Report and recommendations of the Environmental Protection Authority

Yalyalup Mineral Sands Project

Doral Mineral Sands Pty Ltd

Report 1695

January 2021

Environmental Impact Assessment Process Timelines

Date	Progress stages	Time (weeks)
03/01/2018	EPA decided to assess – level of assessment set	
29/05/2019	EPA approved Environmental Scoping Document	73
22/06/2020	EPA accepted Environmental Review Document	55
22/06/2020	Environmental Review Document released for public review	0
20/07/2020	Public review period for Environmental Review Document closed	4
23/11/2020	EPA accepted proponent's Response to Submissions	18
10/12/2020	EPA board considered assessment	2
13/01/2021	EPA provided report to the Minister for Environment	5
18/01/2021	EPA report published	3 days
01/02/2021	Close of appeals period	2

Timelines for an assessment may vary according to the complexity of the proposal and are usually agreed with the proponent soon after the EPA decides to assess the proposal and records the level of assessment.

In this case, the Environmental Protection Authority met its timeline objective to complete its assessment and provide a report to the Minister.

Ms Lee McIntosh
Deputy Chair

11 January 2021

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Summary

This document is an assessment report for Western Australia's Minister for Environment. It describes the outcomes of an Environmental Protection Authority (EPA) environmental impact assessment of the Yalyalup Mineral Sands Project (the proposal), located about 11 kilometres southeast of Busselton, Western Australia. The proponent is Doral Mineral Sands Pty Ltd.

Proposal

The proposal is to extract ore from the Yalyalup Mineral Sands Deposit. The proposal includes the development of mine pits and associated infrastructure, a wet concentration processing plant, solar evaporation ponds, groundwater abstraction and water management infrastructure and a process water dam. The anticipated life of the proposal is up to five years.

Background and Context

The proponent referred the proposal to the EPA on 26 October 2017. On 8 January 2018, the EPA decided to assess the proposal and set the level of assessment at Public Environmental Review, with a four-week public review period for the Environmental Review Document.

The proposal was also determined to be a controlled action under the *Environment Protection and Biodiversity Conservation Act 1999* to be assessed by an accredited process under the *Environmental Protection Act 1986* (EP Act).

The EPA approved the Environmental Scoping Document for the proposal on 29 May 2019.

On 5 November 2019, the proponent applied for a change to the proposal during assessment. The change included a new internal road to access the Ludlow-Hithergreen Road to avoid significant flora and fauna. The change resulted in an increase to the development envelope by 30.63 hectares and an additional 80.67 hectares of disturbance, of which 98% is within cleared pasture/planted species and 2% is within degraded to completely degraded native vegetation. The EPA Chairman consented to the change on 9 January 2020 under s. 43A of the EP Act.

The Environmental Review Document was released for public review from 22 June 2020 to 20 July 2020. Four agency submissions and three public submissions were received.

Public Submissions

The key issues raised in the submissions included:

- groundwater drawdown impacts on conservation significant flora and fauna species, vegetation communities and fauna habitat
- concern regarding the groundwater model

- potential acid sulfate soils
- management of naturally occurring radioactive material
- offsets and land acquisition
- surveys of short-range endemic fauna species.

The proponent responded to these submissions by updating the environmental management plans, clarifying the groundwater modelling information and preparing a Land Acquisition Offset Strategy. The proponent outlined their response to the issues raised in the Response to Submissions document.

Key Environmental Factors and Relevant Principles

The EPA identified the following key environmental factors during the course of its assessment:

1. **Flora and Vegetation –** potential direct impacts to conservation significant flora and Threatened Ecological Communities through clearing, and indirect impacts from groundwater drawdown, dust deposition, introduction of weeds, dieback, fragmentation and changes to fire regimes.
2. **Terrestrial Fauna –** potential direct impact on habitat for conservation significant fauna, including Carnaby's cockatoo, Baudin's cockatoo and the forest red-tailed black cockatoo through clearing, and potential indirect impact on habitat for conservation significant fauna (western ringtail possum) through groundwater drawdown.
3. **Inland Waters –** potential impacts from dewatering and exposure of acid sulfate soils, and potential changes in surface water and groundwater regimes.
4. **Social Surroundings –** potential impacts on Aboriginal heritage sites during construction and an increase in noise and dust from the construction and operation of the proposal.

In identifying the key environmental factors, the EPA had regard to the object and principles set out in s. 4A of the *Environmental Protection Act 1986*. The EPA considered that the following principles were particularly relevant to this assessment:

- the precautionary principle
- the principle of intergenerational equity
- the principle of the conservation of biological diversity and ecological integrity.

Conclusion

The EPA has taken the following into account in its assessment of the proposal as a whole:

- impacts to all the key environmental factors
- EPA's confidence in the proponent's proposed mitigation measures
- relevant EP Act principles and the EPA's objectives for the key environmental factors

- EPA's view that the impacts to the key environmental factors, considered both separately and cumulatively, are manageable provided the recommended conditions are imposed.

Given the above, the EPA has concluded that the proposal may be implemented subject to the conditions recommended in Appendix 4.

Recommendations

The EPA recommends that the Minister for Environment notes:

1. That the proposal assessed is for the Yalyalup Mineral Sands Project which includes the development and operation of a mineral sands mine.
2. The key environmental factors identified by the EPA in the course of its assessment are Flora and Vegetation, Terrestrial Fauna, Inland Waters and Social Surroundings, as set out in section 4 of this report.
3. The EPA has recommended that the proposal may be implemented, provided the implementation of the proposal is carried out in accordance with the recommended conditions and procedures set out in Appendix 4. Matters addressed in the conditions include:
    a) a limit on the authorised extent of physical and operational elements of the proposal in schedule 1 of the Recommended Environmental Conditions (Appendix 4)
    b) no direct impacts to Threatened Ecological Communities within the development envelope (condition 6)
    c) limits to vegetation clearing (condition 6)
    d) limits to direct, and indirect, significant residual impacts, and offsets requirements for these impacts (condition 6 and condition 11)
    e) implementation of the *Yalyalup Mineral Sands Project: Flora and Vegetation Environmental Management Plan (November 2020)* to minimise indirect impacts to conservation significant flora and Threatened Ecological Communities (condition 7)
    f) implementation of the *Yalyalup Mineral Sands Project: Fauna Environmental Management Plan (November 2020)* to minimise the impact to conservation significant fauna and fauna habitat (condition 8)
    g) preparation and implementation of an Acid Sulfate Soils Management Plan to minimise impacts to flora, fauna and inland waters (condition 9)
    h) implementation of the *Yalyalup Mineral Sands Project: DMS-YAL-EMP-2.4 GDE Management Plan (October 2020)* to minimise impacts to Threatened Ecological Communities and Groundwater Dependent Ecosystems (condition 10)
    i) implementation of a Land Acquisition Offset Strategy to counterbalance the significant residual impact of the loss of conservation significant fauna habitat and the Threatened Ecological Community (condition 11)

j) implementation of an additional offset to counterbalance the significant residual impact from the loss of habitat for the western ringtail possum on the McGibbon Track should it be impacted by indirect impacts (condition 12)

k) preparation and implementation of an Abba River Management Strategy to minimise impacts to the Abba River (condition 13), including consultation with South West Aboriginal Land and Sea Council (SWALSC).

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1. Introduction

This report provides the advice and recommendations of the Environmental Protection Authority (EPA) to the Minister for Environment on the outcomes of the EPA's environmental impact assessment of the Yalyalup Mineral Sands Project (the proposal). The proponent of the proposal is Doral Mineral Sands Pty Ltd.

The proposal is to develop and operate a mineral sands mine about 11 kilometres (km) southeast of Busselton. The proposal includes the development of mine pits and associated infrastructure, wet concentration processing plant, solar evaporation ponds, groundwater abstraction and water management infrastructure and a process water pond.

The EPA has prepared this report in accordance with s. 44 of the *Environmental Protection Act 1986* (EP Act). This section of the EP Act requires the EPA to prepare a report on the outcome of its assessment of a proposal and provide this assessment report to the Minister for Environment. The report must set out:

- what the EPA considers to be the key environmental factors identified during the assessment
- the EPA's recommendations as to whether the proposal may be implemented and, if the EPA recommends that implementation be allowed, the conditions and procedures to which implementation should be subject.

The EPA may also include any other information, advice and recommendations in the assessment report as it thinks fit.

The proponent referred the proposal to the EPA on 26 October 2017. On 3 January 2018, the EPA decided to assess the proposal and set the level of assessment at Public Environmental Review, with a four-week public review period for the Environmental Review Document. The EPA approved the Environmental Scoping Document for the proposal on 29 May 2019. The Environmental Review Document (ERD) was released for public review from 22 June 2020 to 20 July 2020.

EPA Procedures

The EPA followed the procedures in the *Environmental Impact Assessment (Part IV Divisions 1 and 2) Administrative Procedures 2016* (State of Western Australia 2016) and the *Environmental Impact Assessment (Part IV Divisions 1 and 2) Procedures Manual* (EPA 2020c).

1.1 Assessment on behalf of the Commonwealth

The proposal was determined to be a controlled action by a delegate of the Commonwealth Minister for the Environment under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) on 8 February 2018 as it will, or is

likely to have, a significant impact on the following Matters of National Environmental Significance (MNES):

- Listed threatened species and communities (s. 18 and s. 18A):
  - western ringtail possum (*Pseudocheirus occidentalis*) – Vulnerable (at the time of the decision)
  - Whicher Range Dryandra (*Banksia squarrosa* subsp*. argillacea*) – Vulnerable
  - Vasse Featherflower (*Verticordia plumose var. vassensis*) – Endangered
  - shrublands on southern Swan Coastal Plain ironstones – Endangered.
- The ecological character of a declared Ramsar wetland (s. 16 and s. 17B)
  - Vasse-Wonnerup wetlands.
- Migratory species (s. 20 and s. 20A):
  - wood sandpiper (*Tringa glareola*) – Migratory
  - sharp-tailed sandpiper (*Calidris acuminata*) – Migratory
  - long-toed stint (*Calidris subminuta*) – Migratory.

During the preparation of the ERD, the following MNES were identified as being relevant and have also been assessed accordingly:

- Listed threatened species and communities (s. 18 and s. 18A):
  - Carnaby`s cockatoo (*Calyptorhynchus latirostris*) – Endangered
  - Baudin’s cockatoo (*Calyptorhynchus baudinii*) – Vulnerable
  - forest red-tailed black cockatoo (*Calyptorhynchus banksii naso*) – Vulnerable.

The proposal was assessed as an accredited assessment between the Commonwealth and Western Australian governments.

2. The Proposal

The proponent proposes to extract mineral sands from the Yalyalup mineral sands deposit, located about 11 km south east of Busselton, in the south-west region of Western Australia (Figure 1).

The proposal involves the disturbance of 451.33 hectares (ha), comprising predominantly cleared pasture (448.61 ha) and degraded native vegetation (2.72 ha), within a 924.84 ha development envelope. The anticipated life of the proposal is up to five years.

The key elements of the proposal include:

- mine pits and associated infrastructure
- wet concentration processing plant
- solar evaporation ponds
- groundwater abstraction and water management infrastructure
- process water dam.

Mineral sands from the deposit will be mined progressively via a series of open-cut pits using dry mining techniques to a maximum depth of about 10.5 metres (m). Dewatering of groundwater inflows to the pit will be required to enable dry mining. Mining will be staged to minimise the area of disturbance (at any one time) and will allow for focused and effective management of the environmental factors at each pit location, prior to moving onto the next pit location.

Heavy Mineral Concentrate (HMC) produced at the wet concentrator plant would be stockpiled on site prior to transport to the proponent's Picton Dry Separation Plant, located about 60 km north-east of the mine, for separation using electrostatic processes. The Picton Dry Separation Plant has a licence to process HMC sourced from the proponent's Yoongarillup Mine. Processing of HMC into products of zircon, ilmenite and leucoxene has occurred since the Picton Dry Separation Plant was approved in 1998.

Once processed, HMC products would be hauled by truck to either the Bunbury Port or Fremantle Port for export. Processing activities at the Picton Dry Separation Plant and exporting of product are not part of this proposal and are not further described in this report.

The key characteristics of the proposal are summarised in Tables 1 and 2 below. A detailed description of the proposal is provided in section 2.4 of the ERD (Doral 2020a).

Table 1: Summary of the proposal

Proposal title	Yalyalup Mineral Sands Project
Short description	The proposal is to construct and operate the Yalyalup mineral sands mine. The proposal includes the development of mine pits and associated infrastructure, a wet concentration processing plant, solar evaporation ponds, groundwater abstraction and water management infrastructure and a process water dam.

