local crops, local livestock and indigenous foods. I support the recommendation from the IAC that the proponent continue to conduct their baseline radiation monitoring and capture the elements recommended by the IAC to further refine and ensure a robust baseline is established to help management during operations.

The EES considered various radiation exposure scenarios including public exposure from sources including gamma dose exposure, inhalation of dust from the project, exposure to food grown in the area, drinking from rainwater tanks that contained dust from the project area and inhalation of radon gas. The EES found that the cumulative exposure from all pathways were low with a median value of 0.039 mSv/y, well below the public dose limit of 1 mSv/y.

The EES similarly concluded that potential radiation exposure to nearby agriculture, flora and fauna, groundwater and potential exposure to the public during transport of radioactive materials were similarly low and would be below regulatory limits.

The IAC considered evidence from the proponent's expert, Mr Hondros and Ms Secen-Hondros and from MFMF's expert witness, Associate Professor Ruff, about the different radiation exposure pathways and the modelled effects. The IAC considered that the Radiation Impact Assessment was rather conservative, as it treated all dust as ore, whereas most of dust predicted to be generated from the project is expected to be vehicle generated dust from internal haul roads, constructed from overburden material (not ore). I agree with the fundings of the IAC that the EES' impact assessment from airborne dust exposure was likely to be conservative.

The potential impacts of radionuclides in dust on nearby crops, including lentils, were examined further during the hearing. The proponent's experts produced additional evidence during the hearing to respond to submissions to clarify that the update factor for cereal grains is typically greater than for lentils and to include an assessment of dust deposition settling on crops[19]. The conservative assessment treated all mine dust as ore and found that the impact was significantly lower than the modelled uptake from soil and the risk was minimal. The IAC was satisfied with the new evidence provided during the hearing.

Key concerns raised by submitters and their experts about the potential movement of radioactive material within groundwater included concerns that radioactive material in the tailings may be more soluble than considered in the EES, particularly if natural waters contained sulphates and organic acids and that potential aggregation of similar materials following the discharge tailings material into the pit could lead to areas with higher radioactivity. As noted in the groundwater section, the IAC found that the different leachate tests conducted on tailings materials clarified potential effects of groundwater. The IAC identified no evidence during the hearing that the groundwater or process water would have high levels of organic acids.

On the matter of differential settling of tailings material the IAC noted that if appreciable differential settling were to occur that the radiation risk assessment could be re-calculated. The IAC recommended a new mitigation measure (R-ADM03) to require the radiation impact assessment to be revised should data indicate that in pit tailings would not be homogenous or chemically stable. I support this recommendation from the IAC.

The IAC considered that the nearest sensitive receptor to the Ultima Terminal was predicted to be exposed to 0.20 mSv/y, which is below the public dose limit. The IAC heard submissions about exposure of workers and drivers to radiation. The proponent noted that the EES process does not consider occupational risks for workers and the IAC noted that the Radiation Management Plans required for the project as part of regulatory approvals will need to consider and ensure that occupational exposure, including for drivers, is appropriately managed. I accept the findings of the IAC.

The EES has outlined a suite of design controls to prevent the release of radioactive material to the environment. These include access restriction, dust suppression, strict storage and stockpile requirements, the installation of pressure detection systems and site rehabilitation. These design measures are further supported by administrative controls, including spill clean-up procedures, incident investigation protocols, and performance monitoring of the design controls.

Generally, there was consensus among VHM and MFMF experts who provided evidence at the radiation conclave on the necessity for the total containment of radioactive materials in all areas of the plant where radioactive materials will be

[19] Technical Document 188

handled. MFMF experts emphasised the need for robust engineering controls to achieve the total containment of radioactive materials and raised concerns about the feasibility of effectively containing dust from the final product within the storage building. VHM's evidence noted baghouses would be part of the engineering controls to manage the release of radioactive dust, along with other mitigation measures in the EMF[20]. Mitigation measure R-ENG03 addresses the requirement for storing various mixed rare earth mineral concentrates in covered sheds before transport off-site, as noted by the IAC.

Overall, the IAC found that the EES has identified appropriate design controls to mitigate the risk of radiation exposure. The IAC notes the necessity of reassessing the Radiation Impact Assessment (RIA) if any of the proposed engineering controls for containing radioactive material fail, which is reflected by the recommendation of a new mitigation measure R-ADM03 in the EMF. I support the IAC's recommendation as R-AMD03 will ensure that any potential failures in the containment of radioactive material are promptly addressed through reassessment and adaptive management. I agree with the IAC's findings, subject to the proponent adopting the IAC's recommendation of including the new mitigation measure R-AMD03 in the EMF.

Assessment

It is my assessment that potential effects associated with radiation are likely to be acceptable, given the proposed mitigations and controls and refinements recommended by the IAC and this assessment, which need to be implemented in accordance with the *Radiation Act 2005*.

5.9. Socioeconomic

Evaluation objective

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

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.

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

Assessment context

Socioeconomic effects are addressed in Chapter 18, Technical Appendix O and Attachment IV of the EES and in Chapter 15 of the IAC Report.

The EES proposed two mitigation measures to deal with socioeconomic matters, namely, a workforce accommodation strategy and neighbour agreements. These mitigation measures relate to construction, operation and closure of the project and have been the subject of recommendations by the IAC including additional measures in response to submissions and discussion at the hearing.

The EES and IAC process examined a number of potential positive and negative socioeconomic effects of the project, including:

- Workforce and local social profile;
- Displacement of land by workforce occupation;
- Access impacts and amenity, particularly for local residents;
- Economic benefits and disbenefits of the project; and
- Health and wellbeing impacts.

Mitigation measures presented in the EES and by the IAC can be summarised as:

- Workforce accommodation strategy;
- Neighbour agreements;

[20] Technical Document 137

- Workforce code of conduct;
- Employment policy; and
- Engagement activities.

This section focusses on the broad socioeconomic effects of the project. Further detail is provided on land use and planning impacts in Section 5.4, and traffic and transport issues in Section 5.5, noise and vibration in Section 5.6, air quality Section 5.7 and radiation in Section 5.8.

Discussion

GSC and SHRCC highlighted socioeconomic benefits of the project such as employment opportunities in their submissions.

Many submitters, including Mr Weston, shared concerns about the capacity of local accommodation, in towns such as Kerang and Swan Hill, to house the influx of up to 325 construction and 400 operation project workers and their families. The IAC was satisfied that a workforce accommodation strategy (MM-SC01) together with the memorandums of understanding (MoUs) with the councils and ongoing monitoring of housing affordability and availability, will provide an appropriate, adaptive approach to monitor and address local housing impacts. I support the IAC's revised phrasing of MM-SC01 to specify the construction phase as well as operations, in addition to a minimum reporting period of 5 years to the GSC and SHRCC. Additionally, the employment policy (MM-SC04) which will be developed and implemented by VHM, will encourage local employment. I concur with the IAC that this policy, if developed and implemented effectively, may alleviate further minimise housing affordability and availability impacts. I consider incorporation of the IAC's recommendations into the workforce accommodation strategy (MM-SC01), together with the employment policy (MM-SC04) will adequately manage the impacts to local housing through continued monitoring and communication with councils and implementation of adaptive management.

Submitters raised challenges and concerns about increased demand for community services in surrounding towns, associated with an influx of project workers, including general practitioner (GP) services, which are currently at or near capacity. The project is predicted to generate a need for an additional GP. To address this, it is recommended the workforce accommodation strategy (MM-SC01) be revised to incorporate monitoring of GP capacity, notably in Kerang and Swan Hill, and in instances where demand exceeds capacity, consider providing an on-site GP for workforce to access or alternative contingency measures to alleviate the competition with existing residents for medical care.

The project would potentially compete with local businesses for attracting and retaining staff, such as the agricultural sector. The employment policy (MM-SC04) does require consideration to minimise potential effects to other local businesses, in addition to encouraging recruitment of existing residents within commuting distance. Therefore, I support the IAC's conclusion that community service demand and possible competition for staff can be adequately managed provided ongoing monitoring and adaptation of the workforce accommodation strategy (MM-SC01) and employment policy (MM-SC04), alongside effective engagement and consultation. While acknowledging the concerns about adverse social and economic effects, I generally support the findings of the IAC and EES that the project will, overall, enhance the economic and social capacity of local communities, by providing new employment opportunities and income streams and enhanced social and cultural outcomes.

Although the IAC's report did not discuss social profile changes due to the influx of workers to the region, I support the employee code of conduct (MM-SC03) as means to addresses concerns for potential local cultural changes or behavioural issues, by establishing behavioural standards for workers when interacting with existing community members.

Concerns were raised by submitters regarding the assessment of economic benefits, particularly the MFMF raising an issue with the model adopted in the EES for the economic impact assessment (EES Attachment IV). I support the conclusion of the IAC that, when read in conjunction with the social impact assessment (technical report O), that the economic impact assessment methodology was appropriate and addressed the scoping requirements. I also note submissions from GSC and SHRCC, that identified economic benefits of the project for the local area, namely, improving viability of towns, services and infrastructure by attracting new residents. I support the findings of the IAC that the project will bring net economic benefits to the local area, region and State, provided the recommended mitigation measures are applied.

The proponent's neighbour agreements (MM-SC02) proposes that owners of the 14 rural dwellings within 3.5 kilometres of the project's mining licence boundary are eligible for an annual payment to address altered amenity due to the project. While such an agreement is not a solution to all issues raised by landholders, I support MM-SC02 as a commendable

mechanism to compensate landholders for changes they will experience. The proposed phrasing of MM-SC02 also provides for signatories to make claims for compensation for impacts resulting from the project under the MRSD Act, should these occur. I support the IAC's recommendation for MM-SC02 to be changed to delete the now superseded reference to signatories' ability to make submissions at the EES hearing. The IAC further noted the merit of a community benefit fund or community benefit sharing; however, these financial arrangements are typically voluntarily delivered by a project. Community benefit funds can provide positive social outcomes from a project and can reduce possible issues associated with some landholders included in the neighbourhood agreement (MM-SC02), and those who are not. I encourage the proponent to discuss this opportunity with councils and the community through existing engagement frameworks, as highlighted by the IAC.

Some submitters raised concerned about insufficient community consultation on the project and its effects while the EES was being developed. Proposed projects of this type in regional settings, introduce potential impacts, anxieties and uncertainties for communities, which need to be understood. I support the IAC's observation that more direct consultation may have alleviated some uncertainties and concerns evident in submissions on the EES. I am however, satisfied that additional mitigation measures and recommendations made via the IAC will help alleviate this and consider these recommendations are important for achieving improvements in engagement and consultation with the community during project's construction and operation.

Health and wellbeing

Many submissions were received relating to human health and wellbeing, notably by MFMF. The EES discussed potential effects across various impact assessment including noise, air quality, surface water and radiation (Technical Reports F,G,H1, H2, N) and the effects of these are discussed in those relevant sections of this assessment.

The EES and IAC report note that noise and vibration effects could affect nearby residents' health and wellbeing, including some disruption of sleep and reduced amenity. The proponent's proposed mitigation measures in the EES and confirmed via the hearing include selecting quieter equipment, installing noise barriers and machine silencers and night-time work restrictions, which will lower noise to reasonable levels. Additionally, impacts on air quality and amenity including dust and emissions are proposed to be managed by limiting silt content in haul roads, adopting advanced emissions reduction technologies, and implementing real-time monitoring to guide adaptive management. These are effective means of reducing impacts to acceptable levels.

While radiation impacts were assessed to be within regulatory limits, various mitigation measures have been proposed to ensure public exposure are further minimised. These include ongoing baseline monitoring, strict design and containment controls, and periodic reassessment to promptly address any containment failures if any occurs.

Dr Wright prepared a Health Human Assessment as an addendum to her expert witness statement, which incorporated a section on community wellbeing. This recommended an additional mitigation measure be included in the EMF to address farmer wellbeing, MM-SC05. MM-SC05 requires the proponent provide community with resources to manage mental health and wellbeing as well as engage with the National Centre for Farmer Health. I agree with the IAC that the project may cause both positive and negative impacts to community wellbeing. I am satisfied that negative health and wellbeing impacts can be managed adequately through the proposed mitigation measures, particularly with the addition of MM-SC05.

Assessment

It is my assessment that the socio-economic impacts of the project will be both positive and negative, and that the likely negative impacts can be managed to acceptable levels.

I support revised phrasing of MM-SC01 and MM-SC02, as well as additional mitigation measures, as recommended through the IAC process. I recommend an additional revision of MM-SC01 to incorporate monitoring of GP capacity and to consider providing an on-site GP for workforce to access or alternative contingency measures where demand may exceed capacity. I consider these recommendations will achieve adequate management of social and economic impacts.

Ongoing stakeholder engagement and consultation will be important for managing social and economic impacts of project construction and operation. I am satisfied that the mitigation measures proposed by the EES and IAC, and refined through my assessment, will embed sufficient consultation requirements for the proponent to continue to address social and economic concerns during the life of the project.

5.10. Agriculture, soils, landform and rehabilitation

Evaluation objective

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

Assessment context

Agriculture and soil effects are addressed in Chapter 16 and Technical Appendix L and M of the EES, geotechnical effects are addressed in Technical Appendix J, and in Chapter 13 of the IAC Report. Rehabilitation and closure are addressed in Chapter 19 of the EES and Technical Appendix P, and in Chapter 16 of the IAC Report. In the exhibited EES, VHM proposed 12 EMMs to deal with agriculture, soils, geotechnical and rehabilitation effects. A soil management and rehabilitation expert conclave was conducted as part of the IAC hearing, which included Rod Masters, SLR consulting, Rob Sonogan, MFMF, and Jim Shovelton, Meridian Agriculture. In response to evidence and submissions during the hearing, 15 mitigation measures have been the subject of recommendations by the IAC incl MM-SLR01, MM-SLR02, MM-SLR03, MM-SLR04 and MM-SLR05, MM-SLR06, MM-GS01, MM-RH01, MM-RH02, MM-RH03, MM-RH04, MM-RH05, MM-AG01, MM-AG02 and MM-AG03.

The EES stated that the project area is mainly utilised for dryland winter cereal cropping, with wheat, barley, oats, and canola being the most frequently grown crops. Soils in the MLA were described as calcarosols, sodosols and chromosols. No soil testing was undertaken in the water pipeline route for the EES, however similar sodic and dispersive soils were determined to be most likely in these areas. The EES proposed that the site would be rehabilitated to an equivalent, or better agricultural capacity post-mining. Therefore, the EES concluded that no land would be permanently removed from agricultural production, due to the intention to return land to its current agricultural land use at the conclusion of the progressive mining and rehabilitation proposed for the project. However, the project would temporarily and sequentially remove parcels of the land in the MLA from agricultural production. Hence there will be a progressive reduction in agricultural production and revenue for the local community during this time, as mine proceeds and rehabilitation ensues.

Mitigation measures presented in the EES, and by the IAC, can be summarised as:

- A Soil Management Plan, incorporating the IAC's recommendations, with input from an agronomist;
- Further investigations to identify variation and distribution of soil types to inform soil management and rehabilitation;
- A Rehabilitation Plan;
- Consultation with adjacent landholders;
- Weed control and monitoring;
- Staged and progressive rehabilitation and backfilling of pits; and
- A ground control management plan.

The EES concluded that residual impacts would be managed sufficiently with the implementation of recommended mitigation measures.

Discussion

Agriculture

The EES assessed the temporary impact on agricultural productivity on a worst-case basis assuming the entire MLA would be unavailable for production for the 20-year life of the mine. However, the IAC found the EES underestimated agricultural yields within the local area. More realistic yields and analysis were provided by the proponent's expert witness, Mr Shovelton, during the hearings, which demonstrated the area produced higher agricultural yields than those estimated in the EES. However, the more conservative yield amounts presented during the hearings were found to represent a minor impact on the local and state economies.

Many submitters noted the agricultural value of the Cannie Ridge and argued the use of land for agriculture was more beneficial than the proposed mining project. There is currently no policy or planning controls which outlines preferential support for protection of agricultural land within the project area, nor for preferential facilitation of natural resource projects such as mineral sands mining. The IAC concluded that the project could achieve a balance of both policies which support

agriculture and natural resource development. With the conservative, revised estimates, provided by Mr Shovelton during the IAC process, the impacts to overall agricultural yield are likely to remain minor. I support the IAC's findings that the project, providing it incorporates recommended mitigation measures, will not have an enduring impact on overall local agricultural productivity.

Submitters were concerned about potential impacts to agricultural productivity on adjacent land, as well as potential threats to organic statuses held by businesses. This stems from concerns about offsite pollution, radiation, traffic and amenity which are also discussed in chapters 9, 10, 11 and 14 of the IAC report and 5.2, 5.3, 5.7 and 5.8 of this Assessment. These sections discuss the possible impact pathways to nearby agricultural activities through air, surface water, groundwater and radiation. The IAC concluded that these impacts can, subject to recommendations, be acceptably managed through the EMF and associated mitigation measures. I support the conclusions drawn by the IAC.

Soils

Submitters, most notably Mr Bennet, expressed concerns regarding the soil testing in the exhibited EES and the proposed soil stripping techniques recommended in the exhibited EMF. The IAC supported the recommendation made by Mr Bennet to separate soil into more zones than proposed in the exhibited EMF, which has been captured by the proponent in the revised day 3 version of MM-SLR01 and will be informed by further soil condition investigations. I support the conclusion that this approach can minimise potential agricultural productivity risks associated with mixing lower soil horizons with topsoil, due to variance in pH, salinity, boron, lime and clay throughout these horizons, as these could have varying impacts on vegetation growth and productivity.

Mr Shovelton recommended in his expert witness statement[21] that further soil sampling and analysis be taken prior to commencing mining activities. These recommendations included specific recommended factors for analysis, which the IAC referred to as analytes. I support the recommendation made by the IAC to include a cross-reference in the mine site soil management plan (MM-SLR01) as the EMF did not previously specify analytes required for soil testing. However, I propose an amendment to MM-SLR01 to correctly reference the table in Mr Shovelton's expert witness statement, as 'untitled Table 3', as the witness statement did not number or title the table according to convention.

Evidence was provided by Mr Shovelton which clarified that the normalized difference vegetation index (NDVI) and electromagnetic soil mapping (EM38) techniques alone would not be appropriate for analysing areas without vegetation, including the pipeline route. The IAC emphasised the need for further soil testing to be undertaken along the pipeline route to establish baseline conditions and risks such as potential for dispersive soils, which has now been included in the updated EMF and the recommended changes to MM-SLR02. I support the IAC's recommendation to investigate existing conditions of all soils along the proposed pipeline route in addition to the MLA, which has been included in MM-SLR02. I am generally satisfied that further detailed soil investigations will better inform the project development and development of the management plans. Provided these recommendations and mitigation and monitoring measures are implemented, it is my assessment that potential soil impacts can be managed to an acceptable level.

Rehabilitation of Agricultural Land

Many submitters were concerned the MLA could not be rehabilitated to the same or better condition post-mining, as assessed in the EES. The IAC's soil management and rehabilitation conclave concluded that provided recommendations are implemented the site is predicted to be returned to its pre-mining status within 5 to 7 years, or in good seasons within 2 to 3 years. However, Mr Sonogan, MFMF's expert witness, later withdrew his support for this conclusion of the IAC conclave. The conclave also concluded early establishment of soil reinstatement trials, with extensive monitoring, will add value for informing future monitoring and adaptive management measures. Mr Shovelton concurred with Mr Bennett that observing soil reinstatement performance across both low and high rainfall seasons is essential to understanding the potential constraints experienced, highlighting the importance of undertaking a multi-year trial to understand the best approach to rehabilitation. I support the recommendations made to implement the soil reinstatement trials as soon as possible in order to observe the effectiveness of techniques across several years. Therefore, I support the revised phrasing of MM-RH05 to clearly outline a 5 to 7 year reinstatement trial which should be extended, as required, to include one below average rainfall season. The IAC accepted the evidence provided in the EES and during the hearing that the soil re-instatement trial is required for fine tuning of rehabilitation techniques and is not necessary to demonstrate that the land can be restored to its pre-mining capacity. I support this finding of the IAC.