Table 2: Location and proposed extent of physical and operational elements

Element	Location	Proposed extent
Physical elements		
Mine pits	Figure 2	Disturbance footprint up to 259.7 ha within a 924.84 ha development envelope
Key mine infrastructure	Figure 2	Disturbance footprint up to 23.03 ha within a 924.84 ha development envelope
Other supporting infrastructure	Figure 2	Disturbance footprint up to 168.6 ha within a 924.84 ha development envelope
Operational elements		
Groundwater abstraction	Figure 2	Abstraction of up to 1.6 gigalitres (GL) per annum from the Yarragadee aquifer
Ore processing Heavy Mineral Concentrate (HMC)	Figure 2	250,000 tonnes per annum

Figure 1: Regional location

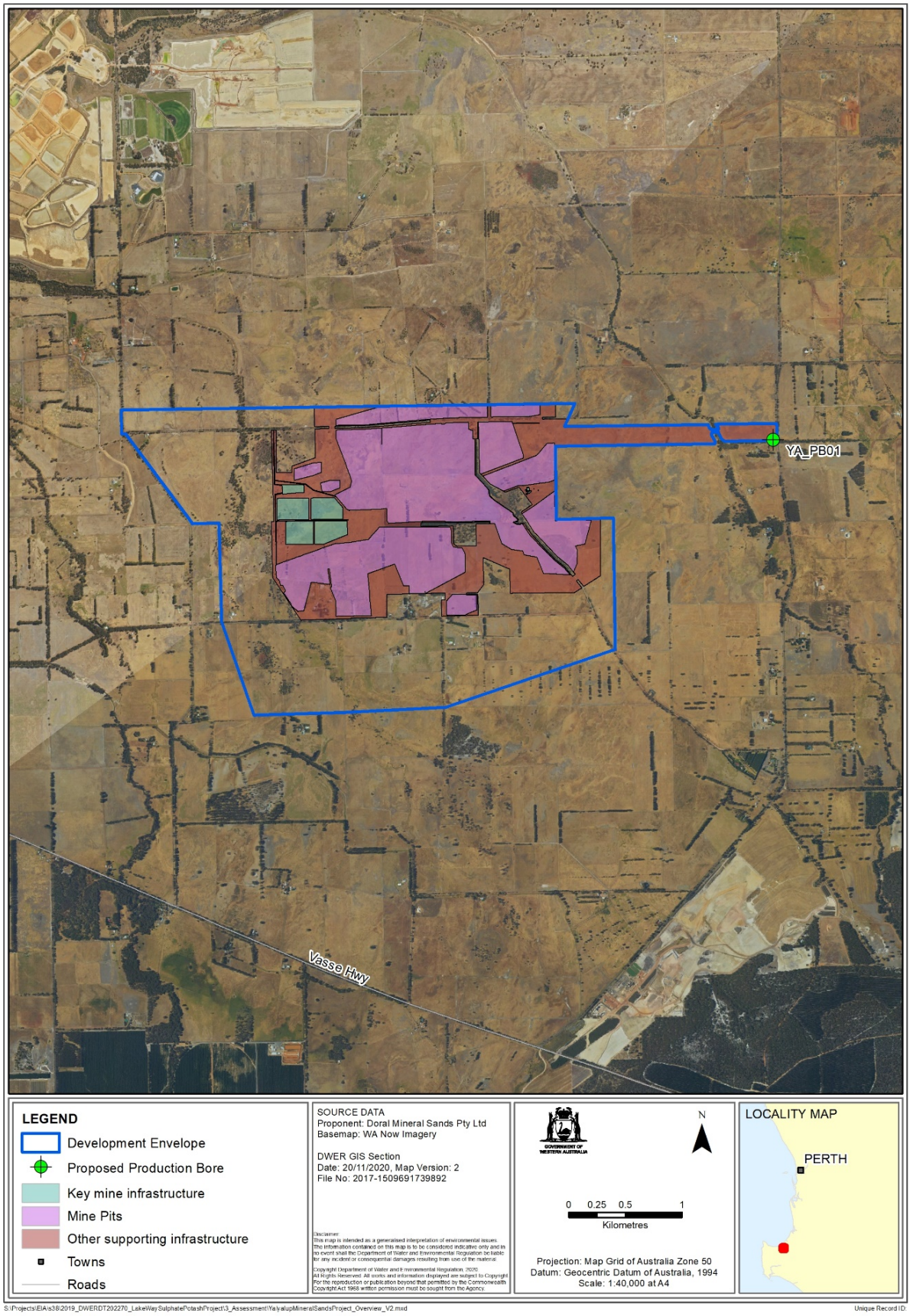

Figure 2: Development envelope and indicative disturbance footprint

2.1 Changes to the proposal during assessment

The proponent requested the EPA consent to a change to the proposal during assessment on 5 November 2019. The original proposal intended to use Princefield Road for haulage, however this would require upgrading the road, resulting in the clearing of about 45 potential black cockatoo breeding habitat trees and five conservation significant flora species.

To avoid impacting high conservation value flora and fauna along Princefield Road, the proponent proposed a change to construct a new internal road to access Ludlow-Hithergreen Road. The proposed change resulted in an increase to the development envelope by 30.63 ha and an increase to the disturbance footprint by 80.67 ha due to modifications of mine pits, key mine infrastructure and other supporting infrastructure.

While there is an increase in disturbance, clearing is almost entirely within cleared pasture/planted species (78.84 ha), with a small area of additional vegetation included for potential disturbance (1.83 ha). The native vegetation to be cleared is considered to be in degraded to completely degraded condition and has low value as potential fauna habitat.

The EPA Chairman, as a delegate of the EPA, concluded that the change was unlikely to significantly increase any impact that the proposal may have on the environment and gave consent under s. 43A of the EP Act to the change on 9 January 2020.

2.2 Context

The proposal is located on the Swan Coastal Plain, located about 11 km southeast of Busselton, in the south-west region of Western Australia (Figure 1). It is generally comprised of farmland and contains three continuous farm drains running southeast/northwest through the area.

The Abba River crosses the northeast corner of the development envelope and the Sabina River lies about 900 m beyond the southwest corner. These rivers drain to the Vasse-Wonnerup wetlands to the northwest of the development envelope. The wetlands are listed as a Wetland of International Importance under the Ramsar Convention.

3. Consultation

The EPA advertised the referral information for the proposal for seven days public comment in November 2017 and received five submissions. One submission requested 'Do Not Assess' and four submissions requested 'Assess – Public Environmental Review'.

The proponent consulted with government agencies and key stakeholders during the preparation of the ERD. The agencies and stakeholders consulted, the issues raised, and the proponent's response are detailed in Table 3-3 of the proponent's ERD (Doral 2020a).

The ERD was released for public comment for four weeks from 22 June to 20 July 2020. The EPA received four agency submissions and three public submissions during the public review period. The key issues raised relate to:

- groundwater drawdown impacts on conservation significant species, communities, and fauna habitat
- concern regarding the groundwater model
- potential acid sulfate soils
- management of naturally occurring radioactive material
- offsets and land acquisition
- surveys of short range endemic fauna species.

The proponent responded to these submissions by updating the environmental management plans, clarifying the groundwater modelling information and preparing a Land Acquisition Offset Strategy. The proponent's responses are in the Response to Submissions document (Doral 2020b).

The EPA considers that the consultation process has been appropriate and that reasonable steps have been taken to inform the community and stakeholders about the proposed development. Relevant significant environmental issues identified from this process were considered by the EPA during its assessment of the proposal.

4. Key Environmental Factors

In undertaking its assessment of the proposal and preparing this report, the EPA had regard for the object and principles in s. 4A of the EP Act to the extent relevant to the particular matters that were considered.

The EPA considered the following information during its assessment:

- proponent's referral information and ERD
- public comments received on the referral, stakeholder comments received during the preparation of the proponent's documentation and public and agency comments received on the ERD
- proponent's response to submissions raised during the public review of the ERD
- EPA's own inquiries
- *Statement of environmental principles, factors, and objectives* (EPA 2020d)
- relevant principles, policy and guidance referred to in the assessment of each key environmental factor in sections 4.1 to 4.4.

Having regard to the EP Act principles, the EPA considered the following principles were particularly relevant to its assessment of the proposal:

1. **The precautionary principle** – the EPA has considered whether the proponent's investigations into the biological and physical environment provide the means to assess risk and identify measures to avoid or minimise impacts. Where greater certainty regarding risk to flora and vegetation, terrestrial fauna and inland waters is required, the EPA has recommended conditions to ensure that certainty is provided.
2. **The principle of intergenerational equity** – the EPA has considered whether the health, diversity and productivity of the environment would be maintained or enhanced during the implementation of the proposal, with particular regard to the diversity and productivity of flora and vegetation, and terrestrial fauna. The EPA has recommended conditions to ensure the biological environment is maintained for the benefit of future generations.
3. **The principle of the conservation of biological diversity and ecological integrity –** the EPA has considered the impacts on flora and vegetation and terrestrial fauna with particular regard to listed threatened and priority species. The EPA has recommended conditions to manage the impacts on conservation significant flora, vegetation and fauna so that biological diversity is maintained.

Appendix 2 of this report provides a summary of the principles and how the EPA considered these principles in its assessment.

Having regard to the above information, the EPA identified the following key environmental factors during the course of its assessment of the proposal:

- **Flora and Vegetation –** potential direct impacts to conservation significant flora and Threatened Ecological Communities through clearing, and indirect impacts from groundwater drawdown, dust deposition, introduction of weeds, dieback, fragmentation, and changes to fire regimes.
- **Terrestrial Fauna –** potential direct impacts to conservation significant fauna habitat for Carnaby's cockatoo, Baudin's cockatoo, forest red-tailed black cockatoo through clearing, and the potential indirect impact through groundwater drawdown to conservation significant fauna habitat for western ringtail possum.
- **Inland Waters –** potential impacts from dewatering and exposure of acid sulfate soils and potential changes in surface water and groundwater regimes.
- **Social Surroundings –** potential impacts on Aboriginal heritage sites during construction and an increase in noise and dust from the construction and operation of the proposal.

The EPA considered other environmental factors during the course of its assessment of the proposal. These factors, which were not identified as key environmental factors, are discussed in the proponent's ERD (Doral 2020a). Appendix 3 of this report contains an evaluation of why these other environmental factors were not identified as key environmental factors.

The EPA's assessment of the proposal's impacts on the key environmental factors is provided in sections 4.1 to 4.4. These sections outline whether or not the EPA considers that the impacts on each factor are manageable. Section 7 provides the EPA's recommendation as to whether or not the proposal may be implemented.

Assessment on behalf of the Commonwealth

The EPA assessed the proposal on behalf of the Commonwealth Minister for Environment as an accredited assessment. The EPA has addressed Matters of National Environmental Significance (MNES) under each relevant factor and has summarised its assessment of MNES in section 6.

4.1 Flora and Vegetation

The EPA's environmental objective for Flora and Vegetation is to *protect flora and vegetation so that biological diversity and ecological integrity are maintained.*

Relevant Policy and Guidance

The EPA considers the following current environmental policy and guidance is relevant to its assessment of the proposal for this factor:

- *Environmental Factor Guideline – Flora and Vegetation* (EPA 2016a)
- *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA 2016e)
- *WA Environmental Offsets Policy* (Government of Western Australia 2011)
- *WA Environmental Offsets Guidelines* (Government of Western Australia 2014).

The considerations for environmental impact assessment for this factor are outlined in *Environmental Factor Guideline – Flora and Vegetation* (EPA 2016a).

EPA Assessment

Existing Environment

The proposal is situated within the Perth Coastal Plain 2 (SWA2) sub-region of the Swan Coastal Plain biogeographic region, as defined in the Interim Biogeographical Regionalisation for Australia (Australian Government 2012).

The proposal is located within a mostly cleared agricultural property. The disturbance footprint is 451.33 ha, of which 448.61 is cleared pasture and 2.72 ha is degraded native vegetation.

Desktop assessments have been undertaken for the development envelope and surroundings area. The following on-ground flora and vegetation surveys of remnant vegetation were also undertaken within and immediately surrounding the development envelope (Appendix 4 of the ERD (Doral 2020a)).

- *Report of a Level 1 Flora and Vegetation*. February 2016. Revised May 2019. (Appendix 4A of the ERD)
- *Report of a Supplementary Level 1 Flora and Vegetation*. November 2017. (Appendix 4B of the ERD)
- *Supplementary Reconnaissance and Targeted Flora and Vegetation Survey*. November 2019 (Appendix 4C of the ERD)

The survey area covered the development envelope and surrounding area, which totalled 1,546 ha. The surveys were undertaken in accordance with the EPA's *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA 2016e).

Surveys recorded 57 introduced species, of which two are listed under C3 (management) category by the Department of Agriculture and Food (DAF 2014).

Threatened species

Two threatened flora species, *Banksia squarrosa* subsp. *argillacea* (Whicher Range Banksia/Dryandra) and *Verticordia plumosa var. vassensis* (Vasse Featherflower), were recorded within the survey area, however only *Banksia squarrosa* subsp*. argillacea* may be impacted by the proposal. The species is known from 11 subpopulations, has an abundance of 2,876 mature plants and an area of occupancy of 0.38 km^2 (Department of the Environment 2015). The survey identified a total of nine individuals within the development envelope, which represents less than 1% of the known population (Ecoedge 2020).