The EPA expressed in their submission concerns for the lack of specificity of erosion and sedimentation controls, as it was not clear what appropriate control measures were. I support the recommendations made by the IAC and revised phrasing of MM-SLR01, MM-SLR04 to include a direct reference to MM-SW01 which includes the development of an

[21] Tabled Document 26

Erosion and Sediment Control Plan. Similarly, I support the revision of MM-RH01 to have the Rehabilitation Plan informed by a detailed risk assessment and note the EPA may have the opportunity to review and provide feedback on the plan at a later stage. I believe effective integration and implementation of these mitigation measures will manage impacts associated with rehabilitation to an acceptable level.

I support the incorporation of a trigger action response plan (TARP) in MM-RH04, as recommended by Mr Masters in his expert witness statement[22]. A TARP was recommended as management actions can be swiftly identified in the event of rehabilitation impacts or outcomes not being achieved in an acceptable timeframe. The IAC recommended the TARP address all foreseeable soil constraints and that the TARP is updated as an adaptive management practice. I believe with effective implementation, and regular updates in response to data from the soil reinstatement trials and / or progressive rehabilitation, the TARP can be an effective tool for risk identification and effective remedial action.

Many submitters held concerns regarding assurance of rehabilitation following mine closure. The exhibited EES outlined the Rehabilitation Plan (MM-RH01) which will need to be approved by ERR, with suggested consultation with EPA, as well as MM-RH02 and MM-RH03 to mitigate unplanned closure risks. MM-RH02 describes the progressive rehabilitation approach by limiting the amount of land needing rehabilitation in the event of unplanned closure, whereas MM-RH03 outlined the rehabilitation bond which is required under the MRSD Act prior to any mining commencing. In response to submitters concerns regarding final landform, linked to differential settlement and potential impacts to drainage, the IAC suggested MM-RH01 be updated to include a monitoring program for identifying areas of differential tailings settlement. The IAC concluded the statutory framework and rehabilitation plan can suitably manage landform rehabilitation. I support the conclusions drawn by the IAC, as well as the revised phrasing of MM-RH01, MM-RH02 and MM-RH03.

Geotechnical

The exhibited Geotechnical Impact Assessment, Technical Report J, assessed ground movement pathways and risks associated with the project such as slope collapse of the ground pit or dispersive soil impacts on ground stability. The technical report found the project would not have significant ground movement impacts, if recommendations within the report are implemented. However, the report identified further potential information gaps and risks outside of the MLA, including location of existing public services; information on current road infrastructure and its ability to support the project; and the extent and nature of dispersive soils along the pipeline alignment. The IAC queried through an RFI, both how the proponent proposed to address information gaps in technical report J, as well as which recommendations in the technical report had not been included in the exhibited EMF. The IAC noted that in response to its request, the proponent both updated the ground control management plan (MM-GS01), and identified how the geotechnical risks and information gaps can be addressed through existing statutory requirements or mitigation measures within the EMF. The IAC was satisfied that information gaps will be addressed through further investigations undertaken within the various existing mitigation measures and other approval consents such as the works on waterways application, work plan and railway and road crossing consents. I support the conclusions of the IAC that the geotechnical impacts can be appropriately managed through the revised MM-GS01, other consents and existing measures in the EMF such as further soil investigations in MM-SLR01 and MM-SLR02.

Assessment

It is my assessment that agriculture, soils, geotechnical and rehabilitation impacts can be mitigated and minimised to acceptable levels, with the implementation of the EMF and specific measures, as amended by the IAC and through my assessment.

I note and acknowledge existing information gaps and related uncertainty around the effectiveness of some proposed mitigation measures, however this information can be appropriately obtained through the suggested further investigations outlined in the EMF and incorporated into relevant management plans or approvals.

This further information is important to ensure that the project is appropriately managed, however is not required to inform my assessment that the project would have acceptable environmental impacts. I support the recommendations of the IAC regarding the phrasing of the various mitigation measures for soils and land resources, geotechnical stability, agriculture and rehabilitation and closure. I largely support the IAC's phrasing of MM-SLR01, provided correct reference to Mr Shovelton's expert witness statement is included.

[22] Tabled Document 22

5.11. Other effects (landscape and visual, contaminated land, wastes and emissions)

As noted in my published reasons for requiring an EES, the EES was to focus on potentially significant effects of the project including those related to remnant vegetation and associated biodiversity values, surface water and groundwater, existing land uses and amenity and landscape values, as well as Aboriginal cultural heritage values. The EES, submissions, IAC and supplementary information carefully examined additional potential effects associated with these aspects. These are considered in sections 5.1 to 5.10 of this assessment with the exception of cultural heritage, historic heritage, and landscape and visual effects.

Historic heritage, cultural heritage and landscape and visual effects are discussed below. Assessments prepared through the EES considered that these effects were more localised and less significant effects and these are discussed in EES Chapters 8 and 9 and were informed by Technical Reports C and D. The panel discussed these issues in Chapters 5 and 6 of its report.

Table 4 outlines the IAC's findings relating to these effects and discusses their significance, the proposed EMF and management controls. I support the findings of the EES and the IAC in relation to these effects and consider that they can be effectively managed through well-established practices including the recommended mitigation measures.

Table 4 Assessment of other environmental effects

IAC findings and recommendations	Assessment
Cultural heritage **The investigations undertaken for Technical Report C did not identify any Aboriginal cultural heritage places within the project study area.** **A draft Cultural Heritage Management Plan (1784) has been prepared alongside the EES, in consultation with Wemba Wamba Aboriginal Corporation, as required under section 49 of the *Aboriginal Heritage Act 2006*.** **The IAC was satisfied the investigations conducted for technical report C were appropriate for the purpose of the EES and the CHMP and MM-CH01 will provide mechanisms to suitably manage impacts.** **The IAC revised MM-CH01 to revert to phrasing included in Technical Report C.**	I support the IAC's findings that the Project's Cultural Heritage impacts and risks can be appropriately managed through the implementation of the CHMP and proposed mitigation measures, as revised by the IAC.
Historic heritage **The EES did not identify any artefacts, structures or sites of historical significance within the project study area. Although one Victorian Heritage inventory registered site was identified 150 m north of the study area.** **Submitters Leanne Pola and Peter Pola Senior (Submitter 30, Tabled Documents 203-210) noted the EES did not refer to the former Gnarwee State School on the south side of Bennett Road, immediately west of the topsoil pit in Area 1.** **The IAC was satisfied the investigations conducted for Technical Report C were appropriate for the purpose of the EES and that any artefacts or values that may be identified during the project would be subject to MM-HH01 which outlines the development of Unexpected Fins Protocols to reduce harm to unknown historical heritage values, including the Gnarwee State School should it have heritage value that requires**	I support the IAC's findings that the Project's Historic Heritage impacts and risks can be appropriately managed through the implementation of the proposed mitigation measures, as revised by the IAC.

protection. The IAC revised MM-HH01 to specify an appropriate contractor induction will be provided to communicate the Unexpected Finds Protocol.	
Landscape and visual **The IAC issued a request for further information (RFI #27) on the visual impacts of stockpiles of ore, overburden or topsoil, as this was not included in the EES. The proponent provided a technical note (TN03, D187) from Moir Landscape Architecture which included six photomontages demonstrating stockpiles at maximum heights may potentially be visible. The technical note proposed the additional material did not alter the conclusions of Technical Report D nor its recommendations.** **The IAC has modified MM-LV01 to specify screen planting along the southern boundary of Area 1 and to specify that visual screening offered to receptors will be at the cost of the proponent. The IAC also revised LV03 to improve clarity of language.** **The IAC found that the EES had appropriately assessed landscape and visual effects and they can be appropriately managed through the proposed mitigation measures which includes the development of a detailed landscape management plan/s and minimising adverse visual effects of lighting and infrastructure.**	I support the IAC's conclusion that the landscape and visual effects of the project are manageable through implementation of the proposed mitigation measures, with inclusion of the IAC's revisions.

6. Conclusions

The environmental effects of the proposed project examined through the EES process are considered acceptable, provided the recommendations of the IAC and this assessment regarding project refinements and mitigation measures are implemented effectively.

It is my assessment that, on balance, the project has merit and benefits for the region but comes with environmental effects that need to be mitigated and, in some cases, offset. I support the findings of the IAC that none of the environmental effects could or should prevent the project proceeding, provided effective mitigation is implemented, consistent with the IAC and my assessment.

I agree with the IAC regarding the residual uncertainty about the specific extent of some effects on biodiversity values along some roads and intersections. There remains potential for some threatened ecological values to be impacted without appropriate avoidance and mitigation. Therefore, I have made recommendations in my assessment regarding these specific ecological values, for completion of further surveys to resolve residual uncertainty and ensure avoidance and mitigation is applied effectively.

I have also recommended the proponent prepare a design management document to demonstrate how the siting and design of the proposed pipeline, road and intersection upgrades outside of the MLA would account for the further survey work and appropriately apply the avoid and minimise approach. I have made similar recommendations for selected areas along roads within the mining licence area where there is some residual uncertainty and there may be opportunities to further avoid and minimise effects. I am satisfied that with these recommendations being adopted and implemented effectively, the potential impacts to biodiversity values will be avoided and minimised to acceptable levels.

In concur with the IAC that the further work and surveys recommended by the IAC (and refined through my assessment) are to help ensure the environmental performance of the project is improved and sound, including to refine some mitigation measures and controls. They are not necessary to establish acceptability of effects or whether the project should proceed.

The Victorian EES process served as the accredited assessment process for the purposes of examining the likely significant impacts of this 'controlled action' on MNES under the EPBC Act. My assessment therefore informs the Commonwealth Minister for the Environment and Water's decision about whether and under what conditions to approve the project under the EPBC Act. I consider that residual impacts on MNES are unlikely to be significant, providing sound implementation of the amended mitigation measures, based on the recommendations of the IAC and this assessment.

Decision-makers need to consider this assessment before deciding whether and how the project should proceed. As a matter of good practice, I also expect decision-makers to write to me and advise how my assessment was considered and applied.

Table 5 summarises my response to the IAC's key recommendations as provided in the Executive Summary of the IAC report. My detailed recommendations relating to each environmental aspect are outlined in Appendix A.

Table 5: Response to IAC's recommendations and additional recommendations

IAC recommendations		Minister's responses and recommendations	Section
Environmental Management Framework			
1	Approve the Environment Management Framework included at Appendix E of this report	Generally supported subject to the recommendations of my assessment that have refined the EMF, also noting my recommendation that the proponent prepare a final version of the EMF responding to the recommendations of the IAC and my assessment for my endorsement.	Sections 4, 5 and Appendix 1.
Draft Planning Scheme Amendment GC218			
2	Approve draft Planning Scheme Amendment GC218, subject to:	Supported in principle noting the additional changes needed to the draft PSA outlined in	Section 4, and Appendix 1

a)	including the Goschen Rare Earths Mineral Sands Project Incorporated Document included at appendix F of this report.	Section 4 and Appendix A of this assessment, and that the final form and content of the PSA will need to be submitted for a formal decision under the Planning and Environment Act.	
b)	Extending the Specific Controls Overlay – Schedule 4 mapping to include water pipeline option A2.		
K01 (Power Generation) Development Licence			
3	The Proponent should address the following in support of the development licence application:	Supported	Section 5.7
a)	Confirm the dimensions of the power station and pump station and the dimensions of any nearby structures.		
b)	Confirm stack heights are adequate to ensure good dispersion.		
c)	Confirm the intention expressed in section 8.1.2 of the exhibited development licence application that emission from the power station and pump station have been minimised as far as reasonably practicable by using selective catalytic reduction such as AdBlue or equivalent technology.		
d)	Provide piping and instrumentation diagrams or equivalent to demonstrate there are no other air discharge points that must be included within the application.		
e)	Periodically report to the Environment Protection Authority Victoria on the availability of an alternative green power supply for its operations.		
f)	Re-run air dispersion model AERMOD for emissions from the diesel generators using selective catalytic reduction and alternative fuels (liquefied natural gas and liquefied petroleum gas) and ensure that the exhaust plume is discharged at least 3 metres above the roofline of the power station or at a height where it can demonstrate plume downwash is minimised.		
4	The Environment Protection Authority Victoria should review emissions from the processing plant to establish whether the prescribed exemptions for general discharges or emissions to the atmosphere apply.	Supported	Section 5.7

HON SONYA KILKENNY
MP Minister for Planning

6/12/2024

Appendix A Environmental Mitigation Measures

The IAC recommended specific changes to the EMF and several mitigation measures in response to submissions and through their analysis of the issues. Section 4 of this assessment outlines the IAC's key findings and recommendations relating to the EMF and my response. Further to this, Section 5 of this assessment sets out where I support and/or recommend further changes to the mitigation measures considered by the IAC.

Table A1 and A2 contains the proponent's 'Day3" version of the mitigation measures and monitoring and contingency measures outlined in the EMF that was tabled at the IAC hearing[23] and incorporates recommended changes from the IAC denoted as either 'additions' and/or ~~'deletions'~~. I generally endorse all changes recommended by the IAC except where qualified in Table A1. Further details regarding my findings and recommendations in this table are contained in Section 5 of this report.

[23] Tabled Document 271

Table A1: Recommended changes to the environmental mitigation measures.

MMID	IAC recommendation	Project phase	Implementation document	Minister's response
Biodiversity and habitat (Flora and Fauna Ecology)				
MM-BD01	Minimise impacts to trees Engagement of an arborist to provide recommendations to avoid or minimise impacts to native vegetation, such as: - micro-siting of pipeline and roadworks to avoid trees where possible - assessment of trees deemed to be lost in EES to determine whether any additional measures can be taken to avoid adverse impacts to structural root zones and ensure that trees persist in the long term - assign designated turning points where there are gaps in the roadside vegetation to prevent compaction and damage near trees - identify and carry out any canopy pruning that is required prior to works commencing to prevent branches being hit or torn off with machinery Undertake an arborist survey to inform swept path design and construction techniques for road upgrades.	Construction	Biodiversity Management Plan within Work Plan EMP under Incorporated Document	Supported
MM-BD02	Minimise impacts to native vegetation - Prior to the final design of relevant intersections and road upgrades, where there is potential for the EPBC listed Natural Grasslands of the Murray Valley Plains to be present, further survey for this community will be undertaken to inform design and construction techniques. - Any proposed vegetation removal ~~is~~ will not be undertaken until applicable approvals and permits have been issued - Vegetation protection zones (aligned with AS 4790) will be established around native vegetation prior to works and will be maintained for the duration of relevant construction (within the area subject to the Incorporated Document) and over the life of the Project (within the area subject to the Work Plan) - Required vegetation / habitat offsets ~~are~~ will be sourced in accordance with Commonwealth and / or State legislation or policy.	All phases	Biodiversity Management Plan within Work Plan EMP under Incorporated Document	Generally supported, with the following recommendations • The further survey work should be conducted to inform the design management document required as a condition of the Incorporated document or for the Mining Licence Area prior to submission of the work plan for approval. Further, the survey work for Natural Grasslands for the Murray Valley Plains should be completed to the satisfaction of DCCEEW, and the results of this survey effort should be considered in MM-BD08. • Final offset calculations should be determined following detailed design work required in MM-

	- Impacted FFG listed species ~~to~~ will be included in revegetation in relevant EVCs in the mine site rehabilitation phase, with seeds and/or cuttings taken from impacted plants where appropriate. - The Rehabilitation Plan (**RH01**) under the Mining Licence ~~to~~ will include requirements to revegetate the mined/closed portions of Bennett Road and Thompsons Road, in consultation with relevant road authorities. - Any areas of native vegetation disturbed in pipeline construction and roadworks construction ~~to~~ will be revegetated with species and communities consistent with those present prior to disturbance, using seeds and/or cuttings taken from impacted plants where appropriate, and following reinstatement of the land in accordance with MM-SLR02.			BD07, to the satisfaction of DEECA and DCCEEW
MM-BD03	Minimise impacts to remnant native vegetation in vicinity of work areas All construction personnel ~~to~~ will be appropriately briefed prior to works, and no machinery or equipment will be placed inside vegetation/tree protection zones	All phases	Biodiversity Management Plan within Work Plan EMP under Incorporated Document	Supported
MM-BD04	Control spread and/or introduction of weeds and/or pathogens - Vehicles - Ensure an appropriately designed clean-down area(s) is established prior to the commencement of works - Ensure vehicles, machinery and plant equipment are clean before entering and leaving the site at the designated clean-down area - Manage waste from clean-down bays by burying the waste below the subsoil	All phases	Biodiversity Management Plan within Work Plan EMP under Incorporated Document	Supported
MM-BD05	Control spread and/or introduction of weeds and/or pathogens - General - Prepare controls to ensure material inspected before entry to and exit from site with rejection of material that contains signs of noxious weeds Control weeds prior to stockpiling of topsoil - Dispose of weed material on site in the designated burn area if possible or seek permission to transport and dispose of the material at a legal place of disposal - High threat weeds, namely Common Heliotrope and African Box-thorn to be treated prior to works commencing - Outbreaks of noxious and/or Weeds or National Environmental Significance (WoNS) within construction and operational areas will be managed. Spread into adjacent land will be prevented	All phases	Biodiversity Management Plan within Work Plan EMP under Incorporated Document as considered appropriate in consultation with the relevant responsible authority.	Supported

	- Dispose of material containing declared noxious weeds in accordance with the Catchment and Land Protection Act 1994			
MM-BD06	Native vegetation revegetation within the Mining Licence Area and pipeline route - Revegetation of impacted roadside areas of native vegetation along the pipeline route and within the Mining Licence Area will be undertaken based on impacted Ecological Vegetation Classes. - Preparation of revegetation will commence as soon as possible, with pre-emptive weed control conducted during the active growth/flowering periods of weed species and at least one month prior to planting. - Pre-emptive pest control (e.g., rabbits), cuttings and seed collection will be undertaken. - Works should be conducted in late autumn to winter after and ideally preceding a significant rain event to encourage successful establishment of new plants. - Revegetation species, design and diversity will be based on EVC benchmarks for Ridged Plains Mallee (EVC 96), Woorinen Mallee (EVC 824) and Plains Savannah (EVC 826) and any advice from local indigenous plant nurseries regarding suitable indigenous species for the area. - Plants should be grouped by life form in dense patches to create a mosaic effect throughout the revegetation zones (this reduces competition and limits the opportunities for weed infestations). A mix of species will create diverse habitat structure and reduce the risk of failure compared using with a few select species. - Along roadsides, plantings of trees and shrubs must consider VicRoads Tree Policy (2016) and other relevant policies to ensure road safety. The majority of revegetation required along the pipeline is less than 1 metre from the road verge, and so any planting of tress and medium to tall shrubs would need to be discussed with VicRoads and/or local Council. - Tube stock will be appropriately protected from rabbits through the installation of tree guards which should be inspected every 3 months for damage requiring replacement. - Once planting is completed, regular, ongoing weed control will be required subject to on-ground conditions for example on a quarterly basis. - Regular watering will be undertaken for at least 12 months after planting depending on rainfall and any signs of plant stress.	All phases	Rehabilitation Plan under Work Plan EMP under Incorporated Document	Generally supported, with the following recommendations: • require the revegetation plan to be developed prior to the commencement of works. • require the plan to: o Include details on the feasibility, cost and proposed extent of works. o Be developed in consultation with stakeholders and landowners. o Outline key agreements and commitments including monitoring and adaptive management measures. o Be developed under the guidance of a suitably qualified ecologist. o Consider opportunities to identify and deliver potential new habitat corridors.