A population of 30 *Verticordia plumosa var. vassensis* was recorded outside the development envelope, along Princefield Road. As the population is outside the development envelope and potential indirect impacts would be minimised through the implementation of environmental management plans, it is unlikely that this population would be impacted by the proposal. As such, this species is no longer considered in this report.

Vegetation communities

The development envelope is 924.84 ha, of which 37.81 ha is remnant vegetation. Most remnant native vegetation within the survey area, and all mapped remnant vegetation on farmland was found to be in ‘Completely Degraded’ condition (31.77 ha in the survey area).

The only vegetation deemed to be in ‘Good’ condition within the development envelope is at the northern end of McGibbon Track and a small area on Princefield Road (2.31 ha in total). These areas were avoided through the site design and are outside the disturbance footprint. Other small areas on McGibbon Track, Princefield Road and Yalyalup Road were rated by Ecoedge (2020a) as ‘Degraded/Good’ condition (2.43 ha in total).

Of the mapped vegetation communities, four Threatened Ecological Communities (TEC) listed under the *Biodiversity Conservation Act 2016* (BC Act) and one listed under the EPBC Act were identified in the desktop survey to potentially occur within the development envelope. These TECs are described below. On-ground flora and vegetation surveys identified that three of these TECs occur within the development envelope.

SCP09 – Dense shrublands on clay flats

An area of 0.55 ha contained similarities to the Dense shrublands on clay flats which is listed as a TEC under the BC Act. The vegetation in this area was considered too degraded to be inferred as an example of this TEC. As such, this community is no longer considered in this report.

SCP10b – Shrublands on southern Swan Coastal Plain ironstones (Busselton area)

Shrublands on southern Swan Coastal Plain ironstones (Busselton area) is listed as a TEC with threat status of 'Critically Endangered' under the BC Act. It is also listed as Endangered under the EPBC Act. The only occurrence of this TEC in the development envelope is 0.45 ha in 'Good' condition on the McGibbon Track.

This community typically occurs on a soil type that is restricted to the eastern side of the Swan Coastal Plain along the base of the Whicher Scarp near Busselton (Meissner and English 2005). This area contains heavy soils that are useful for agricultural purposes and are around 97% cleared (Keighery and Trudgen 1992). Tille and Lantzke (1990) mapped the original extent of the southern ironstone soils in the Busselton area, totalling about 1,200 ha, of which about 139 ha remains uncleared. This equates to a 90% loss of the community that was originally highly restricted in distribution.

SCP1b – Corymbia calophylla woodlands on heavy soils of the southern Swan Coastal Plain

The *Corymbia calophylla* woodlands on heavy soils of the southern Swan Coastal Plain (Gibson *et al.* 2000) is listed as a TEC, with threat status of Vulnerable under the BC Act. The only occurrence of this TEC in the development envelope is 1.18 ha in 'Degraded/Good' and 'Good' condition on the McGibbon Track.

SCP02 – Southern wet shrublands, Swan Coastal Plain

Southern wet shrublands, Swan Coastal Plain is listed as a TEC, with threat status of Endangered under the BC Act. The only occurrence of this TEC in the development envelope is 3.42 ha in 'Degraded/Good' and 'Good' condition on the McGibbon Track.

Potential Impacts

Flora and vegetation could be potentially directly or indirectly impacted through:

- disturbance and clearing activities, including the direct clearing of 2.72 ha of native vegetation
- dewatering activities lowering groundwater levels and impacting groundwater dependent ecosystems
- dewatering activities lowering groundwater levels and exposing potential acid sulfate soils
- construction of the bridge over the Abba River
- introduction of weeds
- dust generation
- introduction of dieback.

Vegetation communities along the McGibbon Track, including the TECs: Shrublands on southern Swan Coastal Plain ironstones (Busselton area) and Southern wet shrublands, Swan Coastal Plain, are considered to be groundwater dependent ecosystems (GDE). As mining moves to the east side of McGibbon Track, these communities may be affected indirectly by groundwater drawdown.

Based on modelling predictions, there is the potential for a temporary indirect drawdown impact of 1.01 ha (low-moderate impact) on the Southern wet shrublands, Swan Coastal Plain, with a predicted higher impact on 1.81 ha of this community for about three to six months which can be scheduled to occur during winter when rainfall replenishes groundwater drawdown.

There is a potential impact from dewatering on the Shrublands on southern Swan Coastal Plain ironstones (Busselton area), with the impact likely to be higher at the northern end. The area of this vegetation unit likely to be impacted is 0.34 ha.

These drawdown impacts have the potential to affect the population of nine individuals of the threatened flora species, *Banksia squarrosa* subsp. *argillacea.*

Of the TECs in the development envelope, impacts on shrublands on southern Swan Coastal Plain ironstones (Busselton area) currently has the greatest cumulative impact. The community is restricted to ironstone formations on the eastern side of the Swan Coastal Plain along the base of the Whicher Scarp near Busselton and has been historically cleared.

Oxidation of sulfides minerals may potentially occur as a result of dewatering activities which could also impact flora and vegetation. This is assessed further in Inland Waters (section 4.3). It is likely that groundwater drawdown represents a more likely impact than oxidisation of sulfides to flora and vegetarian which is why it is not considered further in this section.

Construction of a temporary bridge over the Abba River will not require clearing of native vegetation as the internal road will utilise cleared agricultural land. There is potential for sediment, pollutants and weed introduction from construction of the bridge impacting the ecological and hydrological function of the Abba River.

Mitigation and Management

The EPA notes that in designing the proposal, the proponent has applied the mitigation hierarchy, in accordance with the *Environmental Factor Guideline – Flora and Vegetation* (EPA 2016a).

Avoid

The proponent has avoided clearing of native vegetation as far as possible by utilising previously cleared agricultural land.

Furthermore, in response to public submissions regarding the clearing of TECs, the proponent has agreed to reduce the disturbance footprint in several areas, with the majority being alongside the McGibbon Track. This has reduced the direct impact on

Corymbia calophylla woodlands on heavy soils of the southern Swan Coastal Plain from 0.17 ha to no clearing, and on Southern wet shrubland, Swan Coastal Plain from 0.63 ha to no clearing.

The EPA has recommended condition 6 to ensure there are no project attributable direct impacts to TECs within the development envelope.

Minimise

The proponent has prepared the *Yalyalup Mineral Sands Project: Flora and Vegetation Environmental Management Plan (November 2020)* to minimise impacts to flora and vegetation values. The Plan includes the following key management and monitoring actions:

- access to McGibbon Track will be excluded to avoid any inadvertent impacts to TECs and conservation significant flora species
- demarcation of the area within the Princefield Road reserve (0.3 ha) which is currently infested with dieback and avoidance of this area from any disturbance, for the duration of the proposal
- specific clearing procedures to minimise impacts to flora and vegetation within the disturbance footprint, including demarcation of vegetation/trees to be cleared and authorisation requirements
- specific stockpile management procedures to store and manage crushed vegetation, topsoil and subsoil
- weed and dust management measures.

In addition, the proponent would need to comply with regulations to manage declared weeds present on the site in accordance with the *Biosecurity and Agricultural Management Act 2007* and comply with any further approvals, permits and licenses under the BC Act.

The EPA has recommended condition 7 to implement the *Yalyalup Mineral Sands Project: Flora and Vegetation Environmental Management Plan (November 2020)* to avoid where possible, otherwise minimise indirect impacts to conservation significant flora and TECs within the development envelope.

The Yalyalup Mineral Sands Project: DMS-YAL-EMP-2.4 GDE Management Plan (October 2020) (AQ2 2020d) has been prepared to minimise impacts to flora and vegetation from the indirect impacts associated with groundwater drawdown. This plan details monitoring which will comprise a combination of hydrological parameters and quantitative and qualitative vegetation measurements, eco-physiological measurements and health assessments using qualitative criteria. This will comprise:

- groundwater level monitoring across a network of six monitoring wells, proximal to the GDEs
- monitoring leaf water potential of targeted species in each GDE community (Southern wet shrublands, Swan Coastal Plain and Shrublands on southern Swan Coastal Plain ironstones (Busselton area))

- the species selected for leaf water potential monitoring will also be assessed for vegetation condition using visual inspection and assessed using a scale based on that used by Lay and Meissner (1985).

The *Yalyalup Mineral Sands Project: DMS-YAL-EMP-2.4 GDE Management Plan (October 2020)* includes triggers for parameters that may be affected by mining-induced changes to the water regime. For all trigger exceedances, the management response is a requirement for water supplementation. The plan has been reviewed by the Department of Biodiversity, Conservation and Attractions (DBCA) and the Department of Agriculture, Water and the Environment (DAWE), who have endorsed the management approach.

The key mitigation measure to reduce potential impacts associated with potential acid sulfate soils (PASS) is the preparation and implementation of an Acid Sulfate Soils Management Plan in consultation with DWER guidance (see section 4.3).

The EPA has recommended condition 9 for the preparation and implementation of an Acid Sulfate Soils Management Plans to avoid where possible, otherwise minimise impacts associated with potential acid sulfate soils to conservation significant flora within the development envelope.

Prior to ground disturbance for the purposes of constructing the Abba River crossing, the proponent will prepare the Abba River Management Strategy (see section 4.3).

The EPA has recommended condition 13 to prepare and implement an Abba River Management Strategy to avoid where possible, otherwise minimise direct and indirect impacts to the ecological and hydrological functions of the Abba River from construction activities.

Rehabilitate

The proponent has prepared a Mine Closure Plan (Appendix 3 of the ERD (Doral 2019)) which describes how the Yalyalup mine will be decommissioned and rehabilitated to meet the agreed end land uses. This will include revegetating 4.7 ha of native vegetation along and adjacent to McGibbon Track with local native species.

Offsets

Based on the above assessment, and consistent with the *WA Environmental Offsets Guidelines* (Government of Western Australia 2014) the EPA has concluded residual impacts are likely to be significant for the following values:

- indirect impacts to 0.34 ha of the Shrublands on southern Swan Coastal Plain ironstones (Busselton area) TEC
- indirect impacts to nine individuals of *Banksia squarrosa* subsp. *argillacea*.

The EPA notes advice provided by DAWE, that the above residual impacts are likely to be significant and therefore require offsets to counterbalance the impacts.

The Shrublands on southern Swan Coastal Plain ironstones (Busselton area) TEC is conservation significant and classified as Critically Endangered under the BC Act and Endangered under the EPBC Act.

Banksia squarrosa subsp. *argillacea flora* is conservation significant and classified as Threatened under the BC Act and Vulnerable under the EPBC Act.

Both the TEC and *Banksia squarrosa* subsp*. argillacea* have been impacted from a variety of cumulative impacts through time, hence the high ranking, and is particularly at risk.

The EPA notes the above two values are likely to be impacted indirectly through drawdown associated with the proposal. Whilst indirect impacts may be minimised through implementation of the *Yalyalup Mineral Sands Project: DMS-YAL-EMP-2.4 GDE Management Plan (October 2020)*, the EPA still considers that an offset is required to counterbalance the significant residual impacts and has recommended condition 11 in this regard.

Summary

The EPA has paid particular attention to:

- *Environmental Factor Guideline – Flora and Vegetation* (EPA 2016a)
- no direct impact on threatened flora species or vegetation communities as stated in the *Yalyalup Mineral Sands Project: Flora and Vegetation Environmental Management Plan (November 2020)*
- proponent's application of the mitigation hierarchy to avoid and minimise clearing of conservation significant flora and vegetation
- the endorsement of the flora and vegetation, and GDE management plans to manage direct and indirect impacts by DBCA, DAWE and DWER
- the proponent's proposed offsets strategy.

The EPA considers, having regard to the relevant EP Act principles and environmental objective for Flora and Vegetation that the impacts to this factor are manageable and would no longer be significant, provided there is:

- a limit on the clearing of native vegetation through the authorised extent in schedule 1 of the Recommended Environmental Conditions (Appendix 4)
- no direct impacts to TECs within the development envelope (condition 6)
- implementation of the proposal to avoid where possible, otherwise minimise indirect impacts to conservation significant flora and TECs within the development envelope (condition 7)
- implementation of the proposal to avoid where possible, otherwise minimise impacts associated with potential acid sulfate soils to conservation significant flora, fauna and inland waters within the development envelope (condition 9)

- implementation of the proposal to avoid where possible, otherwise minimise indirect impacts to groundwater dependent ecosystems within the development envelope (condition 10)
- preparation and implementation of a Land Acquisition Offset Strategy (see section 5, condition 11) to counterbalance potential significant residual indirect impacts of groundwater drawdown on 0.34 ha of shrublands on southern Swan Coastal Plain ironstones (Busselton area) and nine individuals of *Banksia squarrosa* subsp*. argillacea*
- implementation of the proposal to avoid where possible, otherwise minimise direct and indirect impacts to ecological and hydrological functions of the Abba River from construction activities (condition 13).

In addition, the EPA notes there is a requirement for regulation of closure and post-closure aspects of the proposal by the Department of Mines, Industry Regulation and Safety (DMIRS) through the *Mining Act 1978.*

4.2 Terrestrial Fauna

The EPA's environmental objective for Terrestrial Fauna is *to protect terrestrial fauna so that biological diversity and ecological integrity are maintained.*

Relevant Policy and Guidance

The EPA considers the following current environmental policy and guidance is relevant to its assessment of the proposal for this factor:

- *Environmental Factor Guideline – Terrestrial Fauna* (EPA 2016d)
- *Technical Guidance – Terrestrial vertebrate fauna surveys for environmental impact assessment* (EPA 2020e)
- *Technical Guidance – Sampling of short range endemic invertebrate fauna* (EPA 2016f)
- *WA Environmental Offsets Policy* (Government of Western Australia 2011)
- *WA Environmental Offsets Guidelines* (Government of Western Australia 2014).

The considerations for environmental impact assessment for this factor are outlined in *Environmental Factor Guideline – Terrestrial Fauna* (EPA 2016d).

EPA Assessment

Existing Environment

The proponent identified six broad fauna habitats within the development envelope that make up about 37.81 ha of the overall development envelope. The remaining development envelope is historically disturbed, with 880.17 ha (95%) pasture grasses and the occasional widely spaced, scattered trees remaining, as well as 6.87 ha (0.74%) of planted non-endemic and exotic trees.

Searches of DBCA databases conducted by the proponent (2019) identified 118 vertebrate fauna species that might occur within 10 km of the development envelope. Fauna surveys including targeted black cockatoo and western ringtail possum surveys were completed in 2017 and 2019 to inform the assessment.

Vertebrate fauna

Field surveys recorded 49 vertebrate fauna species within the development envelope including 39 birds, one reptile, two amphibians and seven mammals.

During the field surveys, four vertebrate fauna species of conservation significance were identified as utilising the development envelope. These included:

- Carnaby's cockatoo (*Calyptorhynchus latirostris*) – Endangered (BC Act), Endangered (EPBC Act)
- Baudin's cockatoo (*Calyptorhynchus baudinii*) – Endangered (BC Act), Vulnerable (EPBC Act)

- forest red-tailed black cockatoo (*Calyptorhynchus banksii naso*) – Vulnerable (BC Act), Vulnerable (EPBC Act)
- western ringtail possum (*Pseudocheirus occidentalis*) – Critically Endangered (BC Act), at the time of this report - Critically Endangered (EPBC Act).

Small areas of the development envelope favour foraging habitat (marri and jarrah) for black cockatoos, with some evidence of foraging attributed to the observation of chewed marri fruits. The development envelope also includes larger trees (greater than 50 centimetres in minimum diameter at breast height) that could be considered potential breeding habitat. However of the potential habitat trees on site, only five had hollows that were adequate size for black cockatoo and none had evidence of being previously utilised for breeding by black cockatoos.

Low numbers of western ringtail possum were identified in the northern section of the McGibbon Track with a total of six dreys observed in 2017 and three in 2019. However they were absent from other sections of the development envelope where mining would occur. The habitat of the western ringtail possum is generally aligned with the occurrence of the Southern wet shrublands, Swan Coastal Plain TEC.

Short range endemic fauna

Phoenix Environmental Services (2020) were commissioned by the proponent to undertake a desktop review of Short Range Endemics (SREs) for the proposal, to determine the likelihood of occurrence of SRE within the development envelope, and to conduct a risk assessment adhering to the *Technical Guidance: Sampling of short range endemic invertebrate fauna* (EPA 2016f). No SREs were identified in the development envelope and the nearest SRE was identified 4.8 km away. Due to the site being historically cleared agricultural land (lack of habitat) and the lack of recorded SREs, it is unlikely that SREs of conservation value occur within the development envelope.

Potential Impacts

Terrestrial fauna may be impacted directly and indirectly through:

- direct clearing of 2.72 ha of native vegetation and 1.78 ha of potential foraging and roosting trees for black cockatoos
- death, injury and/or displacement of fauna species, because of clearing and construction activities
- dewatering activities potentially impacting vegetation which is associated with western ringtail possum habitat
- presence of artificial water bodies because of dewatering may result in the loss/injury of individual fauna
- light, noise and dust emissions could disrupt fauna behavior or reduce the value of fauna habitat
- risk of injury from vehicle strikes
- feral animals.

Clearing for the proposal will have a direct impact on 1.78 ha of potential foraging and roosting habitat trees for black cockatoos. While there is more black cockatoo habitat around the south west region compared to other locations in the Swan Coastal Plain, given the time lapse for habitat trees to mature, there would be a cumulative impact associated with the clearing of this foraging habitat.

Groundwater drawdown may also indirectly impact 1.81 ha of western ringtail possum habitat. Given that the proposal could only potentially impact the western ringtail possum habitat indirectly through groundwater drawdown and that this impact will be managed by the *Yalyalup Mineral Sands Project: DMS-YAL-EMP-2.4 GDE Management Plan (October 2020)*, and the area is not high quality or a core area for the species, it is considered that the cumulative impact associated with this proposal is less than for black cockatoos.

Mitigation and Management

The EPA notes that in designing the proposal, the proponent has applied the mitigation hierarchy, in accordance with the *Environmental Factor Guideline – Terrestrial Fauna* (EPA 2016d).

Avoid

The proponent has designed the proposal to avoid key fauna habitat where possible and use existing cleared agricultural areas. The proposal avoids all but 2.72 ha of fauna habitat within the development envelope, which includes avoidance of the majority of fauna habitat on McGibbon Track.

Minimise

The proponent has prepared the *Yalyalup Mineral Sands Project: Fauna Environmental Management Plan (November 2020)* as part of the assessment. This plan includes mitigation measures in addition to those mentioned above to reduce the impact on fauna and includes:

- specific clearing procedures to minimise impacts to fauna and fauna habitats, including demarcation of cleared areas, pre-clearing surveys and authorisation requirements
- restrictions on vehicle speeds on site and reporting and recording of all collisions with fauna through the proponent's Hazard and Incident Management System
- native fauna injured during clearing or normal site operations should be taken to a designated veterinary clinic or a nominated wildlife carer
- no removal of dead, standing or fallen timber from the site unnecessarily
- to minimise the potential impacts of artificial water bodies and drains on fauna the proponent will:
    - design the site to reduce accessibility to most artificial water sources and drains
    - use fencing to exclude larger animals if artificial ponds or drains are directly adjacent to native vegetation

  - prevent overflow of artificial waterbodies and drains in dry conditions
  - use fauna deterrent devices such as high visibility material flapping over water bodies
  - use non-slippery sides to ponds/drains and/or egress points so that animals that enter the artificial waterbody may escape
  - keep any trenching required for services or drains open only for as long as necessary and provide suitable escape ramps
- education of all staff working on site about conservation significant fauna
- weapons and pets will not be permitted on site
- management of wastes to ensure that fauna have no access to scraps or rubbish
- contribution to feral species removal such as foxes and cats
- direction of lights at night towards construction and operation activities.

The proponent has prepared the *Yalyalup Mineral Sands Project: Flora and Vegetation Environmental Management Plan (November 2020)* to minimise impacts to flora and vegetation including black cockatoo foraging and roosting habitat (see section 4.1).

The *Yalyalup Mineral Sands Project: DMS-YAL-EMP-2.4 GDE Management Plan (October 2020)* has been prepared (AQ2 2020d) to minimise impacts to flora and vegetation values from indirect impacts associated with groundwater drawdown (see section 4.1). From the commencement of groundwater abstraction, the proponent shall prepare and submit a Groundwater Dependent Ecosystems Performance Report to be provided with the Compliance Assessment Report. The Groundwater Dependent Ecosystems Performance Report shall include:

- monitoring results against trigger criteria and threshold criteria
- detail whether the Groundwater Dependent Ecosystems are showing signs of deleterious health
- detail impacts to known groundwater dependent ecosystems related to western ringtail possum habitat where trigger threshold criteria have been exceeded and provide an analysis of changes to vegetation health, particularly noting deleterious changes to health
- detail any changes to groundwater pH in proximal locations to groundwater dependent ecosystems.

Rehabilitate

The proponent has prepared a Mine Closure Plan (Appendix 3 of the ERD (Doral 2019)) which describes how the Yalyalup mine will be decommissioned and rehabilitated to meet the agreed end land uses. This will include revegetating 4.7 ha of native vegetation along and adjacent to McGibbon Track, with local native species including species suitable for western ringtail possums and black cockatoos, to counterbalance impacts to fauna habitat.

Offset

Based on the above assessment, and consistent with the *WA Environmental Offsets Guidelines* (Government of Western Australia 2014), the EPA has concluded residual impacts are likely to be significant for the following values:

- direct impacts to 1.78 ha of potential breeding and foraging habitat for *Calyptorhynchus banksii naso* (forest red-tailed black cockatoo), *Calyptorhynchus baudinii* (Baudin's cockatoo) and *Calyptorhynchus latirostris* (Carnaby's cockatoo)
- indirect impacts to 1.81 ha of potential habitat for western ringtail possum.

The EPA notes advice provided by DAWE, that the above residual impacts are likely to be significant and therefore require offsets to counterbalance the impacts.

The black cockatoo species are all conservation significant species. Carnaby's cockatoo are classified Endangered under the BC Act and EPBC Act, Baudin's cockatoo are Endangered under the BC Act and Vulnerable under the EPBC Act, and forest red-tailed black cockatoo are Vulnerable under the BC Act and EPBC Act.

The western ringtail possum is conservation significant and classified as Critically Endangered under the BC Act and the EPBC Act.

The listed black cockatoo species and the western ringtail possum have been cumulatively impacted over time, hence the high ranking, and are considered to be particularly at risk.

The EPA notes the black cockatoo species are likely to be impacted directly through the clearing of potential habitat trees associated with the proposal. The EPA considers that an offset is required to counterbalance the significant residual impacts and has recommended condition 11 in this regard.

The EPA notes there is a potential significant residual impact associated with western ringtail possum habitat as a result of groundwater drawdown. While indirect impacts may be minimised through implementation of the *Yalyalup Mineral Sands Project: DMS-YAL-EMP-2.4 GDE Management Plan (October 2020)*, some uncertainty remains, and it is possible that there may be a significant residual impact on western ringtail possum habitat. To address this uncertainty, the EPA has recommended condition 12 that requires the proponent to, in the first instance, implement the *Yalyalup Mineral Sands Project: DMS-YAL-EMP-2.4 GDE Management Plan (October 2020)* and if there are signs of impacts to the habitat in the Groundwater Dependent Ecosystems Performance Report, an additional offset would be required to counterbalance the additional impact.

Summary

The EPA has paid particular attention to:

- clearing of habitat for conservation significant fauna species including Carnaby's cockatoo, Baudin's cockatoo, and forest red-tailed black cockatoo

- potential indirect impacts from dewatering on western ringtail possum habitat
- *Environmental Factor Guideline – Terrestrial Fauna* (EPA 2016d)
- *WA Environmental Offsets Policy* (Government of Western Australia 2011)
- proponent's commitments to minimise impacts to terrestrial fauna through the implementation of fauna, flora and vegetation, and GDE management plans.

The EPA considers, having regard to the relevant EP Act principles and environmental objective for Terrestrial Fauna that the impacts to this factor are manageable and meet its objective, provided there is:

- control through authorised extent of clearing in schedule 1 of the Recommended Environmental Conditions (Appendix 4)
- a condition to ensure no direct impacts to Threatened Ecological Communities (condition 6)
- implementation of the *Yalyalup Mineral Sands Project: Flora and Vegetation Environmental Management Plan (November 2020)* to minimise impacts to conservation significant flora and Threatened Ecological Communities (condition 7)
- implementation of the *Yalyalup Mineral Sands Project: Fauna Environmental Management Plan (November 2020)* to minimise the impact to conservation significant fauna (condition 8)
- implementation of the *Yalyalup Mineral Sands Project: DMS-YAL-EMP-2.4 GDE Management Plan (October 2020)* to avoid causing deleterious changes to the health of western ringtail possum habitat (condition 10)
- provision of offsets (see section 5, condition 11) to counterbalance the significant residual impact of loss of potential breeding and foraging habitat for the listed species Carnaby's cockatoo, Baudin's cockatoo and forest red-tailed black cockatoo
- provision of an additional offset to counterbalance the significant residual impact from the loss of habitat for the western ringtail possum on the McGibbon Track should it be indirectly impacted (condition 12).

In addition, the EPA notes there is a requirement for the regulation of closure and post-closure aspects of the proposal by DMIRS through the *Mining Act 1978*.

4.3 Inland Waters

The EPA's environmental objective for Inland Waters is *to maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected.*

Relevant Policy and Guidance

The EPA considers the following current environmental policy and guidance is relevant to its assessment of the proposal for this factor:

- *Environmental Factor Guideline – Inland Waters* (EPA 2018).