MM-BD07	Minimise impacts to biodiversity – road upgrades Prior to detailed design of the Project (including the mine plan): - Undertake an assessment of the potential impacts of the haulage route upgrade options and alternatives on native vegetation (including listed species and communities), trees and fauna habitat (including fauna corridors). - Investigate (through detailed design and in consultation with relevant road authorities) any feasible options or alternatives (including the potential use of adjacent cleared farmland where it is owned by the Proponent) that will avoid and minimise impacts to remnant roadside vegetation and associated habitat. Without limiting the scope of the assessment, further survey work may be required of any previously identified treeless patches of vegetation which may consist of the EPBC listed Natural Grasslands of the Murray Valley Plains community. Consistent with the Guidelines for removal, destruction or lopping of native vegetation (Department of Environment, Land, Water and Planning (DELWP), December 2017) (guidelines), efforts should be focused on areas of native vegetation that has the most value. This assessment is to be undertaken to the satisfaction of the Secretary of DEECA and will inform the avoid and minimise statement required by the application requirements under the guidelines.	Pre-construction	Biodiversity Management Plan within Work Plan EMP under Incorporated Document	Generally supported, with the following recommendations: • The further survey work should be conducted to inform the design management document required as a condition the Incorporated document or for the Mining Licence Area prior to submission of the work plan for approval. • Further avoidance and minimisation of potential impacts to Superb Parrot and Regent Parrot flyways should be included for consideration. • Specific consideration should be given to opportunities to avoid and minimise impacts to threatened flora, including Umbrella Wattle, Yarram and Bush Minuria.
MM-BD08		All phases	Biodiversity Management Plan within the Work Plan Design Management Document under the Incorporated Documents	New requirement In response to the surveys to be undertaken for the EPBC listed Natural Grasslands of the Murray Valley Plains community, the project should demonstrate avoidance of impacts to this listed community. The project should also demonstrate the commitment to avoid impacts to EPBC listed Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions through further design work for the project. The plans must clearly identify the full extent of Natural Grassland of the Murray Valley Plains and Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions community within the project area and must clearly demonstrate how the project will avoid any direct or indirect impacts to any area of these communities, to the satisfaction of DEECA and DCCEEW. The mitigation measures must be tailored to

				the activity type (e.g. ground disturbance, road upgrades), and include a suitable buffer.
MM-FE01	Minimise impact to native fauna – fauna salvage - Fauna salvage ~~to~~ will be undertaken by suitable qualified specialist where fauna habitat is to be removed - Areas suitable to relocate fauna ~~are~~ will be identified prior to fauna habitat removal - Habitat enhancement strategies ~~are~~ will be implemented in areas of fauna habitat to be retained. This may include the translocation of hollow branches, woody debris and where possible leaf litter from areas where native vegetation is removed, consistent with relevant EVC benchmarks and under the supervision of a suitably qualified project ecologist. Where practicable and advised by the project ecologist, place translocated hollow branches at height to provide elevated habitat.	Construction Operation	Biodiversity Management Plan within Work Plan EMP under Incorporated Document	Generally supported with revisions to require pre-clearance surveys for species of conservation significance that the likely to occur within the potential habitat within the project area and that fauna enhancement strategies are developed in consultation with DEECA.
MM-FE02	Minimise impact to ~~native vegetation –~~ Kangaroo Lake flora and fauna habitats - Soil spoil containment areas ~~are~~ will be identified in consultation with relevant regulatory authorities prior to the commencement of works. - Stockpiles of earthworks and pavement materials, and all fuels/oils/chemicals and equipment will be stored away from the lake. - The pump station and works area/s ~~should~~ will be designed to have the smallest footprint possible and ~~should~~ be designed to minimise the need for in-lake works. - Install No Go Zone (NGZ) exclusion and sediment fencing to prevent ingress and protect areas of the lake's banks and bed. - Aquatic, emergent and riparian habitat ~~would~~ will be reinstated following construction of the pump station. - If possible, works at the pump site on Kangaroo Lake ~~are~~ will be undertaken during dry ground conditions. Alternatively bog mats are deployed. - Erosion and sediment controls ~~are to~~ will be in place to minimise the number of erodible surfaces during construction - A waterproof sealed bund ~~is~~ will be installed around the pump works area. - Chemicals ~~are~~ will not ~~to~~ be stored within 1 km of Kangaroo Lake. - Fuels and oils will be stored in a suitably bunded and protected location. - Vehicle movements are to be kept to the minimum required.	Construction Operation	EMP under Incorporated Document	Supported

	- Equipment is checked prior to the commencement of works each morning to check for any chemical leaks. - Any vehicle / equipment leaking chemicals is withdrawn from the works area immediately - Any onsite surface water to be filtered prior to release to the lake. Any water discharged from the works site should not detrimentally impact water quality of the lake. Undertake water quality monitoring to confirm the relevant water quality requirements of EPA's Environmental Reference Standard for *Murray and Western Plans, lowlands of the Loddon basin"* (ERS; EPA, 2021) - Following construction, monitoring of water quality, revegetation, weeds, earthworks/structures and any remaining controls should continue until the project area is stabilised and risk of further impacts is negligible.			
MM-FE03	Minimise impact to native fauna - Commonwealth Light Pollution Guidelines (2020) ~~are~~ will be used as guidance for light installation - Nearest veterinary clinic and / or wildlife carer contact details ~~are~~ will be included in any relevant management plans - Buffers in the form of vegetation and bunds are considered around the mine operations area - Speed restrictions ~~are~~ will be established within the proposed transport routes and all employees and contractors' drivers are informed of the speed limits at the site induction and provided training on how to deal with vehicle/native fauna interactions - Vehicles exhaust systems ~~are~~ will be maintained to limit noise impacts to fauna - Days of high winds, a water cart ~~is~~ will be deployed to minimise dust / gravel displacement onto fauna habitat / roadside vegetation - Processing pond will have wires strung across at 10 metre intervals with bird deterrent discs hung below the wire. - Chain mesh fencing at least 2 metres in height will be erected around the perimeter of mining Area 1 and Area 3 minimising access to terrestrial fauna.	All phases	Risk Management Plan within Work Plan EMP under Incorporated Document	Supported
MM-FE04	Minimise impact to native fauna - Pipeline - Native fauna specialist will provide~~s~~ input to CEMP in regards strategies to minimise impact and development of a fauna recovery protocol, with periodic review for the duration of the pipeline construction	Construction	EMP under Incorporated Document	Supported

	- 30 cm high fauna fence, (constructed from damp course material), ~~is~~ will be erected adjacent to both sides of open trenches - Cover trenches if left open between days of construction activity - Install No Go Zone (NGZ) exclusion fencing around retained areas of Samphire skink habitat along Mystic Park-Beauchamp Road between the Piangil rail line and Bael Bael-Boga Road, and maintain until the completion of adjacent construction activities - Inspection of angled fish screen within one year ~~2 years~~ of operation to assess fitness-for-purpose in minimising risk of entrapment/drowning of aquatic fauna, including fish larvae as small as 4 millimetres			
MM-FE05	Minimise impact to native fauna - Kangaroo Lake - Design the pump station to include an a~~A~~ngled fish screen on the inlet that is designed to Australian best practice standards and is able to effectively protect smaller fish (as small as larva of 4 millimetres long) and other aquatic fauna from entrainment and impingement - Undertake a pre-works aquatic fauna / targeted SPSG survey of the area in the vicinity of the pump station to ascertain the actual SPSG and other aquatic fauna usage at that time. Survey to occur in summer to align with SPSG breeding / larvae.	Construction	EMP under Incorporated Document	Supported
Cultural Heritage				
MM-CH01	Protection of cultural heritage values The project to be delivered in accordance with the approved CHMP which will include (but not be limited to): - The requirement for all personnel involved in ground disturbing activities to participate in an Aboriginal cultural heritage induction. - The need for the proponent to regularly review their compliance with the management conditions contained in the CHMP. - Strategies to be implemented if any suspected ~~cultural artifacts~~ human remains are found within the Project's disturbance footprint. - Process to follow if unexpected Aboriginal places or objects other than human remains are found during the activity. - Custody and management of Aboriginal cultural heritage recovered. - Reviewing compliance with the management plan. - Dispute resolution.	All phases	Cultural Heritage Management Plan	Supported

	- Delays and other obstacles. - Authorised Project Delegates and the handling of sensitive information.			
MM-HH01	Protection of historic heritage values An Unexpected Finds Protocol will be prepared to reduce harm to unknown historical heritage values that may be present within the Project area. If historical heritage sites are discovered during the construction, operation or closure of the Project, the following steps will be applied: - The person who identified the find will immediately notify the person in charge of the activity. - The person in charge of the activity will then suspend any relevant works at this location of the discovery and to a distance within 50 metres of the relevant site extent and isolate the find via the installation of safety webbing, or other suitable barrier and the material to remain in situ. - Works for the activity may continue outside of the exclusion zone, although if additional heritage is identified this must also be protected following the steps outlined above. - The person in charge of works will notify a suitably qualified archaeologist of the find within 24 hours of discovery. - Relevant management actions will be determined by the suitably qualified archaeologist in relation to the Heritage Act 2017 (Vic) and in consultation with Heritage Victoria. - Site cards for identified historic archaeological sites required to be submitted to Heritage Victoria (HV) within 30 days of discovery. - Approvals must be granted by HV (Heritage Victoria) for works to continue. All historical archaeological sites are protected under the Heritage Act 2017 and cannot be harmed without approval Appropriate contractor induction will be provided to communicate the Unexpected Finds Protocol.	All phases	EMP under Incorporated Document	Supported
Landscape and Visual				
MM-LV01	Minimise adverse effects on landscape and visual amenity Detailed Landscape Management Plan/s must be prepared prior to construction that have regard to Technical Report D – Figure 18 and Appendix C and address the following:	All phases	Risk Management Plan within Work Plan	Supported

	- Early establishment (within 1 year of commencement of construction) of vegetation screening along the perimeter of the mine site where appropriate, including as a minimum along the western boundary of the processing facility and along the southern boundary of Area 1 ~~(as outlined in Technical Report D – Figure 18 and Appendix C)~~ with planting of suitable fast growing screen species where appropriate. - Ongoing management and maintenance of vegetation and screen planting. ~~- Soil restoration strategies in line with the recommendation of the Soil and Land Resource Technical Report and the Rehabilitation and Closure Technical Report.~~ ~~- The establishment of plant growth medium to support revegetation that will help restore landscape values.~~ ~~- Monitoring of the rehabilitation measures by providing direction of documentation procedures, data collection, record keeping, and performance tracker for plant establishment~~ Owners of receptors R6, R8 and R12, as shown in Figure 18 of Technical Report D: Landscape and visual ~~(Moir, 2023)~~, will be consulted with and offered landscape planting to provide visual screening at the cost of the Proponent.			
MM-LV02	Minimise adverse effects of visual amenity - lighting - All lighting fixtures installed on-site will be in accordance with the AS4282-1997 Australian Standard and activities associated with the transport, placement and removal of overburden stockpiles will be shielded or limited as far as possible to daylight hours to reduce the requirement (or spill) of night lighting - Wherever possible, lighting should face downwards and be shielded to reduce the likelihood of a light spill and glow effect.	Construction Operation	Risk Management Plan within Work Plan	Supported
MM-LV03	Minimise adverse effects on visual amenity - The building materials and finishes ~~should~~ will be sandy/earthy colour tones, where possible, and ~~should~~ utilise non-reflective materials. - Low contrast textures and materials ~~should~~ will be used so far as reasonably practicable ~~to the extent practicable~~	Construction	Risk Management Plan within Work Plan	Supported
Traffic and Transport				
MM-TP01	Minimise adverse social effects - A community stakeholder and communications plan will be developed with regard to transport with ongoing stakeholder consultation to be undertaken during the lifecycle of the Project. Key notifications to include as a minimum:	All phases	Stakeholder Engagement Plan as part of Traffic Management Plan	Supported

	- Pre-construction stage - Construction, operation and decommission, with: TMP measures and controls; Construction traffic monitoring; and road network monitoring, remediation protocols and maintenance requirements - Operation, with construction close-out meeting, infrastructure hand-back criteria - Post operation - Stakeholder consultation will involve, but not be limited to: DTP, NVHR, Swan Hill Rural City Council, Gannawarra Shire Council, emergency service providers, local road users and land owners affected by road closures.		– part of EMP under Incorporated Document.	
MM-TP02	Minimise adverse social and land use effects Prior to the commencement of construction (excluding preparatory works), a Traffic Management Plan (TMP) will be developed and implemented to minimise disruption so far as reasonably practicable ~~to the extent practicable~~ to affected local land uses, traffic, car parking, on-road public transport, pedestrian and bicycle movements and existing public facilities during all stages of the Project. The TMP will be developed in consultation with the relevant road management authorities and be informed and supported by an appropriate level of transport analysis. The TMP will address ~~include~~, as a minimum the recommendations of ~~those items recommended in Table 38 of~~ EES Technical Report E: Transport (AECOM, June 2023) and Technical Note TN06 29 April 2024 (D268), ~~including~~ and require ~~the~~ movement of ore/product which would occur during daylight hours between 7.00am and 6.00pm. The TMP will be an overarching document to inform subsequent specific work site TMPs developed by works contractors. In addition, as previously discussed there may be a need for other specific TMPs (see MM-TP07).	All phases	Traffic Management Plan – part of EMP under Incorporated Document	Supported
MM-TP03	Minimise adverse land use effects from transport infrastructure Conduct Road safety audits (RSA), at various stages of project development, indicatively suggested at: - All the access points onto minor and major roads. - Functional design stage (and/or concept stage). - Detailed design stage.	All phases	Traffic Management Plan part of EMP under Incorporated Document	Supported

	The audits will include consideration of emergency vehicle access and if road surface upgrades are required.			
MM-TP04	Minimise adverse social effects from transport infrastructure TMP will be developed in consideration to VHM's emergency evacuation protocols and must not conflict with any other local emergency plans in place with local businesses and emergency services.	All phases	Traffic Management Plan part of EMP under Incorporated Document	Supported
MM-TP05	Site access strategy: A site access strategy will be developed and finalised in consultation with all stakeholders, notably near landowners and relevant road authorities to verify final site access strategy, including access points. The locations and arrangements of the site access point used to access the project areas and the water supply pipeline during construction and operations will be investigated further to ensure that safe entry and egress of construction vehicles including heavy vehicles. This includes road section upgrade and provision of appropriate design for all access points intersecting with the public road network. During the design process the speed of major access roads to site access points will be reviewed and verified. Once designs have been completed, they will be subjected to RSAs as highlighted in MM-TP03.	All phases	Traffic Management Plan part of EMP under Incorporated Document	Supported
MM-TP06	Heavy vehicle transport route assessments: High Productivity Freight Vehicles (HPFVS) and Over Size/Over Mass (OSOM) transport route assessments will be completed by a nominated transport contractor from the nominated bulk material locations along with all necessary mitigation measures and stakeholder approvals. Following this assessment final route options will be verified, and any impacts identified along with relevant stakeholders who may need to be contacted to facilitate the safe delivery of materials to the Project sites. Potential impacts include clearance to potential obstructions, such as wires, structures (bridges and culverts), trees, and rail crossing infrastructure for HPFVS and OSOM vehicles.	All phases	Traffic Management Plan part of EMP under Incorporated Document	Supported
MM-TP07	Sub-TMPs: Sub TMPs ~~would~~ will be completed by the relevant contractors, including for specific work activities (Worksite Traffic Management Plans).	All phases	Traffic Management Plan part of EMP under Incorporated Document	Supported

	These ~~would~~ will all need to consider and reference back to the overarching project TMP (MM-TP02).			
Noise and Vibration				
MM-NV01	Minimise risk of harm from noise emissions so far as reasonably practicable – mining equipment Select and use mining fleet and fixed plant: - Having regard to equipment noise emissions, including selecting the quietest available equipment where required to minimise risks of harm to human health and the environment so far as reasonably practicable, and, in all cases, to ensure noise emissions do not exceed the SWL used in the noise model, and - To minimise the risk of harm from tonal, impulsive, or intermittent noise character and high sound energy in the low frequency range so far as reasonably practicable. Undertake noise checks on mining equipment during commissioning and at regular intervals as part of the maintenance program to ensure it is consistent with the above.	All phases	Noise Management Plan within Work Plan Traffic Management Plan part of EMP under Incorporated Document	Supported
MM-NV02	Minimise risk of harm from noise emissions so far as reasonably practicable – Hours of Construction Limit~~ing~~ the hours of construction to normal working hours (Mon-Fri 7 am to 6 pm, Sat 7 am to 1 pm, consistent with EPA publication 1834) with the provision that some works justified to be low noise impact works (which are inherently quiet and unobtrusive, and will be consistent with EPA Publication 1834.1) may occur outside the normal working hours provided that the necessary approvals are sought from the relevant authority. These will be specified as part of a CEMP incorporating a Construction Noise and Vibration Management Plan (CNVMP), prepared in consultation with the relevant authority and key stakeholders. All works will be carried out as outlined in the CNVMP, which must include a list of the activities that may occur outside the normal working hours supported by verifiable evidence that these activities will not be audible at sensitive receivers, or otherwise have an impact on these receivers.	Construction	Noise Management Plan within Work Plan EMP under Incorporated Document	Supported
MM-NV03	Minimise noise emissions so far as reasonably practicable – work methods All staff/contractors ~~to~~ will receive a site induction including details of the ways potentially impacting noise is generated, methods to minimise noise impacts both on-site and on public roads particularly for road trucks.	All phases	Noise Management Plan within Work Plan	Supported

	Inspections and/or audits as part of the noise monitoring program will ensure adherence of these methods.			
MM-NV04	Minimise noise emissions so far as reasonably practicable – maintain roads Those roads VHM is responsible for maintenance: ensure in good condition to minimise noise from vehicle traffic over corrugations and potholes.	All phases	Traffic Management Plan part of EMP under Incorporated Document	Supported
MM-NV05	Minimise risk of harm from noise emissions so far as reasonably practicable – General Practice Employ best practice across all aspects to minimise noise emissions so far as reasonably practicable, including but not limited to: - turning off plant, equipment and vehicles when not in use for an extended period - fitting broadband reversing noise signals to all applicable mobile plant to avoid tonal noise emissions - ensuring all plant, equipment and vehicles are fitted with appropriate noise attenuation devices as per manufacturer specification (e.g. enclosures, baffles, silencers, mufflers etc.) to reduce sound levels and address features that increase the impacts of noise such as tonal, impulsive or intermittent noise character or high energy in the low frequency range, and all equipment is maintained in good repair - provision of suitable site access routes to allow for all third-party trucks to avoid reversing if control over their reversing alarms is limited - restricting the use of engine brakes to ensure it is used only when justified for safety reason (long downhill slopes)	All phases	Noise Management Plan within Work Plan	Supported
MM-NV06	Minimise risk of harm from noise emissions so far as reasonably practicable – Mine Planning An independent and qualified environmental auditor must be appointed to review and verify all noise modelling, including: - that the predicted effective noise levels from the mining operations for all periods have been calculated in accordance with clause 70 of the Noise Protocol (EPA publication 1826.4), the Technical guide: Measuring and analysing industry noise and music noise (publication 1997), and is consistent with the algorithms in International Standard ISO9613-2 Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation.	Operation	Noise Management Plan within Work Plan	Supported

	- That the effective noise levels are predicted to be below the noise limits determined in accordance with the Noise Protocol (publication 1826.4). A copy of the auditor's report must be provided to all nearby sensitive receptors within 14 days of the report being produced and not less than 30 days prior to operations commencing in the vicinity of the sensitive receptor(s). If modelling predicts that particular operations will exceed, or if monitoring establishes that particular operations do exceed, the noise limit determined in accordance with the *Noise limit and assessment protocol for the control of noise from commercial, industrial and trade premises and entertainment venues* (EPA Publication 1826.4) for a particular operating time period within the meaning of the *Environment Protection Regulations 2021*, those operations will not be undertaken during that operating time period. The placement and configuration of overburden stockpiles will be designed so as to provide additional noise screening to nearby receptors from noisier activities Noise bunds will be constructed as early as possible, taking into consideration mine pit sequencing and the onset of impact(s) to receptors. Before the bunds are constructed, noise works that impact on receivers that will be eventually protected by the bunds will be avoided (or their intensity reduced). Contingency measures, including but not limited to temporary relocation offers, should be taken, so far as reasonably practicable, to address potential impacts due to noise that would exceed the noise limits or otherwise be unreasonable.			
MM-NV07	Minimise risk of harm from noise emissions so far as reasonably practicable – Power Plant The Project ~~shall~~ will incorporate the highest levels of noise control to minimise emissions and noise character from the power station so far as reasonably practicable including (but not necessarily limited to), placing all gensets in acoustic enclosures and containing all gensets within a generator building, use of high performance exhaust mufflers and low noise cooling radiators Risk of low frequency noise impacts from the power plant will be controlled by the highest levels of noise control including (but not necessarily limited to), placing all gensets in acoustic enclosures within a generator building, use of high performance mufflers and low noise cooling radiators. Investigate transition to renewable energy when feasibly and practically available.	Operation	Noise Management Plan within Work Plan	Supported
MM-NV08	Minimise risk of harm from noise emissions so far as reasonably practicable – Pumpstation (Kangaroo Lake)	Operation	EMP under Incorporated Document	Supported