EPA Assessment

Existing Environment

Surface Water

The proposal is within the Wonnerup (Busselton Coast) Surface Water Management subarea and the Lower Sabina River sub-catchment. The proposal is not within a proclaimed surface water area (DoW 2009).

The Abba River crosses the northeast corner of the development envelope and the lower Sabina River lies about 900 m beyond the southwest corner, both generally flowing in a north-westerly direction.

The Vasse-Wonnerup wetlands are located about 4.6 km to the northwest of the development envelope. The wetlands are listed as a Wetland of International Importance under the Ramsar Convention and is a Department of Water and Environmental Regulation (DWER) Conservation Category Wetland.

Groundwater

The proposal is located above a multi-layered aquifer system. Three major aquifers have been identified within the proposal area (ordered from shallow to deep):

- the superficial aquifer
- Leederville formation
- Yarragadee aquifer.

The proposal is within a proclaimed area for ground water management (DoW 2009). According to the DWER Water Register Database, there are currently 23 licenced groundwater users within the vicinity of the development envelope (within a 2 km radius), of which two abstract from the superficial aquifer, 21 from the Leederville aquifer and none from the Yarragadee aquifer (AQ2 2020a).

Acid Sulfate Soils

The proposal occurs in an area depicted on acid sulfate soils (ASS) risk mapping as Class II '*moderate to low risk of ASS occurring within 3m of natural soil surface'*.

The proponent undertook a targeted ASS investigation (Appendix 5 of the ERD, Doral 2020a) in conjunction with resource definition drilling in the development envelope in 2014 and 2017. Field results of the ASS investigation indicate that the soils within the development envelope are generally slightly acidic to neutral.

Groundwater results from initial groundwater monitoring undertaken by the proponent indicate that superficial groundwater quality beneath the development envelope is slightly acidic. Groundwater quality in the Leederville Aquifer is also considered to be acidic as evidenced by the high total acidity concentrations and pH generally between 5.6 and 6.2.

Groundwater from the superficial aquifer will be dewatered as part of the mining process. Drawdown of these two aquifers could lead to oxidation of sulfides and acidification of the groundwater.

Potential Impacts

The proposal has the potential to impact on Inland Waters through:

- short-term dewatering of mine pits (four to five years) and associated drawdown of the watertable, which may affect:
    - groundwater users
    - potential GDEs
    - generation of ASS
- hydrological impacts on the Lower Vasse River Catchment and Vasse-Wonnerup wetlands including:
    - groundwater drawdown on surface water courses
    - reduction in surface water yields
    - discharge of surplus water
- short-term abstraction of water from the Yarragadee aquifer, which may affect other users of the Yarragadee aquifer and the overlying Leederville aquifer
- reduction in groundwater quality to the superficial and Leederville aquifers because of dewatering PASS.

Water level drawdown in the superficial aquifer is predicted to be localised within the immediate area of the active mining pits, temporary in duration and relatively small, with a maximum drawdown of 10.5 m predicted at the end of mining in Q2 of 2023. The predicted cone of depression (0.1 m) generally lies within the proposed mining disturbance areas and only marginally extends past this area (up to 700 m for the dry scenario and 600 m for the wet climate scenario).

Oxidation of sulfide minerals may potentially occur during extraction of soils containing PASS and/or as a result of dewatering activities. If the oxidation of *in situ* PASS generates acidity, then groundwater is the initial pathway by which acid and heavy metals may migrate, potentially reducing the quality of groundwater. This could have an impact on water quality for private bores drawing from both the

Superficial and Leederville aquifers and could impact flora and vegetation which is reliant on groundwater.

One production bore will be drilled and screened in the Yarragadee aquifer, to supply sufficient top-up water for mining operations. The highest demand for groundwater (1.6 GL/annum) is expected to be in the first year of operation.

Discharging water offsite may lead to a reduction in surface water quality in the receiving environment. The Site Water Balance (AQ2 2020b) indicates that during the winter of 2023, water pumped to the process water dam from the mine pits may exceed the mine water demand. The proponent has proposed to undertake controlled discharge of water via a 'Licensed Discharge Point' located at the eastern end of Lot 1293/3752 on Princefield Road, within the development envelope. This will require a Licence under Part V of the EP Act. V-notch flow gauges will be installed at the proposed discharge point.

The proponent will construct a temporary bridge over the Abba River to be used as an internal haul road. There is potential for sediment and pollutants from construction of the bridge to impact water quality in the Abba River.

Long-term post mining effects on water levels are expected to be minimal. The recovery of water levels will commence immediately once mining of each active mine pit is completed, due to proposed backfilling of mined-out pits.

Mitigation and Management

The proponent has considered the application of the mitigation hierarchy in accordance with the *Environmental Factor Guideline – Inland Waters* (EPA 2018).

Avoid

The proponent has committed to avoid groundwater drawdown impacts to key ecological receptors (the Lower Sabina River, Abba River and the Vasse-Wonnerup wetlands), and to avoid exposing large areas with PASS, at any one time. This will be achieved by mining/dewatering mine pits in a staged approach, as per the mining schedule. Pits will be mined on a slight incline from the deepest point and then mined moving up gradient in order to retain pit water within a sump at the deepest point on the pit floor. Only suction pumps are used for dewatering and the suction pumps are set up at a level to maintain a 0.5 m saturated pit floor, thus avoiding exposure of the pit floor to significant atmospheric oxygen and potential oxidisation of sulfide minerals, whilst also minimising the drawdown extent for mining.

Minimise

Groundwater drawdown will need to be carefully managed to avoid or minimise impacts to GDEs due to mining operations. The *Yalyalup Mineral Sands Project: DMS-YAL-EMP-2.4 GDE Management Plan* (October 2020) has been prepared to minimise impacts to flora and vegetation values from indirect impacts associated with groundwater drawdown. This would also inadvertently reduce oxidisation of sulfide minerals. Further details of the plan were discussed in Flora and Vegetation (see section 4.1).

As the proposal is in a proclaimed groundwater area, the proponent will need to apply for a licence under section 5C of the *Rights in Water and Irrigation Act 1914* (RiWI Act). A draft Groundwater Licence Operating Strategy (Appendix 7E of the ERD, Doral 2020a) has been developed (AQ2 2020c) and DWER will need to endorse this strategy prior to approving any groundwater licence application(s). The draft Groundwater Licence Operating Strategy has been prepared in accordance with *Operational Policy 5.08 - Use of operating strategies in the water licensing process* (DoW 2011) and the DWER *Guidelines for the preparation of Operating Strategies for mineral sand mine dewatering licences in the South West Region* (DWER 2015).

The draft Groundwater Licence Operating Strategy has been reviewed by DWER and DAWE as part of the ERD public review period. After some modifications to the modelling in the response to submission, both departments are satisfied that the potential impacts from the proposal can be managed. DWER has advised that a detailed assessment along with a groundwater management plan, will be developed with the proponent when an application to take water under the RiWI Act has been received. This will include management responses for the potential impact on the Leederville, Superficial and Yarragadee aquifer. DWER will regulate and if required enforce potential cumulative impacts to existing groundwater users in the area, although on the current information, it has noted that the impacts are manageable.

The key mitigation measure to reduce potential impacts associated with PASS is to prepare and implement an ASS Management Plan in consultation with DWER guidance. The proponent has provided a draft ASS Management Plan as part of the ERD (Appendix 5, Doral 2020a) which includes specific treatment strategies designed to manage impacts to soil, groundwater and surface water receptors (Lower Sabina River, Abba River and Vasse-Wonnerup Wetlands) and outlines the monitoring regime for each specific receptor. The ASS Management Plan will need to be approved in consultation with DWER.

The EPA considers that the *Yalyalup Mineral Sands Project: DMS-YAL-EMP-2.4 GDE Management Plan (October 2020)* and Groundwater Licence Operating Strategy are appropriate to effectively manage impacts to Inland Waters as a result of the proposal.

Prior to ground disturbance for the purposes of constructing the Abba River crossing, the proponent will prepare the Abba River Management Strategy. The management strategy will outline how the proponent will avoid where possible, otherwise minimise, direct and indirect impacts to the ecological or hydrological functions of the Abba River from construction activities including but not limited to:

- erosion
- sedimentation
- pollutants
- weed introduction
- vegetation clearing

- loss of habitat
- changes to ecological values.

The management strategy is required to specify management measures, monitoring methods and contingency measures to be implemented. The Abba River Management Strategy will need to be prepared in consultation with the South West Aboriginal Land and Sea Council and approved by DWER.

The Department of Mines, Industry Regulation and Safety (DMIRS) has advised that surface water management, and post closure water related impacts can be regulated under the *Mining Act 1978*.

Summary

The EPA has paid particular attention to:

- *Environmental Factor Guideline – Inland Waters* (EPA 2018)
- mitigation of potential impacts to surface and groundwater quality through selective mining techniques and site design
- improvement of the Groundwater Licence Operating Strategy as part of the response to submissions
- preparation of draft ASS Management Plan as part of the ERD (Appendix 5, Doral 2020a)
- implementation of the *Yalyalup Mineral Sands Project: DMS-YAL-EMP-2.4 GDE Management Plan (October 2020)*
- advice from DWER that licensing of emissions and discharges will be required under Part V of the EP Act
- the requirement for a water abstraction licence under the RiWI Act
- advice from DMIRS that surface water management and post-closure impacts of the site will be assessed and managed under the *Mining Act 1978*.

The EPA considers, having regard to the relevant EP Act principles and environmental objective for Inland Waters that the impacts to this factor are manageable and would meets its objective, provided there is:

- control through authorised extent in schedule 1 of the Recommended Environmental Conditions (Appendix 4)
- preparation and implementation of an Acid Sulfate Soil Management Plan to minimise impacts of PASS to inland waters (condition 9)
- implementation of the *Yalyalup Mineral Sands Project: DMS-YAL-EMP-2.4 GDE Management Plan (October 2020)* to minimise indirect impacts to conservation significant flora and Threatened Ecological Communities (condition 10)
- implementation of measures to ensure objectives of condition 13-1 are met through the preparation and implementation of an Abba River Management Strategy (condition 13).

In addition, the EPA notes there is a requirement for:

- regulation of closure and post-closure aspects of the proposal by DMIRS through the *Mining Act 1978*
- licensing of water abstraction by DWER under the RiWI Act
- licensing of emissions and discharges by DWER under Part V of the EP Act.

4.4 Social Surroundings

The EPA's environmental objective for Social Surroundings is *to protect social surroundings from significant harm.*

Relevant Policy and Guidance

The EPA considers the following current environmental policy and guidance is relevant to its assessment of the proposal for this factor:

- *Environmental Factor Guideline – Social Surroundings* (EPA 2016c).

The considerations for environmental impact assessment for this factor are outlined in *Environmental Factor Guideline – Social Surroundings* (EPA 2016c).

EPA Assessment

Existing Environment

The proposal is located within a rural farming land setting about 11 km southeast of Busselton, in a generally flat to slightly undulating landscape. Eleven residences are scattered around the local area less than 1 km from the development envelope and a further seventeen residences are present within 1-2 km of the development envelope.

The proposal is within the South West Boojarah #2 (WC06/4) (SWB) native title claim, which is represented by the South West Aboriginal Land and Sea Council (SWALSC). Results of desktop research indicate that one Registered Aboriginal Site, Abba River (DPLH 17354) is currently listed within the development envelope. The Abba River which crosses a small portion of the development envelope in the east is a registered mythological site with historical values (Cuthbert and Hovingh 1998).

The proponent has entered into a Noongar Standard Heritage Agreement with SWALSC, on behalf of the SWB claimants. Ethnosciences (2020) conducted an ethnographic field survey of the development envelope on 28 November 2019 with seven SWB consultants comprising the ethnographic survey team (EST). With the exception of the Abba River, no other ethnographic sites were identified during the survey.

Potential Impacts

The potential impacts to social surroundings associated with the proposal include:

- increased noise emissions during construction, mining, and processing operations
- dust emissions associated with the construction and operation phases of the proposal
- disturbance to Aboriginal heritage sites from construction activities and operation of the proposal.

Noise

As the proposal will operate on a continuous basis (day and night) and given its proximity to residential properties, increased noise emissions during construction, mining and processing operations may impact on surrounding sensitive receptors. The assigned level for noise sensitive premises is determined by the Environmental Protection (Noise) Regulations 1997, Part 2 Division 1 Regulation 8 (3) Table 1. The proposal must comply with these limits.

The proponent has undertaken noise modelling to identify management procedures that need to be in place to meet the noise regulations. The proponent has prepared a draft Noise Management Plan for the proposal to outline to the public and regulators how it would manage noise. The primary objective of the draft Noise Management Plan is to maintain the amenity of neighbouring residences during mining operations. The draft Noise Management Plan includes noise management strategies and control measures to reduce noise emissions and, as a minimum, maintain compliance with the noise regulations.

The proponent has also committed to maintaining ongoing communication with neighbours to ensure impacts from noise are understood and minimised and where necessary have proposed to actively seek amenity agreements with residences as a key part of their social licence to operate. The proponent has implemented the same strategy for noise management in compliance with the noise regulations at its Yoongarillup mineral sands mine to the east of this proposal. Yoongarillup represents the same potential noise management issues as this proposal.

DWER have advised that noise emissions from the proposed Yalyalup Mineral Sands Mine can be assessed and regulated under Part V of the EP Act as part of any prescribed premises category 8 works approval or licence application.

Dust

The proposal has the potential to impact on social surroundings through dust emissions associated with the construction and operation phases of the proposal.

The proponent has identified a number of sensitive receptors that could potentially be impacted by dust emissions from the proposal. During dry and windy ambient conditions five residences may be potentially impacted by nuisance-dust during construction activities, mining of mine pits and other associated dust generating activities from soil disturbance

To manage potential impacts from dust generation, the proponent has developed a draft Dust Management Plan. The proposed dust management strategies are based on those that have been implemented as part of the proponent's Yoongarillup proposal which represents the same type of mining and potential dust issues. These strategies include real time dust monitoring of Total Suspended Particulates and PM_{10} concentrations which will allow timely implementation of mitigation measures, even including stop work orders if required.

DWER has confirmed the impacts to social surroundings from dust emissions can be managed under Part V of the EP Act, and that conditions imposing relevant emission

controls and monitoring regimes to ensure those emissions remain acceptable, would apply.

Aboriginal heritage and culture

In order to access the main haulage route (Ludlow-Hithergreen Rd) from the on-site processing plant, construction of a creek crossing over the Abba River is required. The selected crossing point of the Abba River has been selected to avoid the need for native vegetation clearing.

Mitigation and Management

The EPA considers that the proponent has adequately considered the application of the mitigation hierarchy in accordance with the *Environmental Factor Guideline – Social Surroundings* (EPA 2016c) as detailed above in each sub-section.

Dust and Noise

Avoid

The proponent has proposed a number of mitigation measures to reduce the potential impact of noise and dust on the surrounding sensitive receptors. These include avoidance measures such as:

- undertaking mining operations during the day only with minimal equipment operating at night
- only operating when they can meet the appropriate guidelines
- locating fixed plant at the furthest reasonable distance from sensitive receptors
- avoiding mining scenarios identified in the model as potentially causing non-compliance with the regulations.

Mitigate

The proponent has proposed additional measures to further minimise noise impacts including:

- selecting the quietest equipment available
- modifying equipment including installation of acoustic insulation where practicable to reduce sound power levels
- creating noise bunding around fixed plant to reduce noise
- employing real time dust and noise monitoring to adjust equipment use and mining activities in response to elevated noise and dust levels
- restricting machinery operation during worst case conditions
- regular noise and dust monitoring at sensitive receptors to measure performance of the control measures employed.

The proponent has also committed to maintaining ongoing communication with neighbours to ensure impacts from noise and dust are understood and minimised.

Where necessary, the proponent has proposed to actively seek amenity agreements to maintain their social licence to operate.

Heritage

Avoid

The proponent has designed the proposal to avoid as many heritages sites as possible. The proponent would be impacting the Abba River registered site as a result of other avoidance measures such as those to avoid impacts to Flora and Vegetation.

Minimise

As the Abba River is a registered Aboriginal Site (DPLH 17354), a section 18 Notice under the *Aboriginal Heritage Act 1972* will be required for the construction of the creek crossing. The proponent was granted consent with conditions pursuant to section 18(3) of the Act, approved by the Minister for Aboriginal Affairs for this purpose.

The EPA notes the proponent has a signed Indigenous Land Use Agreement (*Noongar Standard Heritage Agreement)* for the purpose of ensuring that activities are carried out in a manner that protects Aboriginal sites and Aboriginal Objects to the greatest extent possible. The EPA notes that the agreement (signed in 2016), will be updated as the project progresses, in consultation with the appropriate representative body.

Prior to ground disturbance for the purposes of constructing the Abba River crossing, the proponent will prepare the Abba River Management Strategy (further detail in Section 4.3). The Abba River Management Strategy will need to be prepared in consultation with SWALSC, on the advice of the DWER, and approved by the CEO of the DWER.

Summary

The EPA has paid particular attention to:

- *Environmental Factor Guideline – Social Surroundings* (EPA 2016c)
- the avoidance and minimisation measures for dust and noise
- location of the proposal and the history of the proponent at managing dust and noise impacts at nearby mineral sands mines
- the use of real time monitoring and adaptive management to meet dust and noise criteria
- ethnographic studies and surveys undertaken by the proponent
- measures and procedures to avoid Aboriginal Heritage sites or seek approval with conditions to potentially impact sites
- the current land use agreement and ongoing agreement update process.

The EPA considers, having regard to the relevant EP Act principles and environmental objective for Social Surroundings that the impacts to this factor are manageable and would no longer be significant, provided there is:

- implementation of measures to ensure the objective of condition 13-1 is met through the preparation and implementation of an Abba River Management Strategy (condition 13).

In addition, the EPA notes that there is a requirement for:

- regulation of the Yalyalup Mineral Sands Project by the DWER under a works approval and operating licence issued under Part V of the EP Act
- regulation and current consent under section 18 of the *Aboriginal Heritage Act 1972*
- a current Indigenous Land Use Agreement and commitment to update the agreement with the appropriate representative body
- compliance with Environmental Protection (Noise) Regulations 1997.

5. Offsets

Relevant Policy and Guidance

The EPA considers the following policy and guidance is relevant to its assessment of offsets for the proposal:

- *WA Environmental Offsets Policy* (Government of Western Australia 2011)
- *WA Environmental Offsets Guidelines* (Government of Western Australia 2014)
- *Environmental Impact Assessment (Part IV Divisions 1 and 2) Procedures Manual* (EPA 2020c).

EPA Assessment

Environmental offsets are actions that provide environmental benefits which counterbalance the significant residual impacts of a proposal. The EPA may apply environmental offsets where it determines that a proposal's residual impacts are significant, after avoidance, minimisation and rehabilitation have been pursued.

Consistent with Principle 1 of the *WA Environmental Offsets Policy* (Government of Western Australia 2011) the proponent has applied the mitigation hierarchy by identifying measures to avoid and minimise environmental impacts. Mitigation measures are assessed under the relevant key environmental factors (see section 4.1 – Flora and Vegetation and section 4.2 – Terrestrial Fauna).

In applying the residual impact significance model (Government of Western Australia 2014), the EPA considers that the proposal may have a significant residual impact from:

- indirect impacts to 0.34 ha of Shrublands on southern Swan Coastal Plain ironstones (Busselton area)
- indirect impacts to nine individuals of *Banksia squarrosa* subsp. *argillacea*
- direct impacts to 1.78 ha of potential breeding and foraging habitat for forest red-tailed black cockatoo, Baudin's cockatoo and Carnaby's cockatoo

In noting the above potential significant residual impacts, the EPA has considered Principle 2 '*environmental offsets are not appropriate for all projects'*, of the *WA Environmental Offsets Policy* (2011) and has determined that offsets are appropriate and applicable for this proposal.

The proponent has proposed to fund the direct acquisition of land to offset the potential significant residual impacts of the proposal. The proponent has proposed to acquire land that will include the following values:

- potential breeding and foraging habitat for forest red-tailed black cockatoo, Baudin's cockatoo and Carnaby's cockatoo
- Shrublands on southern Swan Coastal Plain ironstones (Busselton area) *and Banksia squarrosa* subsp*. argillacea*

- is able to be afforded a higher level of protection.

The proponent has used the Commonwealth's Offset Assessment Guide (Commonwealth of Australia 2012a), the *WA Environmental Offsets Guidelines* (Government of Western Australia 2014) to calculate the offset quantum for the above environmental values.

The EPA acknowledges that the proponent has proposed an offset that is consistent with the requirements of Principle 3 '*cost-effective, as well as relevant and proportionate to the significance of the environmental value'* and 4 '*sound environmental information and knowledge'* of the *WA Environmental Offsets Policy* (2011). Through consultation with DBCA, the proponent has identified several land parcels that contain a similar value to that of the significant residual impacts, including a preferred site. The proponent has also provided a preliminary draft offsets strategy (commercial in confidence).

The EPA has considered the values of the preferred site and the alternate sites, and the preliminary draft offsets strategy. The EPA has also consulted on these with DBCA and DAWE. The EPA considers that the offsets able to be provided by those sites are relevant and proportionate to the significance of the environmental value being impacted. The EPA considers it has appropriate information and knowledge to assess the offsets for this stage of the proposal, and has also recommended a condition requiring a *Yalyalup Mineral Sands Project Land Acquisition Offset Strategy* be approved before ground disturbing activities. This Strategy must further demonstrate how the offsets outcomes be met and how the environmental values will be counterbalanced.

There is a potential significant residual impact associated with western ringtail possum habitat as a result of groundwater drawdown. Based on modelling of indirect impact of groundwater drawdown, 1.81 ha of potential western ringtail possum habitat might be impacted by the proposal. The EPA notes that because the western ringtail possum was found in low numbers, a contingency offset would be appropriate.

The EPA considers that whilst *Yalyalup Mineral Sands Project: DMS-YAL-EMP-2.4 GDE Management Plan* (October 2020) contains provisions to impacts associated with groundwater drawdown, some uncertainty remains, and it is possible that there may be significant residual impact on western ringtail possum habitat. To address this uncertainty, the EPA has recommended condition 12 that requires the proponent to, in the first instance, implement the *Yalyalup Mineral Sands Project: DMS-YAL-EMP-2.4 GDE Management Plan* (October 2020)and if there are signs of impacts to the habitat, an additional offset would be required to counterbalance the additional impact.

The DAWE has provided advice on the offsets proposed by the proponent. DAWE's comments support the proponent approach to offsets, however the EPA notes that the required offset strategy will be subject to consultation with DAWE and DBCA, and approved by the CEO, which will ensure that it meets the *EPBC Environmental offsets policy (2012).*

Summary

In considering Principles 5 and 6 of the *WA Environmental Offsets Policy*, the EPA recommends that an offset condition (condition 11) is imposed to ensure that the offset is applied with an adaptive frame work and is focused on the longer term strategic outcomes for the state. The offset will be set to counterbalance the significant residual impacts of the proposal. The EPA recommends that offsets are provided for:

- indirect impacts to 0.34 ha of shrublands on southern Swan Coastal Plain ironstones (Busselton area)
- indirect impacts to nine individuals of *Banksia squarrosa* subsp. *argillacea*
- direct impacts to 1.78 ha of potential breeding and foraging habitat for forest red-tailed black cockatoo, Baudin's cockatoo and Carnaby's cockatoo.

The EPA has recommended a contingency offset condition (condition 12) be imposed to counterbalance the significant residual impacts if there are signs of impacts to western ringtail possum habitat. The condition requires the preparation and submission of a Land Acquisition Offset Strategy to be submitted within 12 months of notification from the CEO of DWER.

6. Matters of National Environmental Significance

The Commonwealth Minister for the Environment has determined that the proposal is a controlled action under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) as it is likely to have a significant impact on one or more MNES. It was determined that the proposed action is likely to have a significant impact on the following matters protected by the EPBC Act:

- listed threatened species and communities (s. 18 and s. 18A)
- ecological character of a declared Ramsar wetland (s. 16 and s. 17B)
- migratory species (s. 20 and s. 20A).

The EPA has undertaken an accredited assessment of the controlled action, on behalf of the Commonwealth.

This assessment report is provided to the Commonwealth Minister for Environment who will decide whether or not to approve the proposal under the EPBC Act. This is separate from any Western Australian approval that may be required.