	Low frequency noise impacts from the Kangaroo Lake pumping station will be minimised by the generator performance and engineered acoustic enclosure specified during the detailed design stage.			
MM-NV09	A Noise Management Plan (NMP) will be developed in consultation with EPA Victoria, Earth Resources Regulator, Gannawarra Shire Council and Swan Hill Rural City Council to formally document all of the monitoring, managerial and engineering measures to be proactively implemented to control noise within and from the site, and document the contingency measures that may be required. The NMP will be based on the updated and validated noise model based on the results of the proposed noise monitoring surveys and commissioning measurements. The NMP will include a requirement to minimise risks of harm to human health and the environment so far as reasonably practicable through the selection and use of processes and plants, and to ensure that in any case that the sound power levels used in the noise model are not exceeded. It will also include a requirement to investigate, and adopt wherever reasonably practicable, options for further noise reduction at source (such as specialist noise reduction kits) that can be implemented proactively, or as contingency measures. The NMP will provide a framework for updating the noise model during Project operation to assess noise emissions from the Project, the effectiveness of mitigation measures and the need for further controls, where required. This framework will include the identification of key milestones and triggers for update of the noise model, such as significant variations in activities (including, but not limited to changes in mining areas), investigations in response to complaints or availability of noise monitoring or measurement data. The NMP will ensure that the risk of harm from noise is minimised so far as reasonably practicable throughout all stages of the Project, including the detailing of inspection, maintenance and continual improvement of equipment, plant and their noise mitigation measures to prevent increased noise emissions due to defective operation, ageing, or other preventable deterioration, and to consider all opportunities to further reduce noise emissions and their impacts. In developing the NMP, consideration ~~shall~~ will be given to: - noise character, and to frequency spectrum as a prescribed factor, including specifically the potential risk of problematic low frequency noise; ~~and~~ - land use category as described in table 3.3 of the Environment Reference Standards ascribed to the areas identified below; and - risks of harm to human health and the environment having regard to the character and level of noise modelled and/or monitored at:	All phases	Noise Management Plan within Work Plan and EMP under the Incorporated Document	Supported

	- noise sensitive areas within the meaning of the *Environment Protection Regulations 2021;* and - Koorangie Wildlife Reserve, Yassom Swamp Flora and Fauna Reserve, Bael Bael Grassland Nature Reserve, Tutchewop Wildlife Reserve, Talgitcha Bushland Reserve, Lalbert Recreation Reserve, Mystic Park Bushland Reserve, and the reserves known as Forest Plantation East Road and Adj. Kangaroo Lake and Murray Valley Highway. If any non-conformance or unanticipated additional noise sources are identified, they will be evaluated and options for amelioration considered will be implemented to ensure the Project meets its obligations in relation to noise emissions. The NMP must address the requirements set out in the row titled 'Noise management plan' in Table 21-7.			
MM-NV10	Minimise noise emissions so far as reasonably practicable – Product transport Ore movement offsite by road trucks will not be scheduled at night. Ore movement in the evening period (as defined in regulation 116 of the EP Regulations) will be minimised, so far as reasonably practicable, and subject to justification that transport in this period has a net benefit in terms of risks to human health and the environment. The TMP will require trucks to meet High Productivity Freight Vehicle (HPFV) Performance Based Standards to minimise noise emissions, including but not limited to, road-friendly suspension, antilock braking systems on all axles and low impact tyres (pavement loading and contact area). The TMP will require a code of practice for truck driver behaviour to be developed and implemented to limit impacts from trucks passing residences with consideration to matters including but not limited to noisy accelerations/decelerations, engine brake noise and tailgate rattling. The TMP will also include actions to verify the code of practice is well-adhered to, and actions to promote conforming to the code. The TMP will be prepared in consultation with the operator of the intermodal terminal station to identify any practicable measures which may be included in the TMP for consistency with the intermodal terminal station operator's practices and procedures to minimise risks of harm from noise.	Operation	Noise Management Plan within Work Plan	Supported
Air Quality				
MM-AQ01	Minimise risk of harm from dust emissions so far as reasonably practicable – General practice	All phases	Air Quality Management Plan within Work Plan	Supported

	All staff ~~to~~ will receive a site induction including details of the various ways dust can be generated, methods to minimise dust generation, requirement for speed restrictions across the site and on public unsealed roads particularly for road truck (e.g. below the posted speed limit when necessary) and their responsibility to minimise and report observed dust generation. An Air Quality Management Plan will be prepared ahead of Project construction. It must have regard to any additional measures proposed pursuant to MM -AQ08 and will include a Dust Environmental Management and Monitoring Plan (DEMMP). The DEMMP will capture all project activities with the potential to generate dust, controls, management practices and will detail a dust monitoring program, which at a minimum, will address the requirements set out in MP-AQ01 - MP-AQ07. The DEMMP will require that if inspections or monitoring results indicate that performance requirements are not being achieved, a report will be made to the appropriate regulator, in accordance with section 21.9.2 of this EMF. The DEMMP will be supported by evidence that it is actively being implemented across specific areas of the site. Observations and monitoring will be recorded to improve future performance, and outline any corrective actions that will be implemented to minimise the risk of harm from dust. The DEMMP will be prepared in accordance with: - EPA Publication 1961 Guideline for assessing and minimising air pollution in Victoria. - EPA Publication 1823.1 Mining and quarrying - guide to preventing harm to people and the environment - EPA Victoria website How to control dust from your business			
MM-AQ02	Minimise risk of harm from dust emissions so far as reasonably practicable – Mine planning Employ best practice across all aspects of mining operations to minimise dust emissions so far as reasonably practicable, that will include as a minimum: - Consideration of weather conditions into weekly and daily mine plans - Utilising water spray and misting systems to suppress dust emissions in live active working areas - Water spray systems will be utilised where dust from mobile plant material movements and stockpiles cannot otherwise be practically contained - Excavator and loader operators will minimise the height from which material is dropped into trucks	Construction Operation	Air Quality Management Plan within Work Plan	Supported

	- Trucks carrying uncovered loads of dry material on internal roads, if cannot be avoided, to be loaded below 300 mm of the freeboard
	- Ensuring mobile fleet reduce speed as much as practical when and where necessary such that observed wheel generated dust is avoided or minimised so far as reasonably practicable and specifically during the following:
	  - during hot and dry conditions; and
	  - where/when excessive wheel generated dust is observed; and
	  - when mine haulage roads are within 500 m of a downwind sensitive receptor
	- Preparing and maintaining level and well finished haul road surfaces to minimise dust emission from rolling wheeled vehicles
	- Constructing the surface of internal haul roads with soil with a silt content of less than 10 per cent unless otherwise approved by ERR
	- Regular grading and gravelling of heavy traffic areas such as intersections as required with regular resurfacing of high traffic areas such as intersections to reduce silt build up
	- Attentive monitoring and application of suppressants as surface dries out to avoid and minimise emissions so far as reasonably practicable
	- Progressive consolidation of and/or re-vegetation of exposed areas
	- Compaction of stockpile batters (where viability of top-soils for rehabilitation is not impacted) will reduce the amount of loose material that can be eroded by wind
	- Sustainable mulches or emulsions and polymers applied to stockpile surface on a periodic (nominally yearly) basis to reduce wind erosion			

MM-AQ03	Minimise risk of harm from dust emissions so far as reasonably practicable – Process plant - All trafficable areas within the process plant footprint will be sealed and would be kept clean through sweeping - Product stockpiles ~~to~~ will be located within roofed and three-sided shelters to minimise wind erosion, with their doors positioned away from the prevailing wind and door (the fourth side) must be closed unless vehicles, plant or workers are moving in or out of the shelters.	Operation	Air Quality Management Plan within Work Plan	Supported
MM-AQ04	Minimise risk of harm from dust emissions so far as reasonably practicable – Public roads	All phases	Traffic Management Plan part of EMP under	Supported

	Road trucks travelling to and from the Project site on unsealed public roads will travel at reduced speeds such that observed wheel generated dust is avoided or minimised so far as reasonably practicable. Training of employees and contractors will be undertaken to ensure that drivers are advised to reduce speeds when dusty conditions are observed.		Incorporated Document	
MM-AQ05	Minimise risk of harm from air emissions so far as reasonably practicable – General Practice Employ best practice across all aspects to minimise air emissions so far as reasonably practicable, such as: - turning off plant, equipment and vehicles when not in use for an extended period - all equipment/vehicles to be operated and maintained to manufacturer's specifications in order to minimise exhaust emissions - Requirement under VHM policies to use low emission or solar powered equipment as much as possible to reduce air emissions	All phases	Air Quality Management Plan within Work Plan	Supported
MM-AQ06	Minimise risk of harm from air emissions so far as reasonably practicable - Equipment and Plant Exhaust Emissions: Select diesel generators employing emission reduction technology such as selective catalytic reduction (SCR; e.g. AdBlue) or use LNG/LPG. Use low emission or solar powered equipment so far as reasonably practicable to reduce risk of harm from air emissions. Investigate transition to renewable energy when feasibly and practically available.	Operation	Air Quality Management Plan within Work Plan	Supported
MM-AQ07	A sampling program of rainwater tanks will be offered to all residents of dwellings within 1km of the MIN boundary. At a minimum, testing is to be offered once prior to the commencement of construction of the Project to establish a baseline, and where a baseline is established, bi-annually during the first year of operations and thereafter annually with the potential to decrease frequency if no exceedances of the Australian Drinking Water Guidelines (ADWG) are reported. The sampling will test for the chemicals and metals listed at Table 69 of Technical Report G and will include speciation testing for Chromium III and Chromium VI. VHM will offer to install first-flush downpipe diverters at all rainwater tanks within 1km of the Mining Licence Area boundary. If testing indicates that it is appropriate, VHM will offer for tanks to be cleaned and, where not already installed, offer to pay for the installation of first-flush downpipe diverters as recommended by the Department of Health. If the ADWG are exceeded, the testing area will be extended by one kilometre.	All phases	Air Quality Management Plan within Work Plan	Supported

	The data collected during sampling will be recorded and, if any exceedances of the ADWG are identified, they will be evaluated and options to minimise the risk of harm so far as reasonably practicable will be implemented.			
MM-AQ08	The Air Quality Impact Assessment (EES Technical report G) must be updated to include air emissions for activities downstream of the processing plant. Mitigation measures must be developed and implemented through the Air Quality Management Plan (required by AQ01) consistent with the updated assessment. The mitigation measures must include, but not be limited to: - Use of a scrubber to prevent air emission of particulates from the kiln; - Dust extraction baghouses to prevent any particulate emissions from the drying of product in the gas fired kiln; - Sealed, bottom silo loadout of kiln dried product into covered trailers for transport off-site; and - No open air stockpiling of kiln dried product.	Pre-construction	Air Quality Management Plan within Work Plan	Supported
Surface Water (including Mine Site Surface Water)				

MM-SW01	Development of a Surface Water Management Plan (SWMP) for construction, operation and closure activities.
	The SWMP will be updated during the life of the Project to reflect changes to site layout and risk profile and in response to statutory requirements, monitoring results, community complaints and audit findings.
	The SWMP must outline a framework to avoid and minimise impacts of the Project on surface waters so far as reasonably practicable.
	Any SWMP will include as a minimum the following:
	- Mechanisms which ensure segregation of Process Plant run-off from the rest of mine operations, with any run-off from Process Plant area directed to Process Water Pond (PWP).
	- Specification of chemical treatments, if any, which are to be utilised in the surface water management process.
	- Spill containment and treatment measures, such as:
	  - Minimising chemical and fuel storage on-site where possible and storing hazardous materials and dangerous goods in accordance with AS1940 Storage of flammable and combustible liquids and EPA Publication 1698 Liquid storage and handling guidelines.
	  - Avoiding the storage of liquid material within 50 m of waterways.
		All phases	Surface Water Management Plan within Work Plan
			EMP under Incorporated Document
				Supported

    - The design of first flush systems or gross pollutant traps.
    - Requirement for a level control and alarm to be installed at the process water pond.
    - Response procedures in the event of a spill, including the availability of spill kits.
    - Spill management/responses that are part of a site wide Trigger Action Response Plan (TARP).
- Frequency of internal mine site water quality monitoring that will be conducted. The frequency must be developed having regard to the need to verify the effectiveness of the avoidance and mitigation measures, including but not limited to surface water chemistry and water storage levels
- Contingency measures and corrective actions that will be implemented if water quality objectives are not met (or if water management infrastructure fail), and a process for notifying EPA in these circumstances (refer to Section 21.9 of this EMF)
- Erosion and sediment controls, including in regard to geotechnical stability
- Overland Flow and Run-Off Monitoring and Management Plans
- A requirement for a Trigger Action Response Plan to manage water storage levels in the PWP
- A program to investigate and implement ways to improve the environmental performance of the Project over time and including specific requirements to align with any relevant soil and land mitigation and monitoring measures.

The construction environmental management plan (CEMP) will be developed in accordance with EPA Victoria Publication 1834 – *Civil construction, building and demolition guide*. The sediment, erosion and water quality management plan would address the requirements of the Environment Reference Standard and EPA Victoria Publication 275: Construction Techniques for Sediment Pollution Control.

Erosion and Sediment Control Plans (ESCP) will be developed for works and structures that are in accordance with International Erosion Control Association (IECA) best practice guidelines and comply with local and state requirements.

The environmental management plan (EMP) will be developed to address the requirements of the Environment Reference Standard and will include an adequate monitoring program to ensure vegetation coverage is established as quickly as possible and is maintained.

A survey of the mine site will be undertaken prior to construction works commencing, which will identify key topographical features to ensure that any

	decommissioned channels do not become a conduit for runoff or contamination from the site. The surface water modelling will be routinely updated and reviewed over the life of the Project and prior to entering into each new mining block. Any future investigations which may lead to the optimisation of the Project activities and further mitigate impacts or risks of harm will be integrated into the modelling and management plan updates.			
MM-SW02	Final design of mine site water storages and drainage infrastructure to ensure they can accommodate nominated storm events and will maintain at least 0.5 m freeboard at all times. This includes mitigation of overtopping/losses risk from following: - Wave action - Incident rainfall - Seepage (liner specification) - Unforeseen events The on-site process water pond (PWP) will be lined with a low permeability high density polyethylene (HDPE) liner, or with other comparable materials, in accordance with EPA Publication 1588.1 (Section 6.1.1). Internal drainage infrastructure will be designed with capacity to prevent overflow. Bunds of sufficient height will be designed to prevent surface water intrusion from disturbed catchments.	Construction Operation	Work Plan	Supported
MM-SW03	Revegetate disturbed areas as quickly as practicable on completion of construction and/or mining as part of progressive rehabilitation to minimise erosion and impacts to surface water quality and restoration of surface water flows to pre-development levels.	All phases	Surface Water Management Plan within Work Plan EMP under Incorporated Document	Supported
MM-SW04	Implement appropriate spill control and bunding measures to control and contain spills. All hydrocarbons and hazardous substances are to be stored in facilities designed in accordance with EPA Victoria Publication 1698 – Liquid storage and handling guidelines and AS 1940:2004 – The storage and handling of flammable and combustible liquids. Design the pump station and associated works area so that stormwater runoff and/or spills from surfaces are not discharged directly into Kangaroo Lake or the No. 47 channel.	All phases	Surface Water Management Plan within Work Plan EMP under Incorporated Document	Supported

MM-SW05	Include appropriately sized culverts on drainage lines crossed by access roads with the capacity to accommodate surface water run-off, as stipulated in works on waterways permits.	Construction	EMP under Incorporated Document	Supported
MM-SW06	Ensure that any surface water diversions, that are implemented, discharge into the natural downstream discharge point or the same discharge point as prior to works commencement. Online monitoring systems will be implemented to monitor any potential changes/risks to water quality and flow impacts. If any impacts are detected, corrective actions and contingency measures will be taken to minimise the risk of harm so far as reasonably practicable consistent with the Surface Water Management Plan (MM-SW01).	Construction	Surface Water Management Plan within Work Plan EMP under Incorporated Document	Supported
MM-SW07	Ensure any Project installed infrastructure within the 1% AEP flood extent (e.g Pipeline) is to be designed to withstand potential flooding and would be subject to compliance with the specific requirements of the North Central and Mallee CMAs' floodplain works approval process.	Construction	Surface Water Management Plan within Work Plan EMP under Incorporated Document	Supported
MM-SW08	At all times during operations, the mine void will be designed and constructed to ensure capacity to capture run-off generated from active areas in rainfall events up to the 1% AEP 72-hour design storm event (including allowance for climate change) and at least 0.5 m freeboard.	All phases	Work Plan	Supported
Groundwater				
MM-GW01	Tailings water recovery will be ~~optimised~~ maximised so far as reasonably practicable to minimise risk of harm from seepage to underlying Loxton Parilla Sand (LPS) aquifer and documented in the Tailings Management Plan. The ~~t~~Tailings Management Plan will link to Groundwater Management Plan (MM-GW04), and as a minimum specify the following: - Initial Spigot design - Initial Flocculant application rates - Embankment under drain design - Trigger Action Response Plan (TARP) - Ongoing sampling and analysis of recovered tailings water and process water pond (PWP) water. Sampling of recovered water will be undertaken to verify baseline laboratory testing and demonstrate risks posed by seepage water quality remain minimised during tailings deposition.	All Phases	Groundwater Management Plan within Work Plan Tailings Management Plan within Work Plan	Supported

	A thickener and a flocculant dosing system will be used in the primary stage of dewatering to allow the fines to be thickened. Fines will report to the thickener underflow and will be combined (homogenised) with sand tailings and pumped back to the mine void. Clean water overflow from the thickener will be transferred to a process water pond (PWP). The use of flocculants will be optimised to ensure maximum clean water recovery whilst minimising the amount used, so far as reasonably practicable. The flocculants will be used in the process at very low concentrations in line with ~~standard~~ best practice within the mineral sands industry. Secondary dewatering will occur at the mine void tails discharge outlet. This will involve adding further polymer flocculant to the slurry exiting the pipe head. The clean water will separate from the tailings beach and will report to a decant sump. The recovered water will be recycled to the process water pond (PWP). This process will be periodically reviewed and enhanced to maximise water recovery, so far as reasonably practicable. Tailings water quality must be periodically reviewed throughout the life of the project. Review of the tailings water quality must occur when adverse or unexpected tailings monitoring results are encountered and by other triggers to be developed as part of the Tailings Management Plan. Tests conducted as part of the review of tailings water quality and tailings leachate quality must be conducted using Kangaroo Lake water and must include: - Assessment of the chemical stability and inertness of tailings; - Assessment of the hydrochemical properties of the seepage from the tailings waste; - Assessment of the hydrochemical properties of rainfall infiltration through the tailings waste; Outcomes of any reviews must inform mitigation and management measures to be implemented as part of the Tailings Management Plan. Review of the Tailings Management Plan must be undertaken periodically, or triggered by monitoring results, development of new technologies or by other relevant triggers, to ensure best practice is implemented and risks to human harm and the environment from tailings pollution and waste are minimised so far as reasonably practicable.			
MM-GW02	Obtain the necessary permits and licences that relate to groundwater activities prior to commencement of operations. As a minimum this will include:	Operation	Groundwater Extraction Licence from GWM Water	Supported

	- Take and Use Licence from GWM Water - Groundwater will be extracted from the mounded LPS aquifer in accordance with the conditions, timings, and limits detailed in a licence issued by GWM Water. - A18 Permit from EPA – Tailings will be deposited in-pit in accordance with the conditions, timing and limits detailed in an A18 permit issued by EPA.		and A18 Permit from EPA	
MM-GW03	Risks to groundwater will be minimised so far as reasonably practicable with specification as minimum of the following: - Hazardous waste (as defined by EPA) will be removed from site as soon as practicable by a licensed contractor for treatment or disposal in an approved facility in accordance with licence and regulatory requirements to minimise risk to groundwater - Any hazardous materials, such as laboratory chemicals, will be stored in designated areas in accordance with their safety data sheets. - Spills of fuels or chemicals would be managed in accordance with Part 3.4 of the EP Act 2017 and requirements set out in the Spill Management Plan (CP-SW01). This may include restoration of the affected area (soil and groundwater) to its pre-spill state so far as reasonably practicable	All phases	Risk Management Plan within Work Plan	Supported
MM-GW04	A Groundwater Management Plan (GMP) will be prepared to manage and further mitigate potential risks (if required) to groundwater and establish a framework for the management and monitoring of groundwater. The GMP must be informed by all groundwater mitigation measures (MM GW01-GW06 inclusive) and relevant groundwater monitoring and contingency measures at Table 21-7. The GMP ~~will include~~ must be informed by the outcomes of the Baseline Groundwater Monitoring (MP-GW01 Table 21-7) and the requirements of any A18 permit issued by EPA for the Project. The GMP must be revised based on the results of groundwater monitoring where appropriate ~~against which construction, operation and closure will be assessed~~. The GMP ~~would~~ must capture ~~high~~ risk to groundwater ~~activities~~, present relevant controls and management measures, detail contaminants of concern (indicators), and flocculants and their degradation products the objectives for the appropriate assessment of groundwater, and would detail the groundwater monitoring to be undertaken throughout the life of the Project and ~~would~~ provide trigger levels and contingency actions in the event of trigger exceedances. Trigger levels and contingency actions will be developed based on the Environmental Reference Standard and ~~Australian Drinking Water Guidelines, as~~	All phases	Groundwater Management Plan within Work Plan	Supported

	~~well as any~~ other relevant guidelines. Trigger levels must include staged levels (highlighting a trajectory to harm occurring) or temporal triggers (such as where a change is occurring quicker than expected). The exact scope of the contingency action will depend on the nature and extent of any unacceptable impact or risk if it was to occur. However, as a minimum, the type of contingencies must include: - Actions to intercept, extract or contain impacted groundwater, and/or modify tailings management, triggered where monitoring suggests the environment is, or may be detrimentally impacted by changes in groundwater quality; - Actions triggered where monitoring suggests a groundwater user is detrimentally impacted by changes in groundwater quality from tailings leachate seepage ~~to be considered will be targeted interception and/or pumping of groundwater via a network of bores to stop and draw back groundwater where the quality or elevation has been assessed through the development of a trigger to pose an unacceptable risk in either the short or long term. In addition, a contingency measure will be included in the GMP so that if it is found that~~ If a user of groundwater is detrimentally impacted by the change in groundwater quality from tailings leachate seepage, then a comparable alternative source of water will be offered by the Project to the groundwater user. The GMP will be developed in consultation with relevant stakeholders and must be subject to approval by the relevant Authority. The GMP will include the requirement to conduct ongoing groundwater monitoring (MP-GW02 Table 21-7) and completion of an updated groundwater model (MP-GW02 Table 21-7). Once operations commence, data from groundwater monitoring will be reviewed on a quarterly basis and, where those data indicate a requirement to update modelling, modelling will be updated. Any future investigations or groundwater data which may lead to the optimisation of the Project activities and further mitigate impacts or risks of harm will be integrated into modelling and management plan updates.			
MM-GW04A	~~The application for a permit under the Environment Protection Act 2017 to discharge or deposit waste to an aquifer will include groundwater~~ Groundwater modelling must be prepared in accordance with the Australian Groundwater Modelling Guidelines (Barnett et al 2012) and consistent with the Groundwater Impact Assessment and must be ~~that is~~ updated to: - incorporate the results of pumping tests; - inform the suitability of tailings and groundwater management plans;	Pre-construction	A18 permit application	Supported

	- refine predictions on potential extent of groundwater quality and levels changes during and post operations; - review (and ~~potentially~~ update) the groundwater monitoring regime if modelling indicates risks of harm beyond the predicted modelled extent; and - ~~estimate~~ establish the nature and extent of natural attenuation process and provide prediction on groundwater quality changes during and post operations. - Data from groundwater monitoring undertaken as part of the groundwater monitoring program (MP-GW02) will be reviewed on a quarterly basis and, where those data indicate a requirement to update modelling, modelling will be updated. Any future investigations or groundwater data which may lead to the optimisation of the Project activities and further mitigate impacts or risks of harm will be integrated into modelling and groundwater management plan updates.			
MM-GW05	Throughout the life of the Project, the proponent will re-assess the risks of harm to human health and the environment in the context of groundwater impacts. The risk assessment must be updated prior to preparing the GMP and when new information attained through groundwater monitoring data or updated modelling information suggests the risks of harm to human health and the environment may have changed. ~~Prior to preparing the GMP, the proponent will re-assess the groundwater risk assessment undertaken in March 2024. The re-assessment must:~~ ~~- Demonstrate a conservative approach which accounts for the uncertainties and assumptions with regards to the likelihood and consequence classifications of the risk assessment;~~ ~~- Outline controls to be implemented in order to eliminate or minimise the risks of harm so far as reasonably practicable; and~~ ~~- Evaluate:~~ ~~- The likelihood and consequence of risks of harm to future users; and~~ ~~- The likelihood and consequence of risks of harm to groundwater as a receptor.~~	Pre-construction	Condition of the mining licence	Supported
Soils and land resource				
MM-SLR01	Minimise effects on native soils – Mine Site A Soil Management Plan will be prepared, with input from an agronomist with experience in mallee soils, and will include~~ing~~ the following management and mitigation strategies:	Construction Operation Closure	Risk Management Plan within Work Plan and	Supported, provided correct reference is made to the analyte table in Mr Shovelton's expert witness statement (Tabled document 26) as 'untiltled Table 3'.

- Prior to stripping disturbance areas:
    - Investigate soil conditions through a combination of soil sampling at a suitable scale, EM38 and NDVI images to identify the variation and distribution of soil types and characteristics of topsoil and subsoil to be stripped
    - Soil samples should be analysed for analytes provided in Table 1 of Expert Witness Statement of James Branston Shovelton, 7 March 2024 (D26).
    - Soil samples from zones currently exhibiting no obvious restrictions to rooting depth of 1 metre to be sampled to 2 metres at 20 centimetre intervals. Such samples should be analysed for salinity and boron as a minimum.
    - Establish the number and depths of topsoil and subsoil stripping horizons based on the soil condition investigations and the outcome of any soil reinstatement trials carried out under the Rehabilitation Plan (**MM-RH01**)
    - Informed by further soil analysis, the soil surface would have an indicative 5 to 10 tonnes per hectare of natural gypsum applied
- Soil ~~would~~ will be stripped in a slightly moist to moist condition wherever possible. This occurs when soil is pliable while hand texturing (15-30% soil moisture). Material would not be stripped in either excessively dry, powdery or very friable conditions (i.e . <15% moisture, or >30% moisture).
- Prior to placement of overburden on an overburden stockpile location, strip topsoil and subsoil to the depths established based on the soil conditions investigations.
- Prior to placement of subsoils on a subsoil stockpile location, strip the subsoil to the depth established based on the soil conditions investigations.
- Preference given to using equipment which can scrape, grade or push soil into windrows.
- Topsoil and subsoil stockpiles ~~would~~ will be stored separately and clearly signposted, including with segregation of subsoil in accordance with identified soil zones where necessary. The location of stockpiles ~~would~~ will be recorded using GPS, along with data relating to the soil type and volume. An inventory of available soil ~~would~~ will be maintained and updated regularly to ensure adequate topsoil and subsoil materials are available for planned activities

Rehabilitation Plan under Work Plan

- Maximum stockpile heights of two metres (top soil and subsoil) and 35 metres (overburden) will be maintained, other than where the characteristics of subsoil will not be affected by greater maximum stockpile heights.
- The surface of soil stockpiles ~~would~~ will be left in as coarsely structured condition as possible, to promote rainfall infiltration and minimise erosion, prior to cover vegetation becoming established.
- Stockpile storage time ~~would~~ will be minimised, where possible. If long-term stockpiling is planned (greater than three months), such as those stockpiles which will be formed during the initial pit and infrastructure development, stockpiles would be bunded and either seeded with an annual cover crop species or hydro mulched, as appropriate.
- Where possible, freshly stripped subsoil and topsoil ~~would~~ will be re-spread directly onto rehabilitation areas and to depths according to target requirements. Topsoil ~~would~~ will be spread, treated with fertiliser and seeded in one consecutive operation.
- Stockpiles ~~would~~ will not be disturbed until required for rehabilitation, weed management, erosion control or for seeding and fertilising purposes.
- The surface of all stockpiles ~~would~~ will be treated with ameliorants such as gypsum and a complete fertiliser (such as Granulock 15, Granulock Z or equivalent) to create the most suitable growth medium for chosen rehabilitation crop species.
- Appropriate erosion and sediment control measures ~~would~~ will also be applied, as per a site-specific Erosion & Sediment Control Plan required in accordance with MM-SW01, particularly when the timing of stockpiling is not conducive to cover crop germination.
- Include gypsum requirement test and gypsum purity testing. Gypsum requirements to consider sensitivities of a range of crops including lentils. Gypsum application method to consider need for gypsum in the subsoils. Indicative gypsum rates of 10 tonnes per hectare are recommended where exchangeable sodium percentage (ESP) is greater than 14 (i.e. strongly sodic). The gypsum sourced would have a minimum 19% calcium and 15% sulfur.
- All employees and contractors engaged in stripping, stockpiling (including management of stockpiles) and reinstatement of soils will receive training, induction and toolbox talks.

MM-SLR02	Minimise effects on native soils – Pipeline Prior to trenching ~~of vegetated land~~, investigate soil conditions to identify the variation and distribution of soil types, and establish the stripping depth based on the outcome of those investigations. Topsoil will be stripped to a depth determined on the basis of the soil conditions investigations prior to any trenching activities. The trench would be progressively backfilled to minimise the duration of time that the more dispersive subsoil is exposed to rainfall. The subsoil would be backfilled first, followed by topsoil and ameliorant application (including gypsum application to the surface of in-filled material).	Construction	EMP under Incorporated document	Supported
MM-SLR03	Minimise effects on land resource Mine pit faces ~~would~~ will be as steep as recommended in the geotechnical assessment (a maximum of 32 degrees for pits up to 42 m deep and 31 degrees for pits up to 47 m deep), in order to minimise the surface area of exposed subsoil layers during the mining process. Progressive rehabilitation ~~would~~ will be undertaken as the mine advances to minimise the duration of time that subsoils are exposed to potential rainfall events.	Construction Operation	Risk Management Plan within Work Plan and Rehabilitation Plan under Work Plan	Supported
MM-SLR04	Minimise effects on native soils During closure, if rehabilitation is delayed, the exposed subsoil will be treated with gypsum and appropriate erosion and sediment control measures would be applied in accordance with MM-SW01.	Operation Closure	Risk Management Plan and Rehabilitation Plan within Work Plan	Supported
MM-SLR05	Minimise effects on native soils Weed control will be undertaken in areas yet to be mined in order to prevent seed set prior to topsoil stripping. During stockpiling, weeds will be monitored continually and controlled as required to ensure that they do not reach the seeding phase and spread and stockpiles will be seeded with cover crop to provide competition for weed species.	Operation	Risk Management Plan within Work Plan	Supported
MM-SLR06	Spills and Leaks Spills and leaks ~~would~~ will be managed in accordance with MM-SW01 and MM-GW03.	All phases	Risk Management Plan within Work Plan	Supported
Agriculture				
MM-AG01	Minimise potential adverse land rehabilitation effects	Closure	Rehabilitation Plan under Work Plan	Supported

	Reinstate ~~of a~~ the soil profile based on the number and depth of stripping layers established under SLR01, and test replaced topsoils and subsoils to establish that the soil characteristics are comparable to pre-mining conditions and, if not, apply appropriate ameliorants or fertilizers. Topsoil and subsoil will be ameliorated as required during stripping and stockpiling activities to ensure pre-disturbance agricultural productivity is attained or improved. Wherever possible topsoil and subsoil will be respread directly onto active rehabilitation areas rather than stockpiling to minimise handling and possible structure decline. Reinstated topsoils ~~are to~~ will be assessed for water repellency and treated if present, prior to sowing. Reinstate soils at a time enabling immediate sowing where practicable and, where not practicable, apply measures for moisture retention and erosion protection such as hydraulic soil binders. In the first year after reinstatement of the soil profile, areas ~~should~~ will be sown to a legume cereal mix, such as vetch and oats, or other crops as appropriate if seasonal conditions are unsuitable to a legume cereal mix. Undertake grain yield mapping where practicable from adjacent non-mined paddocks and paddocks to be mined in the future to establish whether comparable yields are being obtained from rehabilitated mine areas. Set yield targets for rehabilitated land having regard to any yield mapping and in consultation with stakeholders including landholders and local agronomists.		Community Engagement Plan (CEP) under Work Plan	
MM-AG02	Minimise potential adverse land use effects Adjacent landholders will be consulted prior to, and during the development of each mining stage as to the requirement for alternative entry points and additional fencing, gates or grids. Development of a Traffic Management Plan (MM-TP02) ~~to~~ will: - avoid or, where avoidance is not possible, limit the duration of temporary road closures associated with construction of the Project or upgrade or maintenance of roads during harvest periods; - require advance notice to and consultation with owners of land adjacent to roads in respect of proposed temporary road closures; - allow adjacent landowners continued access during temporary road closures and diversion.	All phases	Community Engagement Plan (CEP) under Work Plan EMP under Incorporated document	Supported

MM-AG03	Minimise potential adverse biosecurity effects Weed control will be continued on areas which are not under current agricultural production. Disturbance areas, soil stockpiles and rehabilitation areas will be monitored for weed growth, with control measures undertaken as necessary. Weeds will be monitored continually and controlled as required to ensure that they do not reach the seeding phase and spread and stockpiles will be seeded with cover crop to provide competition for weed species. ~~Control of weeds must be undertaken biannually (both summer and winter weed species control) on stockpiles during autumn/winter and spring/summer.~~ Herbicide resistant species will be identified at each site and herbicide control options will be developed based on resistant species present. Herbicide resistant species will be controlled during stockpiling to prevent issues following reinstatement. Any import of equipment or machinery from interstate or overseas will follow the standard procurement safeguards and quarantine procedures as per Victorian and Australian requirements from the Biosecurity Act 2015.	All phases	Risk Management Plan within Work Plan	Supported
Radiation				
R-ENG01	Project to be operated in accordance with a management licence addressing radiation safety in accordance with the provisions of the Radiation Regulations, including likely conditions such as compliance with the Radiation Protection Series No. 9 and preparation of a radiation sub-plan for all operations. The plan would account for any special conditions or exemptions from specific provisions of the Radiation Regulations that might apply to the project.	All phases	Radiation Management Plan	Supported
R-ENG02	Minimise radiation effects: Engineering design - A wheel wash and vehicle washdown bay ~~would~~ will be established to minimise the spread of potential contamination around the site and off the site - The processing facility will be constructed with spillage containment. This includes all tanks having concrete bunds, as secondary containment, to store at least the volume of the tank [Vic EPA 2018]. - Provision for hose down facilities and sumps, access ways and sufficient room for bobcats for clean up under conveyors - Tailings pipelines will be fitted with a leak detection system that will turn off pumps if a pipe failure is detected– with a schedule of preventative maintenance	Construction Operation	Risk Management Plan within Work Plan and Radiation Management Plan	Supported

	and inspection to be established for pipelines carrying radioactive process materials - Dust minimisation and suppression system within process plant - with a schedule of preventative maintenance and inspection to be established for areas with radioactive process materials			
R-ENG03	Minimise radiation effects: Product packing All product packing will occur within building, including the use of a packing booth for REMC. Packaging must be fully sealed and selected to ensure there will be no leaks. Shipping containers must be sealed and must not leak.	Operation	Radiation Management Plan	Supported
R-ADM01	Minimise risk of harm from radiation effects so far as reasonably practicable: Administrative Safe operating procedures outlined in RMP to ensure the safe and environmentally responsible operation of the Project RMP ~~to~~ will specify that all employees and contractors ~~would~~ will receive training in the radiological aspects of the Project and be provided instruction on prevention of contamination release from the Project. A qualified and experienced Radiation Safety Officer will be available to undertake radiation monitoring, advise management on measures to reduce radiation, exposures and regulatory reporting. Site access controls will be implemented to ensure that: - unauthorised access is restricted - intentional or inadvertent removal of radioactive material from the operation is prevented	Construction Operation	Radiation Management Plan	Supported
R-ADM02	Minimise risk of harm from radiation effects so far as reasonably practicable: Rehabilitation Radiological input to the Rehabilitation/Closure Plan will occur, based on approved radiological closure criteria of return to pre-operational radiological conditions, with monitoring to confirm compliance.	Closure	Radiation Environment Management Plan and Rehabilitation Plan under Work Plan	Supported
R-ADM03	Reassessment of radiation impact assessment	All phases	Radiation Environment Management Plan	Supported

	Additional baseline sampling must be undertaken to account for the natural variability in the soils. Sampling of local crops, local livestock and indigenous foods is to be considered. The radiation impact assessment may be revised at any time and must be revised if: - subsequent data, including but not limited to data informing the Tailings Management Plan, indicates the in-pit tailings will not be homogenous, will not be chemically stable and will release any metals or that the radionuclides in tailings are soluble; - the dust emissions are greater than those modelled in the Air Quality Impact Assessment prepared for the Environment Effects Statement (refer to Table 21-7); - engineering controls are unable to fully contain radioactive materials; or - there is significant variation from the data used to inform the Radiation Impact Assessment prepared for the Environment Effects Statement (refer to Table 21-7).			
Social and land use				
MM-SC01	Workforce Accommodation Strategy: A draft strategy has been developed and will be updated in consultation with relevant stakeholders, including local Gannawarra Shire Council and Swan Hill Rural City Council, prior to commencement of construction. Once finalised, the proponent will implement the strategy. As part of the update of the draft strategy, it will be amended to include measures to manage the influx of permanent employees during construction and operations, including: - A commitment to agree with local authorities on a maximum influx of permanent workers who would be able to seek to accommodate in the local housing market (rental and/or for purchase) in Years 1 to 3, by location, with any residual housing demands being met through the use of the short stay accommodation developed and enhanced as part of the Workforce Accommodation Strategy. - A process for reporting to the Gannawarra Shire Council and Swan Hill Rural City Council over a minimum 5-year period the number of workers who are recruited from outside the region and the accommodation solution utilised in each case.	All phases	Workforce Accommodation Strategy to be prepared and implemented as a condition of the mining licence	Generally supported, with amendments that the mitigation measures should be revised to incorporate monitoring of GP capacity, notably in Kerang and Swan Hill, and in instances where demand exceeds capacity, consider providing an on-site GP for workforce to access or alternative contingency measures to alleviate the competition with existing residents for medical care