Commonwealth Policy and Guidance

The EPA had regard to the following relevant Commonwealth guidelines, policies and plans during its assessment:

- Matters of National Environmental Significance. Significant Impact Guidelines 1.1. *Environmental Protection and Biodiversity Conservation Act 1999* (DoE 2013)
- Department of Environment and Conservation, 2005, *Shrubland Association on Southern Swan Coastal Plain Ironstone (Busselton area) (Southern Ironstone Association)* Interim recovery plan no. 215 (Meissner and English 2005)
- *Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy* (Commonwealth of Australia 2012a)
- Significant impact guidelines for the vulnerable western ringtail possum (*Pseudocheirus occidentalis*) in the southern Swan Coastal Plain, Western Australia. Nationally threatened species and ecological communities. EPBC Act policy statement 3.10 (DEWHA 2009a)
- *EPBC Act Referral guidelines for three threatened black cockatoo species: Carnaby's cockatoo (endangered) Calyptorhynchus latirostris, Baudin's cockatoo (vulnerable) Calyptorhynchus baudinii, forest red-tailed black cockatoo (vulnerable) Calyptorhynchus banksii naso* (Commonwealth 2012b 2012)
- Conservation Advice *Pseudocheirus occidentalis* western ringtail possum. Canberra: Department of the Environment and Energy (Threatened Species Scientific Committee 2018a)

- Conservation Advice *Calyptorhynchus baudinii* Baudin's cockatoo. Canberra: Department of the Environment and Energy (Threatened Species Scientific Committee 2018b)
- Western ringtail possum *(Pseudocheirus occidentalis) Recovery Plan*. Wildlife Management Program No. 58. Department of Parks and Wildlife, Perth, WA (DPaW 2017)
- Approved Conservation Advice for *Calyptorhynchus banksii naso* (forest red-tailed black cockatoo). Canberra: Department of the Environment, Water, Heritage, and the Arts (DEWHA 2009b)
- Forest black cockatoo (Baudin's cockatoo *Calyptorhynchus baudinii* and forest red-tailed black cockatoo *Calyptorhynchus banksii naso*) Recovery Plan. Department of Environment and Conservation, Western Australia (Chapman 2008)
- *Carnaby's cockatoo (Calyptorhynchus latirostris) Recovery Plan*. Department of Parks and Wildlife, Perth, Western Australia (DPaW 2013)
- *Wildlife Conservation Plan for Migratory Shorebirds*. Canberra, ACT: Department of the Environment (Commonwealth of Australia 2015)
- EPBC Act Policy Statement 3.21 - Industry Guidelines for avoiding, assessing, and mitigating impacts on EPBC Act listed migratory shorebird species (DoE 2015)
- Conservation Advice *Banksia squarrosa subsp. argillacea* Whicher Range Dryandra, Whicher Range dryandra. Canberra: Department of the Environment (Threatened Species Scientific Committee 2015)
- Commonwealth EPBC Act *Environmental Offsets Policy* (Commonwealth of Australia 2012).

EPA Assessment

In its assessment the EPA has considered the impacts to the MNES - Listed threatened species and communities (s. 18 and s. 18A), ecological character of a declared Ramsar wetland (s. 16 and s. 17B) and migratory species (s. 20 and s. 20A). The EPA has considered the direct and indirect impacts to:

- *Banksia squarrosa* subsp. *argillacea*
- Shrublands on the southern Swan Coastal Plain ironstones
- Carnaby's cockatoo (*Calyptorhynchus latirostris*)
- Baudin's cockatoo (*Calyptorhynchus baudinii*)
- forest red-tailed black cockatoo (*Calyptorhynchus banksii naso*)
- western ringtail possum (*Pseudocheirus occidentalis*)
- Vasse-Wonnerup wetlands
- wood sandpiper (*Tringa glareola*)
- sharp-tailed sandpiper (*Calidris acuminate*)

- long-toed stint (*Calidris subminuta*).

Banksia squarrosa subsp. *argillacea* is listed as vulnerable under EPBC Act. A total of nine individuals could be indirectly impacted by groundwater drawdown as a result of dewatering. The EPA considers that there remains a significant residual impact to this species from the proposal and has recommended an offset condition be applied.

Shrublands on the southern Swan Coastal Plain ironstones is listed as critically Endangered under BC Act and Endangered under EPBC Act. A total of 0.34 ha of could be indirectly impacted by groundwater drawdown as a result of dewatering. The EPA considers that there remains a significant residual impact to this community from the proposal and has recommended an offset condition be applied.

The Carnaby's and Baudin cockatoos are listed as Endangered under EPBC Act, while the forest red-tailed black cockatoo is listed as vulnerable under EPBC Act. The proposal would clear 1.78 ha of potential cockatoo habitat trees, however there is no evidence of nesting within the development envelope. The EPA considers that there remains a significant residual impact to these species from the proposal and has recommended an offset condition be applied.

There is a potential significant residual impact associated with western ringtail possum habitat as a result of groundwater drawdown. Based on modelling of indirect impact of groundwater drawdown, 1.81 ha of potential western ringtail possum habitat might be impacted by the proposal.

The EPA considers that while the *Yalyalup Mineral Sands Project: DMS-YAL-EMP-2.4 GDE Management Plan* (October 2020) contains provisions to minimise impacts associated with groundwater drawdown, some uncertainty remains, and it is possible that there may be significant residual impact on western ringtail possums. To address this uncertainty, the EPA has recommended condition 12 that requires the proponent to, in the first instance, implement the *Yalyalup Mineral Sands Project: DMS-YAL-EMP-2.4 GDE Management Plan* (October 2020) and should there be signs of impacts to western ringtail possum habitat, an additional offset would be required to counterbalance the additional impact.

Vasse-Wonnerup wetlands is a declared Ramsar wetland located 4.6 km from the proposal. Based on groundwater modelling for dewatering activities, there is unlikely to be indirect impacts to the Vasse-Wonnerup wetlands, as it is well outside the maximum extent of groundwater drawdown. Furthermore, potential indirect impacts on Inland Waters as a result of the proposal will be managed through the Groundwater Licence Operating Strategy, GDE and ASS management plans. Due to the distance from the proposal and the management plans in place, the EPA considers it unlikely the proposal will impact the Vasse-Wonnerup wetlands.

Vasse-Wonnerup wetlands hosts a variety of migratory bird habitat including species identified as MNES such as the wood sandpiper (*Tringa glareola*), sharp-tailed sandpiper (*Calidris acuminate*), and long-toed stint (*Calidris subminuta*). These species of migratory birds are not likely to utilise the proposal area as they are wetland species. As the EPA considers that there will be no impacts to the ecological

character of the Vasse-Wonnerup wetlands as a result of the proposal, it is unlikely the migratory species will be impacted.

Summary

The EPA recommends the following environmental conditions to minimise impacts on MNES:

- no direct impacts to Threatened Ecological Communities within the development envelope (condition 6)
- limits to vegetation clearing (condition 6)
- limits to direct, and indirect, significant residual impacts, and offsets requirements for these impacts (condition 6 and condition 11)
- implementation of the *Yalyalup Mineral Sands Project: Flora and Vegetation Environmental Management Plan (November 2020)* to minimise indirect impacts to conservation significant flora and Threatened Ecological Communities (condition 7)
- implementation of the *Yalyalup Mineral Sands Project: Fauna Environmental Management Plan (November 2020)* to minimise the impact to conservation significant fauna (condition 8)
- preparation and implementation of an Acid Sulfate Soils Management Plan to minimise impacts of PASS to flora and fauna (condition 9)
- implementation of the *Yalyalup Mineral Sands Project: DMS-YAL-EMP-2.4 GDE Management Plan (October 2020)* to minimise indirect impacts to conservation significant flora and Threatened Ecological Communities (condition 10)
- provision of offsets (see section 5, condition 11) to counterbalance the significant residual impacts to conservation significant flora and vegetation and Terrestrial fauna
- provision of an additional offset to counterbalance the significant residual impact from the loss of habitat for the western ringtail possum on the McGibbon Track should it be indirectly impacted (condition 12).

It is the EPA's view is that a significant residual impact remains from the proposal and that offsets are required for the MNES listed above. This offset combined with the application of proposed conditions above would result in the impacts of the proposal meeting its objectives.

7. Conclusion

The EPA has considered the proposal by the proponent to extract ore from the Yalyalup Mineral Sands Deposit, located about 11 km southeast of Busselton.

Holistic Impact Assessment

While the EPA assessed the impacts of the proposal against the key environmental factors individually and concluded that they are manageable, given the inextricable link between flora and vegetation, terrestrial fauna, inland waters and social surroundings, the EPA also considered the connections and interactions between parts of the environment to inform a holistic view of impacts to the whole environment.

Understanding the environmental processes and interactions was relevant to assessing the significance of potential impacts from the proposal on the environmental values.

The proposal has been designed, as far as practicable, to avoid clearing of native vegetation and fauna habitat and maximise the use of existing cleared pasture, which accounts for more than 99% of the proposed disturbance footprint.

Of the 37.81 ha of native vegetation present within the development envelope, only 2.7 ha of degraded or completely degraded vegetation will be directly impacted through clearing. By applying this mitigation to native vegetation in the development envelope, the proponent has minimised impacts to the health of other elements of the environment including the values associated with terrestrial fauna, inland waters, and social surroundings.

The EPA has also considered the high degree of connectivity between the hydrological processes and the health of vegetation.

The key environmental factors, flora and vegetation, terrestrial fauna and inland waters are linked as a result of dewatering of mine pits causing localised drawdown of the water table which could potentially impact the TECs, which are groundwater dependent and correlate with the western ringtail possum habitat, along the McGibbon Track.

Through the implementation of the proposed management measures and environmental management plans, the potential impacts from groundwater drawdown on the listed TEC and western ringtail possum habitat would be minimised.

The EPA also considered the connection between the key environmental factor social surroundings and inland waters. The EPA noted the significance and cultural attachment to the Abba River, and recognised that the construction of the crossing could potentially impact cultural sites. The EPA's recommendation for the preparation and implementation of an Abba River Management Strategy would

ensure that impacts to the Abba River, and consequently any associated cultural sites are avoided.

When the separate environmental factors of the proposal were considered together, the EPA formed the view that due to the relative small size of the proposal and application of the mitigation hierarchy, the impacts from the proposal on environmental values would be manageable.

Application of the Mitigation Hierarchy

Consistent with relevant policies and guidance, the proponent has addressed the mitigation hierarchy by identifying measures to avoid, minimise and rehabilitate environmental impacts including:

- avoiding and minimising impacts to flora and vegetation by locating most of the proposal within predominately cleared agricultural land
- avoiding clearing key fauna habitat as much as possible
- avoiding impacts from dewatering and potential acid sulfate soils through mining in a staged approach
- minimising and managing the impacts to social surroundings
- managing impacts to flora and fauna through progressive rehabilitation during the life of the project and upon closure
- managing impacts to groundwater through a Groundwater Operating Strategy
- managing potential impacts to Ground Dependent Ecosystems through implementation of the *Yalyalup Mineral Sands Project: DMS-YAL-EMP-2.4 GDE Management Plan (October 2020)*
- managing impacts from potential acid sulfate soils with an Acid Sulfate Soils Management Plan
- managing impacts to flora and vegetation through the *Yalyalup Mineral Sands Project: Flora and Vegetation Environmental Management Plan (November 2020)*
- managing impacts to terrestrial fauna through implementation of the *Yalyalup Mineral Sands Project: Fauna Environmental Management Plan (November 2020)*
- managing impacts to the Abba River through the Abba River Management Strategy.

Offsets

The EPA considers the proposal would have a significant residual impact from:

- direct impact on 1.78 ha of potential breeding and foraging habitat for black cockatoos Carnaby's cockatoo (Endangered), Baudin's cockatoo (Endangered), forest red-tailed black cockatoo (Vulnerable)
- indirect impact from dewatering on 0.34 ha of Shrublands on southern Swan Coastal Plain ironstones (Busselton area), nine individuals of *Banksia squarrosa* subsp. *argillacea* and 1.81 ha of western ringtail possum habitat.

The EPA has recommended condition 11 for a Land Acquisition Offset Strategy to offset the significant residual impact to significant flora and fauna.

The EPA has also recommended condition 12 as an additional offset to counterbalance the significant residual impact from the loss of habitat for the western ringtail possum on the McGibbon Track should it be indirectly impacted.

Conclusion

The EPA has taken the following into account in its assessment of the proposal as a whole:

- impacts to all the key environmental factors, separately and cumulatively
- EPA's confidence in the proponent's proposed mitigation measures
- relevant EP Act principles and the EPA's objectives for the key environmental factors.

It is the EPA's view that the impacts to the key environmental factors are manageable, provided the recommended conditions are imposed.

Given the above, the EPA recommends that the proposal may be implemented subject to the conditions recommended in Appendix 4.

8. Other Advice

The EPA consulted with key regulators during the assessment. As a result of this consultation, the EPA considers that the proposal can by regulated, in appropriate areas, through other instruments, such as the Part V EP Act licence for licensing of emissions and discharges, and a RiWI Act groundwater abstraction licence. The EPA provides the following advice regarding key aspects that require regulation.

Emissions and Discharges

The EPA notes that a works approval and licence is a statutory requirement under Part V of the EP Act for this proposal and is the most appropriate regulatory instrument to regulate emissions and discharges from mineral sand mining. The DWER will assess emissions and discharges in detail, and management and monitoring conditions are expected to be applied to the proposal.

The EPA notes that, in relation to monitoring the potential ground and surface water impacts associated with dewatering from mining activity, the proponent proposed additional monitoring locations in its Response to Submissions document (Doral 2020b). The EPA considers that, at a minimum, these additional locations should be incorporated into the monitoring program required under a licence to be issued under Part V of the EP Act.

The EPA notes that the proponent has committed to and proposed a number of monitoring and management procedures for dust and noise which were available for public comment and consideration by regulatory agencies. These include measures to meet the noise regulations and appropriate dust standards, such as real time monitoring and adaptive management, including up to the cessation of mining should conditions likely result in an exceedance for noise and dust. The EPA notes that Part V may require additional monitoring and management measures from the proponent and more detail for its assessment.