MM-SC02	Neighbour Agreement. Owners of existing dwellings within 3.5 kilometres of the proposed mining licence boundary (MIN) will be given the option to enter into a Neighbour Agreement with VHM for the duration of the Project. The agreement is offered in recognition that the rural amenity within this area will be altered by the Project, and that this may affect residential satisfaction among those affected. The agreement will provide a sliding scale annual payment that becomes payable once construction works commence at the mine site and will then be paid annually during the life of the mining operation. The payment will be based on the distance of the existing dwelling from the MIN according to the following zones: - $25,000 if the dwelling is within 1km of the MIN; - $10,000 if the dwelling is between 1km to 2km of the MIN; and - $5,000 if the dwelling is between 2km to 3.5km of the MIN. The location of each zone and the associated financial offer will be publicly available and thus disclosed to all participants, to ensure transparency. If an owner of a dwelling chooses to sign a neighbour agreement, this will not preclude them from ~~making a submission at the EES hearing or~~ making a claim for compensation for any unacceptable impact that occurs as a result of the Project (including any claim under Part 8 of the MRSD Act). Dwelling owners within the designated zones will be able to sign on to the neighbour agreement at any time during the life of the Project.	All phases	Individual Agreements with landowners The requirement to offer the Neighbour Agreement for the duration of the Project will be reflected in the Community Engagement Plan within the Work Plan, noting that the Neighbour Agreement will not apply retrospectively.	Supported
MM-SC03	Code of Conduct The proponent will develop and implement a code of conduct for its workforce. Training of employees and contractors will be undertaken to ensure they are aware of their obligations under the code of conduct (as amended or replaced from time to time).	All phases	Code of Conduct VHM suggests that compliance with MM-SC03 be required as a condition of the mining licence	Supported
MM-SC04	Employment Policy The proponent will develop and implement a policy to encourage the employment of local workers while minimising the potential effects of this on other businesses. who live within commuting range of the Project.	All phases	Employment Policy VHM suggests that compliance with MM-SC04 be required as a condition of the mining licence	Supported

MM-SC05	Farmer wellbeing The proponent will provide information to the community in relation to existing resources relevant to managing mental health and wellbeing. Further the proponent will engage with the National Centre for Farmer Health to provide the community with additional resources/tools to manage stress and anxiety.	All phases	Project website	Supported
MM-LU01	Bushfire Management Plan A Bushfire Management Plan will be prepared to ensure that construction outside of the mining licence area is undertaken and any infrastructure maintained in consultation with the relevant authorities such as the Country Fire Authority and relevant asset owners.	All phases	EMP under Incorporated document	Supported
Geotechnical stability				
MM-GS01	Mining activities will be operated in accordance with a Ground Control Management Plan (GCMP) that covers construction, operation and closure activities within the proposed MIN. The CGMP will be updated during the life of the Project to reflect changes to site layout and risk profile, and cover as a minimum the following: - pit slopes - stockpiles - in-pit tailings embankments. The CGMP will: - incorporate comprehensive geotechnical design methodology and review using conservative elastic parameters and incorporate sensitivity assessments - implement the pit and stockpile buffer zones from sensitive receptors set out in the EES Project description - require mine operation planning to be integrated with ground and surface water monitoring to ensure mine pit floor is above groundwater table and surface flows are directed to minimise interaction with exposed slopes to avoid water altering material properties. The GCMP will be an overarching document to inform subsequent specific operating procedures.	All phases	Ground Control Management Plan within Work Plan	Supported
Rehabilitation and closure				
MM-RH01	Project ~~to~~ will be rehabilitated and closed in accordance with the finalised Rehabilitation Plan and in accordance with the provisions of the MRSDMI	Closure	Rehabilitation Plan under Work Plan	Supported

	Regulations, including likely conditions such as compliance with the specific provisions of the Radiation Regulations that might apply to the project. As required under the MRSDMI Regulations, the Rehabilitation Plan will be informed by a detailed risk assessment that incorporates post-closure rehabilitation risks, including potential risks that the rehabilitated land may pose to the environment, to any member of the public or to land, property or infrastructure in the vicinity of the rehabilitated land as required under the new duty proposed to be included in the MRSD Act pursuant to the *Mineral Resources (Sustainable Development) Amendment Act 2023.* The Rehabilitation Plan will include a monitoring and review process to monitor rehabilitation performance, identify emerging risks and enable early intervention in accordance with monitoring and contingency measures outlined in Table 21-7 of the EMF. The Rehabilitation Plan will include a program for monitoring settlement of the tailings and the final surface to identify areas of differential settlement.			
MM-RH02	Unplanned closure – Staged and progressive rehabilitation and backfilling of pits ~~to~~ will be undertaken, which limits the amount of land needing rehabilitation at any given time and will limit any legacy rehabilitation issues in the event of unplanned closure.	Operation Closure	Rehabilitation Plan under Work Plan	Supported
MM-RH03	Unplanned closure – Rehabilitation bond ~~to~~ will be adequate to address safety risks and site restoration in the event of default by miner.	Closure	Rehabilitation Plan under Work Plan	Supported

MM-RH04	Quality assurance and adaptive management
	The Rehabilitation Plan must include:
	- a detailed Soil Management Plan including details of appropriate erosion and sediment control measures to be implemented consistent with SLR01 and SLR04.
	- completion criteria consistent with the restoration of disturbed land to equivalent or better agricultural land capability to enable a variety of productive agricultural uses
	- a quality assurance plan to ensure the requirements of the Plan are being implemented, which must include a requirement for periodic auditing and address:
	  - soils consultant support;
	  - training;
		Construction
		Operation
		Closure
			Rehabilitation Plan under Work Plan and EMP under the Incorporated Document	Supported

- inductions and toolbox talks;
- inventory reconciliation;
- stockpile management;
- testing;
- records and reporting, and

- an adaptive management strategy, which is to include a Trigger Action Response Plan, that sets out required management actions in the event of impacts to rehabilitation or where rehabilitation outcomes are not achieved within the timeframes set out in the Rehabilitation Plan
- the Trigger Action Response Plan (TARP) is to address all foreseeable soil constraints which may be encountered as part of rehabilitation. The TARP is to be a live document updated from monitoring data in accordance with adaptive management.

MM-RH05	Soil Reinstatement Trial plots Establish soil reinstatement trial ~~rehabilitation~~ sites, as soon as practicable following issue of a Mining Licence and other necessary approvals. The number and location of soil reinstatement trial sites will be determined based on the outcomes of further soil analysis. The purpose is for soil reinstatement site locations to cover the range of constraints likely to be encountered across the mining area. Soil reinstatement trails are to adopt ~~, with application of~~ soil investigation, stripping, stockpiling, reinstatement and post-reinstatement measures consistent with the Soil Management Plan and Rehabilitation Plan and to inform activities in respect of mined areas. Individual soil reinstatement trial sites are to be monitored for 5 to 7 years, and include at least one season of below average rainfall without stored water (where such conditions are not experienced in 5 to 7 years, the trail should be extended until such a season).	Construction Operation	Rehabilitation Plan under Work Plan	Supported

Table A2: Recommended changes to the monitoring and contingency measures relevant to the project.

Environmental aspect (as detailed in the respective Technical Report)	Monitoring program / measure	Project Phase	Implementation	Minister's response

Biodiversity and habitat

Impacts to roadside vegetation	- Daily monitoring during construction to ensure vegetation / fauna habitat removal is within the approved areas. - During construction weekly audits to ensure no damage along transport route, construction vehicles confined to road surface, no vehicles parking in tree protection zone, TPZ barriers in place and maintained. - During operations monthly audits of onsite and remanent roadside vegetation / fauna habitat for dust and damage by vehicles - Monitoring every 2nd year by an arborist of trees identified as 'assumed lost' due impacts to the Tree Protection Zone. - Monitoring of understorey / ground layer if trees 'assumed lost' senesce at higher rate than expected.	Construction Operation	EMP under Incorporated Document	Supported
Changes to the Ecological Character of Kangaroo Lake as an artefact of water extraction	Water extraction rates and lake water levels to be monitored as per licence requirements and reported monthly as part of VHM Ltd water extractions licence.	Construction Operation	Water Licence from GMW	Supported
Fauna salvage (water pipeline intake)	- Inspection of angled fish screen within 2 years of commencement of operation to determine fit-for-purpose: specifically, to assess risk of trapping/drowning freshwater turtles. - If pump inlet fish screen is unable to adequately exclude fish larvae, limit water offtake so far as reasonably practicable during periods when relevant larvae are expected to be present.	Operation	EMP under Incorporated Document MM-FE04	Supported
Vehicle / wildlife collisions	- Vehicle speeds –random monitoring of mine vehicle speeds within the transport routes. - Process for vehicle / wildlife collision occurs included in inductions and toolbox meetings at least annually. - Monitoring of vehicle / wildlife collisions – collisions are recorded in incident register and rate collisions monitored annually.	All phases of mine life	Traffic Management Plan under Incorporated Document. Risk Management Plan within Work Plan	Supported
Fauna salvage (pipeline)	- Bunting erected in no-go zones. - Salvage permits are obtained. - Installation of 30cm damp course plastic fauna exclusion fence sealed at ground level for trenching of pipeline. - Project personnel check trench each morning and at completion of days' work and reports to environmental supervisor to implement fauna recovery protocol.	Construction	EMP under Incorporated Document	Supported

Noise from vehicles and mine operations impacting on behaviour of wildlife	- Noise levels, noise character and frequency spectrum are monitored as part of mobilisation of new mobile plant and equipment. - Noise monitoring and measurement as per the program developed and implemented under the Noise Management Plan.	All phases	Noise Management Plan within Work Plan	Supported
Indirect impact: Fuel and oil spillages egresses into fauna habitat / roadside native vegetation	- Daily pre-starts of vehicles for visible leaks. - Audits of fuel and chemical storage areas.	All phases	EMP under Incorporated Document	Supported
Indirect impact: Lights from vehicles and mine operations impacting on behaviour of wildlife	- Monthly lighting checks	Construction Operation	Biodiversity Management Plan within Work Plan	Supported
Indirect impact: Dust degrading fauna habitat	- Dust monitoring as per Dust Environmental Management and Monitoring Plan (DEMMP)	All phases	Air Quality Management Plan within Work Plan	Supported
Indirect impact: Fauna accessing processed water pond and in pit tailings	- Site induction will include the protocols for recording fauna interactions / observations and the relevant contact person. - Any fauna fatalities will be reported in the company's incident database and reported as part of regulatory requirements. - Where multiple fatalities occur, these will be investigated, as required by the Project ecologist, to determine cause of death. Results will be included in companies' incident report. Adaptive management and contingency measures are to be implemented where necessary. - The surface decant water in the tailing pits and process pond will be monitored to ensure it is within expected range and will review against appropriate standards to minimise the risk to staff and the environment.	Operation	Biodiversity Management Plan within Work Plan	Supported
Cultural Heritage				
Aboriginal Cultural Heritage	Aboriginal Heritage: - Preparation and delivery of a CHMP induction, including cultural awareness induction. - Use of a compliance checklist throughout the construction phase. - The requirement for appropriate contractor induction to communicate the protections, requirements, and the Unexpected Finds Protocol.	All phases	CHMP	Supported

Non-Aboriginal Heritage	Non-Aboriginal Heritage: - Maintain records of appropriate contractor induction to communicate the protections, requirements, and the Unexpected Finds Protocol.	All phases of mine life	Risk Management Plan within Work Plan	Supported
Traffic and transport				
Dilapidation surveys	Dilapidation surveys of the road network would be completed as part of the pre-construction phase and at regular intervals during the operation phase are proposed to monitor the transport impacts associated with the project. These surveys are specified in **Table 21-5** and are outlined in the following measures: MM-T01 Stakeholder Engagement Plan. MM-T02 Traffic Management Plan.	All phases	Traffic Management Plan under Incorporated Document	Supported
Noise and vibration				
Noise Management Plan	The Noise Management Plan required under MM-NV09 must include the noise survey and modelling commitments listed below: Commissioning noise surveys will be completed for all major fixed plant components e.g. power station, processing plant, pumping station etc. to ensure they achieve their respective noise emission requirements. If any non-conformance or unanticipated additional noise sources are identified, they will be evaluated and options for amelioration considered and implemented to ensure the Project meets its obligations in relation to noise emissions. As the mine cells and operations will change through the duration of the Project a program of noise monitoring surveys to be conducted promptly after each significant variation in activities (including, but not limited to, changes in mining areas) will be developed and implemented. This program will also define other triggers for noise monitoring and measurement, for example updates to the noise model or investigations in response to complaints. Monitoring will be completed at the nearest affected receptors as well as at appropriately justified reference locations. Noise monitoring data will inform the periodic update of the noise model to allow for continuous improvement. Monitors will be used that hold National Association of Testing Authorities (NATA) accredited calibration and are compliant with the relevant Australian Standards and EPA guidelines (e.g. publications 1996 and 1997). Monitoring will be conducted by a suitably qualified person in accordance with EPA guidelines (e.g. publications 1996 and 1997).	All phases	Noise Management Plan within Work Plan	Supported

	The Noise Management Plan will be proactively prepared and implemented within the Work Plan.			
Procurement of mining fleet	The Procurement of subcontracted mining fleet will include a requirement to provide the quietest available equipment where required to minimise risks of harm to human health and the environment so far as reasonably practicable, including risks of harm from low-frequency noise and to ensure no plant or equipment ~~which in any case does not~~ exceeds the SWL used in the noise model. Noise checks on mining equipment will be conducted during commissioning and at regular intervals as part of the maintenance program to ensure noise levels, including any audible characteristics, continue to be minimised so far as reasonably practicable.	Construction Operation	Noise Management Plan within Work Plan	Supported
Procurement of fixed plant equipment	Procurement of noise generating fixed-plant will include a noise emission requirement to ensure that all fixed plant meet or better that which has been assumed in the noise model and to ensure fixed-plant is selected to minimise risks of harm to human health and the environment so far as reasonably practicable, including risks of harm from low-frequency noise. During commissioning a programme of noise commissioning checks will be undertaken to determine if fixed plant comply with the sound power level specification and do not present an unexpected risk of tonal, impulsive or intermittent character or of excessive sound energy in the low frequency range.	Construction Operation	Noise Management Plan within Work Plan	Supported
Noise survey	Workplace OH&S noise surveys will be undertaken in noisy areas frequently accessed by personnel. It is anticipated that this will include areas such as the power station and the processing plant.	Construction Operation	Noise Management Plan within Work Plan	Supported
Mobile mining plant noise suppression	After market noise suppression options will be investigated for mining equipment to further reduce noise emissions where practicable, having regard to the sound levels, the noise character and the frequency spectrum. The addition of noise suppression kits to typical mobile plant such as excavators, scrapers, haul trucks and dozers would typically result in an overall reduction of approximately 5 dBA from the standard model.	All phases	Noise Management Plan within Work Plan	Supported
Air quality				
Project specific air quality monitoring plan MP-AQ01	The DEMMP will, at a minimum: Set out monitoring responsibilities of staff and contractors. Identify air quality indicators to be monitored.	All phases	Air Quality Management Plan within Work Plan MM-AQ01	Supported

	Establish monitoring criteria for the air quality indicators. Set out appropriate air quality monitoring methods, schedules and reporting requirements. (See below).			
Continuous air quality monitoring MP-AQ02	Compliance continuous PM10 and PM2.5 monitoring will be conducted in accordance with relevant Australian Standards at a location representative of where a sensitive receptor(s) is likely to experience the highest particulate concentrations during the operational stage of the Project to demonstrate that dust emissions are being controlled adequately to meet relevant Air Pollution Assessment Criteria (APACs). The monitoring will be undertaken in accordance with a schedule approved in the Air Quality Management Plan (MM-AQ01), using monitors that are compliant with the relevant Australian Standards. The monitoring program must be developed by a suitably qualified person such that it is aligned with the requirements of EPA Publication 1961 "Guideline for Assessing and minimising air pollution". The siting, maintenance and calibration of the instrument and analysis of data is to be completed by a suitably qualified person with National Association of Testing Authorities (NATA) accreditation for the method used. The intent of the monitoring is to characterise the relevant risks and impacts associated with the Project. Monitoring will be reported on a quarterly frequency (or less if results necessitate more frequent reporting). The data will be reported to the regulators. The information from the data will be communicated to community members and other stakeholders during the construction, operation and closure (including rehabilitation and post-closure) phases of the project in accordance with the Community Engagement Plan.	All phases	Air Quality Management Plan within Work Plan	Supported
Compliance monitoring of RCS MP-AQ03	Compliance monitoring of RCS (as PM2.5) and heavy metals (as PM10) will be conducted monthly in accordance with relevant Australian Standards at a location representative of where a sensitive receptor(s) is likely to experience the highest particulate concentrations during the operational stage of the Project to demonstrate that dust emissions are being controlled adequately to meet relevant APACs. Monitors will be used that are compliant with the relevant Australian Standards. Monitoring will be conducted by a suitably qualified person and reported on a quarterly frequency (or less if results necessitate more frequent reporting). The data will be reported to the regulators. The information from the data will be communicated to community members and other stakeholders during the	All phases	Air Quality Management Plan within Work Plan	Supported

	construction, operation and closure (including rehabilitation and post-closure) phases of the project in accordance with the Community Engagement Plan.			
Monitoring of PM10 MP-AQ04	Indicative continuous PM10 monitoring will be conducted to provide near real-time feedback to site management with regard to potential dust emission across the site boundaries. Short-term average concentration trigger levels will be used so that site management are alerted (e.g. via SMS) to elevated concentrations such that additional management controls can be actioned to reduce dust levels to below the trigger level as defined by the applicable Trigger Action Response Plan (TARP).	All phases	Air Quality Management Plan within Work Plan	Supported
Fugitive dust generation monitoring MP-AQ05	A Dust Environmental Management and Monitoring Plan (DEMMP) will be prepared. Visual assessment of both fugitive dust generation, especially that leaving the site boundary, and dust deposition on the vegetation surrounding the site would be detailed as part of the DEMMP. Fugitive dust generation monitoring will be undertaken routinely by all site personnel and reported to the site manager. The site manager will record, investigate and implement contingency measures (e.g. increased haul road watering and/or further reduced speed limits for road trucks on unsealed site and public roads).	All phases	Air Quality Management Plan within Work Plan	Supported
Deposition to rainwater tanks MP-AQ06	A sampling program of rainwater tanks will be offered to all residents of dwellings within 1 km of the MIN boundary in accordance with MM-AQ07. If testing indicates that it is appropriate, VHM will offer to undertake the contingency measures required by MM-AQ07.	All phases	Air Quality Management Plan within Work Plan MM-AQ07	Supported
Surface water				
Clean up of spills CP-SW01	Implement contingency plan(s) to clean up and manage spills.	All phases	Surface Water Management Plan within Work Plan MM-SW01	Supported
Water quality monitoring program MP-SW01	Develop and maintain a water quality monitoring program that will comply with applicable legislation and guidelines. The SWMP will define the exact monitoring locations, frequency and parameters. Water quality sampling external to the mine site will be undertaken in conjunction with the internal mine site water quality monitoring program, noting that the external sampling will be event-based, given the lack of permanent streams or	All phases	Surface Water Management Plan within Work Plan EMP under Incorporated Document MM-SW01	Supported

	flow paths impacted by the Project. The potential water sampling locations are shown in Figure 8-5 of Technical Report H1 Surface Water Impact Assessment. In the design and pre-construction phase, water quality monitoring will also be carried out in accordance with the recommendations at section 7.1 of the Phase 1 Desktop Aquatic Ecology Assessment of Kangaroo Lake (Aquatica Environment, 2023). The water quality indicators to be included in the monitoring corresponds to the environmental quality indicators and objectives for rivers and streams as outlined in the ERS 2021.			
Diversions monitoring MP-SW02	Ecological and water quantity monitoring of any surface water diversions to ensure they have no impact on downstream ecosystems. If change is detected, remedial actions will be implemented to rectify the problem immediately to avoid irreversible damage to downstream ecosystems.	All phases	Surface Water Management Plan within Work Plan MM-SW06	Supported
Process water pond MP-SW03	Process water pond levels will be routinely monitored to confirm at least 0.5 metres of freeboard are maintained. If desired levels are not achieved, corrective actions and contingency measures will be carried out.	Operation	Surface Water Management Plan within Work Plan MM-SW02	Supported
Groundwater				
Baseline groundwater monitoring MP – GW01	Purpose: Further inform baseline conditions to develop a baseline groundwater level and quality database against which changes to groundwater can be monitored. Data collected will inform strategies to m~~M~~inimise risk of harm to groundwater during construction. Indicators and objectives: Groundwater quality and levels as set out in the GMP (MM-GW04) and in accordance with the ERS. Groundwater monitoring conducted prior to construction and during construction ~~would~~ will further inform baseline conditions and identify potential departure from background conditions. Parameters: Groundwater parameters and chemicals of concern to include, as a minimum, the suite listed in Table 8-11, 8-12, 8-13 and 8-14 of Groundwater Impact Assessment (CDM Smith, 2023). The suite of analytes will also include considerations of speciation of chemicals of potential concern, and flocculant degradation products at a minimum. The monitoring will be undertaken in accordance with EPA's *Groundwater Sampling Guidelines* (EPA Publication 669.1). Locations: ~~As a minimum, t~~The groundwater bores listed in Table 8-10 of Groundwater Impact Assessment (CDM Smith, 2023) will be reviewed based on guidance in EPA Publication 668.1 and the recommendations of the Inquiry and	Pre-Construction	Groundwater Management Plan within Work Plan MM-GW01	Supported

	Advisory Committee (except for recommendations not accepted by the Minister for Planning) to ensure the number and location of monitoring bores are fit for purpose. Frequency: Groundwater monitoring ~~would~~ will be conducted at a frequency that supports hydrogeological conceptualisation in accordance with EPA Publication 668.1 and data reviewed at least quarterly. ~~biannually (in accordance with EPA Publication 669.1) for a period of two years prior to commencement of construction~~			
Operational phase groundwater monitoring MP-GW02	Groundwater monitoring: Parameters: Groundwater parameters and chemicals of concern as set out for the Baseline groundwater monitoring (MP-GW01), with consideration of any outcomes of review and changes deemed appropriate based on ongoing monitoring results. The suite of analytes will also include considerations of speciation of chemicals of potential concern, and flocculant degradation products at a minimum. The monitoring will be undertaken in accordance with EPA's *Groundwater Sampling Guidelines* (EPA Publication 669.1). Locations: Groundwater monitoring locations will be specified in the GMP and at a minimum, will include the locations set out for the Baseline groundwater monitoring (MP-GW01), additional bores to be installed down-hydraulic gradient of mining pits, and an additional bore located up-hydraulic gradient of Area 1 in addition to continuous review and improvement to the network based on the results of monitoring and guidance in EPA Publication 668.1. Frequency: Groundwater monitoring ~~would~~ will be conducted at a frequency that supports the hydrogeological conceptualisation in accordance with ~~biannually (in accordance with~~ EPA Publication 6689.1~~)~~ and in accordance with the GMP and based on an ability to determine trends and changes prior to causing an impact on sensitive receptors.	Operation	Groundwater Management Plan within Work Plan MM-GW04	Supported
Operational phase groundwater review CP-GW01	If water level or water quality change outside predicted is detected over the life of operations undertake review of groundwater data and mining practices that have occurred to determine the nature and cause of the impact. Review modelling results with observed data to update and inform a revaluation of impact assessment. Detailed trigger levels and contingency actions will be specified in the GMP as required by MM-~~AQ~~GW04.	Operation	Groundwater Management Plan within Work Plan MM-GW04	Supported
Rehabilitation / closure phase groundwater monitoring MP-GW03	Purpose: Minimise risk of harm to groundwater following rehabilitation and mine closure.	Closure	Groundwater Management Plan within Work Plan MM-GW04	Supported

	Indicators and objectives: Groundwater quality and levels as set out in the GMP (MM-GW04) and in accordance with the ERS. Parameters: Groundwater parameters and chemicals of concern as set out for the Baseline groundwater monitoring (MP-GW01), with consideration of any outcomes of review and changes deemed appropriate based on ongoing monitoring results. The suite of analytes will also include considerations of speciation of chemicals of potential concern, and flocculant degradation products at a minimum. The monitoring will be undertaken in accordance with EPA's *Groundwater Sampling Guidelines* (EPA Publication 669.1). Locations: Groundwater monitoring locations will be specified in the GMP and at a minimum, will include the locations set out for the Operational phase groundwater monitoring (MP-GW02), with appropriate changes where required based on the purpose of the monitoring (in accordance with EPA Publication 668.1). The monitoring network may evolve over the closure/post-closure phase. Frequency: Groundwater monitoring ~~would~~ will be conducted at a frequency that supports hydrogeological conceptualisation in accordance with EPA Publication 668.1 and data reviewed ~~biannually (in accordance with EPA Publication 669.1)~~ and in accordance with the GMP (MM-GW04) and based on an ability to determine trends and changes prior to causing an impact at sensitive receptors. Cessation of monitoring: Following the completion of operations, the monitoring plan must establish groundwater mounding and groundwater quality triggers by which cessation of monitoring may occur.			
Rehabilitation/closure phase groundwater review CP-GW02	If groundwater level or quality change outside predictions are detected during the closure/post closure monitoring, undertake review of the groundwater data to determine the nature and cause of any impact. Review modelling results with observed data to update and inform a revaluation of impact assessment. Detailed trigger levels and contingency actions will be specified in the GMP to manage post closure risks (MM-GW04).	Closure	Groundwater Management Plan within Work Plan MM-GW04	Supported
Land use planning				
There are no specific land use planning monitoring measures proposed to mitigate potential land use planning impacts. Relevant monitoring measures are set out in other specialist technical studies. It is anticipated that these measures would be implemented through the regulatory documents and management plans such as the Work Plan, Incorporated Document, CEMP, TMP, BMP, and REMP.			N/A	Supported
Agriculture and soils				
Agriculture and soils and land resource	Visual monitoring of stockpiles will be undertaken regularly, particularly after significant rainfall events. The following characteristics would form part of the	All phases	Soil Stockpile Management Plan within Work Plan	Supported

	checklist in both a site-specific Soil Stockpile Management Plan and an Erosion & Sediment Control Plan, which will include action triggers and contingency actions to be implemented: - Integrity of sediment control. - Effectiveness of drainage. - Integrity of erosion and sediment control measures. - Pasture growth. - Weed infestation. - Pest animal infestation. Samples will also be collected down slope or next to stockpiles to detect whether any mobilisation of solutes or solids is occurring. Sampling of topsoil stockpiles will occur prior to respreading with testing undertaken for agricultural nutrients. ~~Undertake grain yield mapping from adjacent non-mined paddocks and paddocks to be mined in the future to establish whether comparable yields are being obtained from rehabilitated mine areas.~~	Erosion & Sediment Control Plan within Work Plan	
Agriculture	Undertake grain yield mapping from adjacent non-mined paddocks and paddocks to be mined in the future to establish whether comparable yields are being obtained from rehabilitated mine areas (reference sites). Productivity variation of rehabilitated areas to be monitored by NDVI imagery during the growing season and causes investigated where significant variations are observed compared with reference sites. Plant tissue tests to be taken to monitor the nutritional status of the crop, to identify any underlying nutritional issues. Initial crops grown should be harvested with yield monitor to map actual and relative yield variation across crops. Monthly monitoring to take place at all locations with crops sown to ensure issues such as weeds, nutrient issues (deficiencies and toxicities) diseases and pests are not compromising crop production. Crop monitoring will be undertaken for at least five years and include biannual in-crop biomass assessments and tissue tests, and grain yield and quality for reinstated areas and reference sites. If comparable production is not achieved within five years, further remediation should be undertaken.	Rehabilitation Plan under the Work Plan	Supported

Groundwater and surface water	Frequent inspections of the chemicals and hazardous waste storage areas will be conducted to ensure wastes are being stored appropriately, consistent with the requirements of MM-GW03 and MM-SW04.		Waste Management Plan within Work Plan MM-SW01	Supported
Radiation				
Direct (external) gamma	Handheld environmental gamma monitor, OSLD Annual survey and passive detectors at environmental monitoring locations, to include (but not be limited to) Ultima township.	All phases	Radiation Management Plan(s) required under Radiation Licence.	Supported
Rn-220 and Rn-222 Concentrations	Long term passive monitors Placed at the environmental monitoring locations and changed quarterly	All phases		Supported
Dispersion of dust containing long-lived, alpha-emitting radionuclides	Dust deposition gauges sampling at off-site environmental monitoring locations. Samples composited for one year then analysed for radionuclides	All phases		Supported
Dispersion of dust containing long-lived, alpha-emitting radionuclides	HiVol sampling Analysis of routine air quality samples for radionuclides as part of the Air Quality Management Plan	All phases		Supported
Seepage of contaminated water	Groundwater sampling from monitoring bores. Sampling from monitoring bores and analyses for radionuclides.	All phases		Supported
Run off contaminated water	Surface water sampling. Opportunistic surface water sampling will occur following significant rainfall events	All phases		Supported
Radionuclides in potable water supplies	Sampling and radiometric analysis annually	All phases		Supported
Radionuclides in crops	Offers to undertake sampling and radiometric analysis of representative crops on an annual basis for the first 3 years of construction and operations, and thereafter at a frequency to be determined having regard to the results obtained during the first 3 years of monitoring	All phases		Supported
Social				
A comprehensive environmental monitoring regime and complaints process will be established for the Project. The complaints management process for the Project will be established in-line with that required by ERR. The complaints management process, will include the following: - Provision of a visible and user-friendly system for providing feedback. - Information on how and where to provide feedback would be published on the VHM website and discussed during community engagement activities.			Community Engagement Plan within Work Plan Workforce Accommodation Strategy	Supported

- Detailed feedback register.
- Clear accountabilities and procedures for staff to investigate and respond to community feedback.
- Commitment to respond promptly, fairly and confidentially to feedback received. VHM will target a response timeframe of less than 48 hours.
- An internal monitoring and auditing system to ensure effectiveness of the complaint management process, and to identify recurrent themes and appropriate management responses
- VHM will undertake~~s~~ direct contact with the complainant to determine the nature and extent of any impact. All complaints ~~are to~~ will be recorded in the company communication database and reported to the appropriate regulators. Community will be provided quarterly summaries of the any reportable incidents. VHM will continue to liaise with the complainant to assist in alleviating any concerns or potential ongoing issues.

~~In addition, the proposed~~ The Workforce Accommodation Strategy will include monitoring and contingency measures. ~~As such, no further monitoring and contingency measures are recommended.~~

Rehabilitation and closure				
Rehabilitation monitoring	VHM will implement a formalised rehabilitation monitoring and review process to monitor rehabilitation performance, identify emerging risks and enable early intervention. Rehabilitation monitoring would include surveys to be undertaken routinely within each discrete rehabilitation area. The recommended frequency of survey would vary depending on the stage of rehabilitation and progress towards completion, but also depending on the presence or otherwise of active rehabilitation threats. A typical monitoring frequency might include: - Monthly for the first three months during initial vegetation establishment, then. - Quarterly for the first year following commencement of rehabilitation, then. - Annually until completion and achievement of closure criteria. Rehabilitation monitoring will continue until the rehabilitation objectives have been met and are substantially trending towards the completion criteria such that active intervention is no longer required and the area is assessed as stable. Rehabilitation surveys will record key details of rehabilitation progress, including identification of any emerging risks (including but not limited to weeds, diseases and pests), activation of triggers for mitigation controls, and noting any corrective actions that may be required. Any identified deficiencies or failures shall be noted and follow-up actions identified. Success factors would be noted for future reference and to assist in continuing improvement.	Operation Closure	Rehabilitation Plan within Work Plan	Supported, with consideration of the requirements of MM-BD06

Appendix B Matters of national environmental significance

Context

The EES and this assessment examine the likely impacts on matters of national environmental significance (MNES), relevant to the controlling provisions identified in the Commonwealth EPBC Act controlled action decision, i.e., Ramsar wetlands (sections 16 and 17B); listed threatened species and communities (sections 18 and 18A) and nuclear actions (section 21 and 22A).

This appendix consolidates information on the likely effects of the project on relevant MNES protected under the EPBC Act, drawing on the assessment of specific matters discussed in other sections of my assessment. This includes relevant assessment findings on biodiversity (Section 5.1), groundwater (Section 5.2), surface water (Section 5.3) and radiation (Section 5.8).

Potential impacts on relevant MNES were examined by the proponent's EES within technical reports A and A1 (flora vegetation), B (fauna ecology), H1 and H2 (surface water), I (groundwater), and N (radiation), and are addressed in Chapter 7 (terrestrial and aquatic ecology), Chapter 13 (surface water), Chapter 14 (groundwater), Chapter 17 (radiation), and Chapter 20 (MNES) of the EES main report.

Section 17.4 of the IAC report summarised the likely impacts on MNES, with discussion of evidence and submissions related to MNES provided in Chapters 3 (flora), 4 (fauna), 10 (surface water), 11 (groundwater) and 14 (radiation) of the IAC report. The overall finding of the IAC was that residual impacts on MNES will be sufficiently avoided or minimised through implementation of the proposed mitigation measures and that the project would not have a significant impact on relevant MNES.

A likelihood of occurrence of possible or higher for listed species under the EPBC act, within either the project area or broader study area (summarised in Table B1), were used to inform more in-depth biodiversity assessments. Surveys were undertaken for Plains Wanderer (*Pedionomus torquata*) and Corben's Long-eared bat (*Nyctophilus corbeni*) despite the rated low likelihood of occurrence within the project area, based on recommendations from agencies on the TRG established for this EES process. These are discussed further in the sub-sections below.

Table B1: MNES listed fauna species considered within the EES with likely presence (i.e. with a likelihood of occurrence of 'possible' or higher near the study area). Source: adapted from Technical Report B of the EES.

Species	EPBC Conservation Status	Likelihood of Occurrence
Curlew Sandpiper (*Calidris ferruginea*)	Critically endangered	Medium
Australasian Bittern (*Botaurus poiciloptilus*)	Endangered	Recorded
Regent Parrot (*Polytelis anthopeplus monarchoides*)	Vulnerable	Medium
Superb Parrot (*Polytelis swainsoni*)	Vulnerable	Recorded
Painted Honeyeater (*Grantiella picta*)	Vulnerable	Medium
Growling Grass Frog (*Litoria raniformis*)	Vulnerable	Medium
Murray Cod (*Maccullochella peelii*)	Vulnerable	Known to occur
Silver Perch (*Bidyanus bidyanus*)	Critically endangered	Likely present
Murray Hardyhead (*Craterocephalus fluviatilis*)	Endangered	Possibly present

The EES also identified the potential for four EPBC Act listed threatened ecological communities (TECs) to occur within the study area including: *Plains Mallee Box Woodland of the Murray Darling Depression and Riverina*, *Mallee Bird*

Community of Murray Darling Depression Bioregion. As these two TEC's were listed after the controlled action decision, impacts to these TEC's are not required to be considered as specific matters as part of the approval decision under the EPBC Act, however they should be considered as part of the nuclear action trigger. Potential impacts to these TEC's are considered further in section 5.1 of my assessment, and section B3 of this attachment.

The EPBC listed, critically endangered, *Natural Grassland of the Murray Valley Plains* was identified within the project area however impacts to the TEC were proposed to be avoided in the EES. Surveys undertaken post public exhibition of the EES identified some of this community within the proposed pipeline alignment. Potential impacts to this community will be discussed further in section B2 of this assessment.

The EPBC listed Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions were identified in the study area, however the EES considered the project would avoid impacts to this listed community. I note the commitment within the EES to avoid impacts to this community and recommend MM-BD08 is updated to demonstrate that direct and indirect impacts to this community can be avoided, to the satisfaction of DCCEEW.

The EES considered the potential for EPBC listed species such as Chariot Wheels (*Maireana cheeli*), Winged Peppercress (*Lepidium monoplocoides*) and Slender Darling-pea (*Swainsona murrayana*) to be present within the project area, and concluded they were unlikely to occur. In light of this conclusion, I consider that the project is unlikely to result in significant impacts to these species.

B.1 Ramsar wetlands

The EES considered potential impacts to the Kerang Lakes wetland site. This area is listed under the Convention on Wetlands of International Importance, commonly referred to as the Ramsar Convention. The EES described the Kerang Wetlands site as covering 9,784 ha and comprising 23 different lakes, marshes and swamps with over 50 species of migratory species recorded breeding within the Kerang Wetlands complex.

The Kerang Wetlands site is located approximately 30 km east of the MLA. The EES concluded that there is no hydrological connection between the MLA and the Ramsar site and therefore there is no pathway for the proposed construction, operation or decommissioning works within the MLA to impact the Ramsar site. The IAC accepted the conclusions of the EES and it is my assessment that the components of the controlled action within the MLA is not likely to impact the Ramsar site.

The project also proposes to construct and operate a water supply pipeline between a proposed pump station at Kangaroo Lake, one of the wetlands that forms part of the Kerang Lakes Wetlands Ramsar site, and the MLA to supply 4.5 GL per year during the start-up of the project and up to 3.1 GL per year during operations of the project.

Kangaroo Lake, is an artificial hydrological system, managed by Goulburn Murray Water. Goulburn Murray Water will continue to be responsible for managing water levels in Kangaroo Lake and water is expected to be maintained at or near full supply levels to maintain ecological condition of littoral zone, with annual fluctuations of up to 600 mm in water level as per historical management[24].

Construction works for the pump station within the lake are limited in extent and a number of well-established construction techniques (MM-SW04, MM-FE02) are proposed to manage potential effects to water quality associated with the construction of the pump station. Further mitigation and monitoring measures were recommended through the IAC hearings about ensuring construction of the pump station is undertaken with pre-works aquatic fauna surveys and ecologists to be on call for fauna salvage during construction of the pump station. The EES proposed screens over the pump inlet (MM-FE05) to limit the potential for entrainment of fish and fish larvae within the pump during operation. The IAC recommended strengthening the proposed monitoring of these screens and limiting the timing of pumping to avoid the presence of fish larvae should monitoring indicate potential impacts. I support these recommended mitigation measures.

I support the findings of the EES that the project is unlikely to have a significant impact on the Kerang Lakes Wetlands Ramsar site.

[24] Tabled Document 118

B.2 Listed threatened species and communities

Natural Grasslands of the Murray Valley Plains

The project described in the exhibited EES did not propose the removal of any areas of the critically endangered Natural Grasslands of the Murray Valley Plains. However, after exhibition of the EES further surveys were conducted by the proponent and areas of Natural Grasslands of the Murray Valley Plains were identified within the alignment of pipeline route option A3. The extent of potential removal (1.689 ha) was considered to represent a significant impact on the listed community. The proponent proposes to avoid the impact by using pipeline route option A2 or by using alternative construction methods to avoid impacts to the listed communities. I support this commitment, and recommend a new mitigation measure (MM-BD08), which demonstrates how the information survey effort in MM-BD07 has been used to avoid any areas of Natural Grassland of the Murray Valey Plains in the pipeline area.

There is also potential for further impacts to this listed community associated with potential upgrades to roads and intersections. Dr Callister, the proponent's expert witness, acknowledged that further surveys for the EPBC listed Natural Grasslands of the Murray Valley Plains should be undertaken on intersections where upgrades are required and the listed community has the potential to occur. The IAC captured this within a proposed mitigation measure (MM-BD07). I support this recommendation from the IAC and consider that these surveys and demonstration of avoidance and mitigation of any further values that may be identified through surveys, conducted in consultation with DEECA, should be undertaken as part of a design document that should be prepared to the satisfaction of DEECA and DCCEEW, ahead of my consideration of the PSA.

Based on the information before me, it appears unlikely that the community is present within areas of the mining licence area. Should any of the further survey work undertaken to support the development of the project within the mining licence area identify the presence of the community, the proponent should avoid impacts to this community, as is proposed for the pipeline alignment. I consider that the works within the pipeline corridor can be managed to avoid impacts to Natural Grasslands of the Murray Valley Plains. There is some residual uncertainty with the works associated with parts of road and/or intersection upgrades may result in impacts to this community, therefore I recommend that a new mitigation measure (MM-BD08) is included which considers the results of the survey work and demonstrates how impacts to this community have been avoided.

I note that the Conservation Advice for the Natural Grasslands of the Murray Valley Plains recommends a buffer zone of at least 30 m be maintained from the outer edge of a remnant patch of the ecological community. A smaller buffer between the edge of disturbance may be justifiable, however given the uncertainty of the presence / absence of the vegetation community in certain areas of the project, it is my recommendation that the new mitigation measure (MM-BD08) includes a requirement to ensure that there is an adequate buffer provided to protect the grasslands community from direct and indirect impacts associated with works to the satisfaction of DEECA and DCCEEW, should the proposed buffer be less than 30 m.

Plains-wanderer (*Pedionomus torquata*)

The Plains-wanderer has a specific requirement for native grasslands and can be absent from areas where grass becomes too dense or too sparse. Plains-wanderer diet typically includes a mix of fallen grass, chenopod and arthropods. The species' diet and foraging behaviour are linked with their habitat requirements, which includes bare ground to forage and vegetation clumps to provide cover from predators. Habitat loss and predation are among the main threats to the species

The EES outlined the surveys and the results of surveys undertaken for Plains-wanderer within the project area. The EES noted the presence of potential predators and the high density of prey sources, e.g. mice and active mice nests, for predators of the Plains-wanderer in the project area. The EES also described the agricultural practices within the project area and noted that Plains-wanderer has not been recorded in similar area where continuous cycles of cropping and soil improvement occur. Plains-wanderer were not detected in the project area during the targeted surveys, however the EES noted that for this cryptic species the absence of evidence is not evidence of absence. The EES concluded that the project was unlikely to have a significant impact on the Plains-wanderer.

I accept the findings outlined in the EES and note that the proposed mitigation measures, as recommended by the IAC and my assessment, will serve to further avoid and minimise potential effects to potential fauna movement corridors, ensure that pre-clearance surveys are undertaken for the species in areas of potential habitat along the pipeline route and road and intersection upgrades to confirm the project's understanding of potential effects and ensure a more strategic approach to fauna habitat enhancement works undertaken by the project.

It is my assessment that, in accordance with the Matters of National Environmental Significance Significant Impact Guidelines for critically endangered species, the project is not expected to have a significant impact on the Plains-wanderer.

Corben's Long-eared Bat (*Nyctophilus corbeni*)

Corben's Long-eared Bat, sometimes referred to as South-eastern Long-eared Bat, is vulnerable under the EPBC Act. The range of south-eastern long-eared bat is mostly throughout the Murray Darling Basin, which includes north-western Victoria. Few scattered records of the species in Victoria have occurred throughout the Northern Plains and the Mallee regions of Victoria in *Eucalyptus gracilis* mallee, Buloke and black box woodlands.

Corben's Long-eared Bat are typically found in woodlands and forests with dense understorey, which includes vegetation typical of the Plains Mallee Box Woodland community that occurs extensively throughout the study areas for Technical Report A and B. A targeted harp trap survey for the species was conducted in October 2018, due to indistinguishable bat call detections recorded in March 2018 throughout song meter ultrasonic bat recordings along the edge of woodland habitats, with no individuals being recorded in the survey.

The EES concluded that there was a low likelihood of occurrence due to limited presence of suitable habitat and lack of historical records of the species. Attempts to avoid and minimise impacts were therefore not considered. The IAC considered that the EES adequately considered the potential impacts to Corben's Long-eared Bat.

I agree that the project is unlikely to have a significant impact on the species provided that proposed and amended mitigation measures are effectively implemented, which includes revegetation of roadside vegetation with Ridged Plains Mallee and Woorinen Mallee EVCs (MM-BD06), fauna salvage and habitat enhancement (MM-FE01), and development of a fauna recovery protocol (MM-FE04). Measures to minimise removal of trees (MM-BD01) and native vegetation (MM-BD02) will also ensure that Plains Mallee Box Woodland habitat for the species will be minimised as much as practicable. I recommend that pre-clearance surveys are undertaken for the species in areas of potential habitat along the pipeline route and road and intersection upgrades to confirm the project's understanding of potential effects on this species.

An assessment of the impacts of the project on Corben's Long-eared Bat under the Significant Impact Guidelines 1.1 for vulnerable species was not undertaken. Based on the argument that the species is only expected to use the project area occasionally for foraging, I agree there is a low likelihood of significant impacts to Corben's Long-eared Bat.

Superb Parrot (*Polytelis swainsoni*)

Superb Parrot is listed as vulnerable under the EPBC Act. The species is associated with the EPBC endangered listed Mallee Bird Community of the Murray Darling Depression Bioregion. Superb Parrots typically nest in large, living or dead trees with many hollow branches. Most nest sites are within 10 km of box-gum woodland. Major threats to the Superb Parrot include habitat clearing and degradation of box woodland throughout the species' distribution, with most remnant habitat occurring along roadsides and in scattered remnant patches on private land. The Superb Parrot recovery plan lists recovery actions including the securing all areas of public land that provide, or potentially provide, nesting or foraging habitat for the species under conservation management, particularly those in timber reserves, transport corridors and local government land.

The EES described the project area as lacking the preferred habitat for Superb Parrot for both feeding and foraging habitat. The EES noted that habitat considered important for the species is found in the Barmah Forest area and areas along the Murray River. In spite of this, the surveys undertaken to support the EES identified a juvenile individual within the project area. The individual was considered to be a vagrant or dispersing individual moving to more suitable habitat located outside of the project area. The EES assessed the project against the Matters of National Environmental Significance Significant Impact Guidelines and concluded that the project would not result in a significant impact to the species.

I accept the findings in the EES and note that the proposed mitigation measures, as recommended by the IAC and my assessment, will serve to further avoid and minimise potential effects to potential fauna movement corridors (MM-BD07), ensure that pre-clearance surveys (MM-FE01) are undertaken to confirm the project's understanding of potential effects and ensure a more strategic approach to fauna habitat enhancement works undertaken by the project. It is my assessment that the project is not expected to have a significant impact on the Superb Parrot.

Regent Parrot (*Polytelis anthopeplus monarchoides*)

Similar to the Superb Parrot, the EES described the Regent Parrot as relying on River Red Gum forests and woodland for breeding. The project area was described as not containing suitable habitat for breeding and being beyond the reported 100 km flight distances from breeding areas for foraging. Mallee woodlands, within 20 km and ideally within 5 km of nest

sites for foraging are important to support breeding parrots, as well has having treed flight corridors between breeding and foraging habitats. Relatively little is known about Regent Parrot habitat, although they are thought to remain in the Murray Darling Basin throughout the year. However, during the non-breeding season some birds will use Mallee woodlands for foraging up to 100 km from the river throughout the year.[25] Loss of flyways (e.g. vegetated roadside corridors) and clearing of Mallee woodland are identified as key threats to the species.

No public records of the species occurring within the project area were identified and the species was not recorded as being present during surveys, although individuals have been recorded about 30 km from the site. The EES concluded that the project would not result in a significant impact on the species given the lack of records, the distance of the project area from known breeding sites and the lack of contiguous roadside vegetation providing for flight corridors between breeding sites and the project area.

I accept the findings in the EES and note that the proposed mitigation measures, as recommended by the IAC and my assessment. In particular the further avoidance and minimisation of impacts to roadside vegetation (MM-BD07), will serve to further avoid and minimise potential effects to potential Regent Parrot flyway corridors, ensure that pre-clearance surveys are undertaken to confirm the project's understanding of potential effects and ensure a more strategic approach to fauna habitat enhancement works undertaken by the project. It is my assessment that the project is unlikely to have a significant impact on the Regent Parrot. However, any habitat that cannot be avoided during the further design work must be offset in accordance with Commonwealth offset requirements, should this be considered by DCCEEW to be appropriate, during the decision on whether the approve the proposed action under the EPBC Act.

Curlew Sandpiper (*Calidris ferruginea*)

The EES acknowledges that Curlew Sandpiper is an EPBC listed critically endangered species, and EPBC listed migratory species associated with the Plains Mallee Box Woodland of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions and Mallee Bird Community of Murray Darling Depression Bioregion. The species is found in both Victorian coastal areas and inland areas where in suitable wetland habitats exist. In non-tidal wetlands, the species typically wades in water 15 to 30 mm deep.

The EES states that Curlew Sandpiper had not been recorded as part of fauna assessments for the project, which was informed by 2022 bird surveys along the western bank of Kangaroo Lake. The EES states the northern section of the lake possessing very limited suitable areas of habitat for wader birds, but notes that Curlew Sandpiper have a medium likelihood of occurrence surrounding the project area due to historical records in Lake Kelly, Lake Tutchewop and Cullens Lake located to the east, north and south respectively within the Kerang Wetlands Ramsar site.

I agree with the EES that the steepness of the embankment of Kangaroo Lake's shoreline would be of limited value for smaller wading birds, such as Curlew Sandpiper. There would be a negligible impact on Curlew Sandpiper at Kangaroo Lake from the construction and operation of the pump station in and adjacent to Kangaroo Lake.

An assessment of the impacts of the project on Curlew Sandpiper under the Significant Impact Guidelines 1.1 for vulnerable species was not undertaken. Based on the argument that the impacts to potential habitat would be limited to the western shorelines of Kangaroo Lake which would be of limited value to the species, I agree there is a low likelihood of significant impacts to Eastern Curlew.

Painted Honeyeater (*Grantiella picta*)

The EES acknowledges that Painted Honeyeater is an EPBC listed vulnerable species. Painted Honeyeater typically occur west of the Great Dividing Range, and prefer dry open forest and woodland associated with mistletoe for habitat. The species is more likely to prefer wider blocks of remnant woodland rather than narrower strips found in roadside reserves.

The EES stated there was a medium likelihood of occurrence due to the presence of suitable habitat. However, surveys undertaken for the EES did not identify the species and there are no of historical records of the species being detected in the project area. Attempts to avoid and minimise impacts to the species were therefore not directly considered. The IAC considered that the EES adequately considered the potential impacts to Painted Honeyeater.

An assessment of the impacts of the project on Painted Honeyeater under the Significant Impact Guidelines 1.1 for vulnerable species was not undertaken. Based on historical and present survey data suggesting habitat within the project area is seldom utilised by Painted Honeyeater, I agree significant impacts to Painted Honeyeater are unlikely.

[25] National Recovery Plan for the Regent Parrot (eastern subspecies) *Polytelis anthopeplus monarchoides*

Australasian Bittern (*Botaurus poiciloptilus*)

The EES acknowledges that Australasian Bittern is an EPBC listed endangered species, and associated with the critically endangered Plains Mallee Box Woodland of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions ecological community. Australasian Bittern occur mainly in freshwater wetlands with tall dense vegetation, and are known to forage in still, shallow water up to 0.3m deep at the edge of pools and waterways, and favours habitats dominated by sedges, rushes and reeds. The species is distributed throughout the Murray River region of central northern Victoria, including within the project area.

The EES concludes that Australasian Bittern has a high chance of occurrence surrounding the Project area due to the project area's proximity to suitable habitat and historical records within the Kerang wetlands Ramsar site. I agree the area where the water pump would be constructed and operated to the north-west of Kangaroo Lake would be of limited value for wading bird habitat due to the steepness of the embankment and the depth of the water pump inlet, and that no areas of suitable habitat for Australasian bittern would be affected elsewhere throughout the project area.

An assessment of the impacts of the project on Australasian Bittern under the Significant Impact Guidelines 1.1 for vulnerable species was not undertaken. Based on the argument that the impacts to potential habitat in Kangaroo Lake would be limited to the north-western shorelines of Kangaroo Lake which would be of limited value to the species, I agree there is a low likelihood of significant impacts to Australasian Bittern.

Silver Perch (*Bidyanus bidyanus*)

Silver Perch is listed as critically endangered under the EPBC Act. Surveys for aquatic species were limited to desktop review for aquatic fauna species within 10 km of Kangaroo Lake. The EES identified that the Victorian Biodiversity Atlas (VBA) recorded 21 individuals records in 2021 within the Kerang Wetlands, with the most recent record within Kangaroo Lake occurring in 1983. The EES concluded that the species was likely to be present in Kangaroo Lake, due to historical records of the species and connectedness of waterbodies within the Kerang wetlands. Potential impacts on the species include potential entrainment and impingement in the water pump intake and from reduced water quality and extent.

An assessment of the impacts of the projects on Silver Perch under the Significant Impact Guidelines 1.1 was undertaken, and it was determined that the species is unlikely to be significantly impacted. The IAC considered that the EES adequately considered the potential impacts to Silver Perch. I agree that the project is unlikely to have a significant impact on the species provided that proposed and amended MMs are effectively implemented, which includes having a qualified ecologist available to assist with salvage during construction, measures to minimise entrainment and impingement of fish via the installation (MM-FE05) and regular monitoring of an angled fish screen (MM-FE04).

Murray Hardyhead (*Craterocephalus fluviatilis*)

Murray Hardyhead is listed as endangered under the EPBC Act. Surveys for aquatic species were limited to desktop review for aquatic fauna species within 10 km of Kangaroo Lake. The EES identified that the VBA recorded two individual records in 2019 within the Kerang Wetlands. The EES concluded that it could be possible for the species to be present in Kangaroo Lake, due to historical records of the species, suitable habitat and connectedness of Kerang wetlands waterbodies. Potential impacts on the species include potential entrainment and impingement in the water pump intake, and from reduced water quality and extent.

An assessment of the impacts of the projects on Murray Hardyhead under the Significant Impact Guidelines 1.1 was undertaken, and it was determined that the species is unlikely to be significantly impacted. The IAC considered that the EES adequately considered the potential impacts to Murray Hardyhead I agree that the project is unlikely to have a significant impact on the species provided that proposed and amended MMs are effectively implemented, which includes having a qualified ecologist available to assist with salvage during construction, measures to minimise entrainment and impingement of fish via the installation (MM-FE05) and regular monitoring of an angled fish screen (MM-FE04).

Murray Cod (*Maccullochella peelii*)

Murray Cod are vulnerable under the EPBC Act. Surveys for this species was limited to desktop review, however the EES explains that up to 50,000 Murray Cod are stocked annually into Kangaroo Lake and that the species is known to occur in Kangaroo Lake. Potential impacts on the species include potential entrainment and impingement in the water pump intake and from reduced water quality and extent.

The IAC concluded that the EES adequately considered the potential impacts to Murray Cod. I agree that the project is unlikely to have a significant impact on the species provided that proposed and amended MMs are effectively implemented, which includes having a qualified ecologist available to assist with salvage during construction, measures to

minimise entrainment and impingement of fish via the installation (MM-FE05) and regular monitoring of an angled fish screen (MM-FE04).

Growling Grass Frog (*Litoria raniformis*)

Growling Grass Frog is listed as vulnerable under the EPBC Act. Assessment of Growling Grass Frog was limited to desktop review. The EES identified suitable habitat for the species to be present at Kangaroo Lake. The EES states that Growling Grass Frog was assumed to be present within Kangaroo Lake, due to suitable habitat and historical records within the Kerang Wetlands. Potential impacts on the species include removal and/or fragmentation of habitat from the construction and operation of the pump station on the western bank of Kangaroo Lake, and water quality impacts from accidental spills and water extraction.

The IAC considered that the EES adequately considered the potential impacts to Growling Grass Frog. I agree that the clearance of terrestrial native vegetation (i.e. 431 m^2 of Plains Savannah and 422 m^2 of wetland vegetation) required for the installation of the pump station at Kangaroo Lake will not significantly remove or alter terrestrial or aquatic habitat corridors for Growling Grass Frog. I also agree that the operation of the pump station at Kangaroo Lake will not significantly impact water quality or alter aquatic vegetation diversity or structure that would lead to a decrease in habitat quality. The MMs for mitigating risk from entrainment and impingement, soil, fuel and chemical containment, sediment fencing, availability of a qualified ecologist to assist with fauna salvage and habitat reinstatement would be an acceptable means of managing the risk of significant impact should the species be identified in Kangaroo Lake.

B.3 Nuclear action

The project is classified as a nuclear action as it involves the storage of radioactive materials (uranium and thorium) which are present in the Phase 1 Rare earths mineral concentrate, Phase 1 and Phase 1a Zircon Titania heavy mineral concentrate (HMC) and Phase 3 zircon and zircon concentrate stockpiles which exceed the levels set out in the *Environment Protection and Biodiversity Conservation Regulations 2000*. These materials are to be contained, while stored on-site, to ensure no emissions, stored in bulk bags and lined shipping containers and or stockpiled within buildings and lined shipping containers. The triggering of the nuclear action controlling provision under the EPBC Act requires a whole of environment assessment for the relevant component of the action. This has been addressed through the broader scope of the assessment in the EES and is considered in detail within section 5 of my assessment.

Radiation Impacts

Radiation impacts are discussed in detail in section 5.8 of my assessment. It is my assessment that the radiation mitigation measures are adequate to sufficiently avoid, mitigate and manage the project's radiation effects subject to the IAC's recommended changes to mitigation measures. Calculated doses of radiation exposure for members of the public reported in the EES are predicted to be considerably less than the regulatory annual dose limit. The IAC made recommendations for further baseline monitoring to account for different soil types across the project area and that the Radiation Impact Assessment should be updated at any time to account for additional baseline sampling and subsequent data that arises during the life of the project. I support the recommendations of the IAC to update and re-consider the potential effects during the life of the project as further data becomes available.

I acknowledge the comprehensive regulatory framework that applies to managing radiation in Victoria which will necessitate that the project obtain a radiation management licence and density gauge licence prior to commencing operations as well as approval of a radiation management plan and radioactive waste management plan and radiation environment plan by the Department of Health.

Whole of environment assessment

It is my overall conclusion that the project will result in acceptable environmental effects subject to the implementation of relevant mitigation measures proposed in the EES and refined by the IAC and through this assessment. This includes:

- Acceptable environmental effects on biodiversity (Section 5.1) subject to management through a number of mitigation measures, including further surveys for threatened flora, fauna and ecological values and avoidance and minimisation along the pipeline route and potential haul road and intersection upgrades.
    - It is noted that the removal of 11.347 hectares of the critically endangered Plains Mallee Box Woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions is a significant impact, and measures to reduce this impact should be considered during the detailed design ahead of consideration of the work plan.
- Acceptable environmental effects environmental effects on surface water including water quality, flooding and to the Kerang Lakes Ramsar site. I also consider that effects will be acceptable on groundwater levels and quality

related to mounding of water from tailings deposited within backfilled mine voids subject to implementation of the mitigation measures.

- Acceptable environmental effects on soils and landform (section 5.10) and land use (section 5.4) associated with the temporary change from agriculture to mining within the mining licence area subject to the implementation of the mitigation measures, including the implementation of a rehabilitation management plan that is approved under the MRSD Act.
- Acceptable impacts on amenity and human health, noting that there will be changes during construction and operations of the mine, the project can appropriately minimise the potential noise and air quality, including dust, impacts for nearby residents to ensure that impacts are acceptable.
- Acceptable socio-economic effects would be acceptable noting that the proponent has landholder agreements in place with landholders within the ML, although I acknowledge that the project will impact individuals within the community differently and they will each perceive these impacts in their own way.
- Acceptable environmental effects on other environmental values (Aboriginal cultural heritage, historic heritage, and landscape and visual section 5.11).

B.4 Assessment

It is my assessment, taking account of the findings and recommendations of this assessment, that:

- The project is not expected to have a significant impact on any MNES, with the implementation of the proposed EMMs as amended by the IAC and as amended through my assessment.
- The project is unlikely to have a significant impact on the Ramsar listed Kerang Lakes wetlands site given the limited residual impacts to Kangaroo Lake associated with construction of the pump station and that lake levels within Kangaroo Lake are proposed to continue to be managed by Goulburn Murray Water to maintain the ecological values of the lake.
- I support the findings of the IAC that impacts to Natural Grasslands of the Murray Valley Plains along the pipeline route must be avoided and to that end have recommended that the proponent prepare a design management document to ensure that areas of this listed community are avoided along the pipelines route. I have also recommended that there should be a demonstration of avoidance along potential haul road and intersection upgrades where areas of Natural Grasslands of the Murray Valley Plains and/or Regent Parrot flyways may be impacted.
- There are some residual uncertainties associated with the potential presence of come listed fauna species along the pipeline route and potential road and intersection upgrades. Pre-clearance surveys and other recommended changes to the mitigation measures, such as implementation of a revegetation plan and fauna habitat enhancement, mean that the projects are unlikely to be significant and that the project's impacts on these values are likely to be acceptable.
- Potential radiation effects are likely to be acceptable if the project is managed within the existing regulatory framework within Victoria and in accordance with the mitigation measures.
- It is my assessment that the whole of environment assessment undertaken for the EES that the project will not result in unacceptable environmental effects on environmental values including biodiversity, surface water, groundwater, agriculture, traffic, amenity, human health, land-use, socio-economic values, soils and landforms and Aboriginal and historic heritage.