Groundwater

The DWER administers the RiWI Act that provides for the granting of licences and permits to abstract groundwater and surface water. The DWER will consider potential impacts on the State's water resources from future land planning and development proposals such as the Yalyalup Mineral Sands Project. The EPA notes that the groundwater abstraction licence will contain conditions to ensure that drawdown is carefully monitored and impacts on nearby groundwater users (private bores), and groundwater dependent ecosystems are appropriately regulated. The EPA notes that the operating strategy for water was available for public comment and consideration by regulatory agencies.

9. Recommendations

That the Minister for Environment notes:

1. That the proposal assessed is for the Yalyalup Mineral Sands Deposit, located about 11 km southeast of Busselton.
2. The key environmental factors identified by the EPA in the course of its assessment are Flora and Vegetation, Terrestrial Fauna, Inland Waters and Social Surroundings, set out in section 4.
3. The EPA has recommended that the proposal may be implemented, provided the implementation of the proposal is carried out in accordance with the recommended conditions and procedures set out in Appendix 4. Matters addresses in the conditions include the following:
    a) a limit on the authorised extent of physical and operational elements of the proposal in schedule 1 of the Recommended Environmental Conditions (Appendix 4)
    b) no direct impacts to Threatened Ecological Communities within the development envelope (condition 6)
    c) limits to vegetation clearing (condition 6)
    d) limits to direct, and indirect, significant residual impacts, and offsets requirements for these impacts (condition 6 and condition 11)
    e) implementation of the *Yalyalup Mineral Sands Project: Flora and Vegetation Environmental Management Plan (November 2020)* to minimise indirect impacts to conservation significant flora and Threatened Ecological Communities (condition 7)
    f) implementation of the *Yalyalup Mineral Sands Project: Fauna Environmental Management Plan (November 2020)* to minimise the impact to conservation significant fauna and fauna habitat (condition 8)
    g) preparation and implementation of an Acid Sulfate Soil Management Plan to minimise impacts to flora, fauna and inland waters (condition 9)
    h) implementation of the *Yalyalup Mineral Sands Project: DMS-YAL-EMP-2.4 GDE Management Plan (October 2020)* to minimise impacts to Threatened Ecological Communities and Groundwater Dependent Ecosystems (condition 10)
    i) implementation of a Land Acquisition Offset Strategy to counterbalance the significant residual impact of the loss of conservation significant fauna habitat and the Threatened Ecological Community (condition 11)
    j) implementation of an additional offset to counterbalance the significant residual impact from the loss of habitat for the western ringtail possum on the McGibbon Track should it be impacted by indirect impacts (condition 12)
    k) preparation and implementation of an Abba River Management Strategy to minimise impacts to the Abba River (condition 13), including consultation with South West Aboriginal Land and Sea Council (SWALSC).

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Appendix 1: List of Submitters

Agencies and organisations

Department of Agriculture, Water and the Environment (DAWE)
Department of Biodiversity, Conservation and Attractions (DBCA)
Department of Mines, Industry Regulation and Safety (DMIRS)
Department of Water and Environmental Regulation (DWER)
South West Catchments Council

Individuals

ANON-M9EV-PTTD-W
ANON-M9EV-PTTX-H

Appendix 2: Consideration of Environmental Protection Act Principles

EP Act Principle	Consideration
1. The precautionary principle *Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In application of this precautionary principle, decisions should be guided by –* *a) careful evaluation to avoid, where practicable, serious or irreversible damage to the environment; and* *b) an assessment of the risk-weighted consequences of various options.*	This principle is a fundamental and relevant consideration for the EPA when assessing and considering the impacts of the proposal on the environmental factors of Flora and Vegetation, Terrestrial Fauna and Inland Waters. The EPA notes that the proponent has identified measures to avoid or minimise impacts to Shrublands on southern Swan Coastal Plain ironstones (Busselton area) as well as all threatened and conservation significant flora species. The EPA has considered these measures during its assessment. The EPA has recommended conditions to ensure that environmental protection outcomes are achieved, and that management plans for flora and vegetation and fauna are finalised (in consultation with relevant agencies) to the satisfaction of the CEO of DWER. The EPA has recommended an offsets strategy be prepared by the proponent to counterbalance the significant residual impact to 1.78 ha of potential breeding and foraging habitat for black cockatoos and 1.81 ha of potential habitat for western ringtail possum, and on 0.34 ha of Shrublands on southern Swan Coastal Plain ironstones (Busselton area) and nine individuals of *Banksia squarrosa* subsp*. argillacea.* The EPA has also recommended a contingency condition for an additional offset to counterbalance the significant residual impact from the loss of habitat for the western ringtail possum (*Pseudocheirus occidentalis*) on the McGibbon Track should it be impacted by indirect impacts (condition 12).

EP Act Principle	Consideration
	The EPA notes that the proponent has responded to comments concerning potential impacts from dewatering activities including the generation of PASS, impact to groundwater dependent ecosystems and impact on water quality of other potential bore users. The proponent included improved measures for Acid Sulfate Soil Management Plan. From its assessment of this proposal the EPA has concluded there is no threat of serious or irreversible harm provided that the recommended conditions are implemented.
2. The principle of intergenerational equity *The present generation should ensure that the health, diversity and productivity of the environment is maintained and enhanced for the benefit of future generations.*	In considering this principle, the EPA notes that Flora and Vegetation, Terrestrial Fauna, Inland Waters and Social Surroundings could be significantly impacted by the proposal. The assessment of these impacts is provided in this report. In assessing this proposal, the EPA has recommended conditions to manage impacts to Flora and Vegetation, Terrestrial Fauna and Inland Waters. The proposal is in a rural farmland setting in close proximity to neighbours. There are other regulatory instruments which can be used to manage and mitigate the impacts of dust and noise. The EPA recommended a further condition to manage the potential impact of the proposal on Aboriginal heritage and culture. This condition requires the preparation and implementation of an Abba River Management Strategy to ensure impacts to the River are manageable and would not be significant. From its assessment of this proposal, the EPA has concluded that the environmental and social values will be protected and that the health, diversity and productivity of the environment will be maintained for the benefit of future generations.
3. The principle of the conservation of biological diversity and ecological integrity	This principle is a fundamental and relevant consideration for the EPA when assessing and considering the impacts of the proposal on the environmental factors of Flora and Vegetation and Terrestrial Fauna. This

EP Act Principle	Consideration
Conservation of biological diversity and ecological integrity should be a fundamental consideration.	principle is also relevant to the EPA consideration of the proposed Land Acquisition Offset Strategy. In considering this principle, the EPA notes that Flora and Vegetation and Terrestrial Fauna could be significantly impacted by the proposal. The assessment of these impacts is provided in this report. The proponent has undertaken comprehensive baseline studies to understand and assess potential threats to biological diversity and ecological integrity. The EPA notes that the proponent has identified measures to avoid or minimise impacts to these factors. The EPA has considered these measures during its assessment (provided in this report) and has recommended a Land Acquisition Offset Strategy for the significant residual impact on Flora and Vegetation and Terrestrial Fauna. Furthermore, the EPA has recommended conditions relating to these factors. From its assessment of this proposal the EPA has concluded that the proposal would not compromise the biological diversity and ecological integrity of the affected areas.
4. Principles relating to improved valuation, pricing and incentive mechanisms *(1) Environmental factors should be included in the valuation of assets and services.* *(2) The polluter pays principles – those who generate pollution and waste should bear the cost of containment, avoidance and abatement.* *(3) The users of goods and services should pay prices based on the full life-cycle costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste.* *(4) Environmental goals, having been established, should be pursued in the most cost effective way, by establishing*	In considering this principle, the EPA notes that the proponent would bear the cost relating to management and monitoring of environmental impacts during operation and the management and monitoring of closure activities including earth works, rehabilitation and ongoing monitoring to demonstrate performance against completion criteria. The EPA has had regard to this principle during the assessment of the proposal.

EP Act Principle	Consideration
incentive structure, including market mechanisms, which enable those best placed to maximise benefits and/or minimize costs to develop their own solution and responses to environmental problems.	
5. The principle of waste minimisation *All reasonable and practicable measures should be taken to minimise the generation of waste and its discharge into the environment.*	In considering this principle, the EPA notes that the proponent proposes to minimise waste through establishment of waste management procedures and incident reporting procedures which will be communicated to staff in inductions and regular meetings to ensure best practise management of wastes is implemented for the proposal. The EPA has had regard to this principle during the assessment of the proposal.

Appendix 3: Evaluation of Other Environmental Factors

Environmental factor	Description of the proposal's likely impacts on the environmental factor	Government agency and public comments	Evaluation of why the factor is not a key environmental factor
AIR			
Air Quality	Air quality has the potential to be directly impacted through: particulate (dust) and other emissions from mining operations including but not limited to vehicle movement, construction activities, stockpiling material, and transport.	**Public comments** One comment was received on this factor during public consultation. The submitter noted there is no mention in the proposal of the material to be used to form the track or any ongoing maintenance that will be required of the chosen material or any potential effects this may have on our (the submitters) property.	The proponent has committed to managing dust emissions from the proposal through application of established mitigation strategies, including: Avoid • scheduling topsoil stripping to avoid periods of high winds • suspension of mining activities during periods of high winds Minimise • limiting areas open for mining at any one time • minimising the number and size of stockpiles • encouraging vegetative cover on stockpiles • spraying Heavy Mineral Concentrate stockpiles at the mine with water if they dry • management and monitoring of ore loading and unloading operations

Environmental factor	Description of the proposal's likely impacts on the environmental factor	Government agency and public comments	Evaluation of why the factor is not a key environmental factor
			• co-disposal of sand tails and clay tails into pit backfill areas • applying water (or dust suppressants) to roads, working surfaces and stockpiles as required, • rehabilitating disturbed areas no longer in use. The proponent has made a commitment to monitor dust emissions to enable dust management performance to be continually assessed. Strategies to manage dust emissions are further detailed in the key environmental factor of social surroundings (see section 4.4). Having regard to: • the proponent's management strategies, including dust suppression activities and rehabilitation actions • significance considerations in the *Statement of Environmental Principles, Factors and Objectives* (EPA 2020d) • the *Environmental Factor Guideline – Air Quality* (EPA 2020a), the EPA considers the proposal would meet its objectives for Air Quality and that the impacts to this factor can be

Environmental factor	Description of the proposal's likely impacts on the environmental factor	Government agency and public comments	Evaluation of why the factor is not a key environmental factor
			adequately managed and regulated under part V of the EP Act. Accordingly, the **EPA did not consider the factor Air Quality to be a key environmental factor** at the conclusion of its assessment.
Greenhouse Gas Emissions			Greenhouse Gas Emissions was not identified as a preliminary key environmental factor when the EPA decided to assess the proposal. Having regard to: • the *Environmental Factor Guideline for Greenhouse Gas Emissions* (EPA 2020b) which details that greenhouse gas from a proposal will be assessed where it exceeds 100,000 tonnes of scope 1 emissions each year measured in carbon dioxide equivalence (CO_2-e) • the proposal contributing about 12,000 tonnes CO_{2}-e per year from the combustion of diesel for operation of vehicles and mining fleet during construction and operation and from the generation of electricity from a diesel generator • the proposal not commencing until about 12 months after the closure of

Environmental factor	Description of the proposal's likely impacts on the environmental factor	Government agency and public comments	Evaluation of why the factor is not a key environmental factor
			the Yoongarillup Mine, and as such the proposal will not significantly increase the proponent's current overall greenhouse gas emissions • the proponent's requirement to manage greenhouse gas emissions in accordance with the *National Greenhouse and Energy Reporting Act 2007* and report the energy production, energy consumption and greenhouse gas emissions annually • the proponent's commitment to an ongoing program of review to identify opportunities to further reduce energy consumption and reduce greenhouse gas emissions, the EPA considers that the proposal will meet its objective for **Greenhouse Gas Emissions**.
PEOPLE			
Human Health	Human Health has the potential to be directly impacted through: Naturally Occurring Radioactive Material (NORM) being exposed from mining operations and leaching into the surrounding environment.	**Public Comment** Doral has not considered how NORM enriched tailings will be managed post- mining operations. NORMs pose a material risk to the ecologically fragile Vasse Wonnerup Wetlands, particularly as the hydraulic gradient within the Superficial aquifer flows downstream from the proposed mine towards the Wetlands.	Given the concern raised by the potential impacts on the Wonnerup Wetlands from NORM, the proponent has committed to revising the Groundwater Licence Operating Strategy to include six monthly sampling and analysis for Uranium, Ra226 and Ra228 in the neighbouring monitoring bores. The neighbouring monitoring bores are within a range of less than 1 km from the mining void and

Environmental factor	Description of the proposal's likely impacts on the environmental factor	Government agency and public comments	Evaluation of why the factor is not a key environmental factor
		Presumably, Doral believes applying lime to the tailings will reduce this risk via neutralisation of potential acid sulfate soils. However, NORMs, such as Uranium, can be mobilised under neutral/alkaline conditions given sufficient redox potentials. Furthermore, lime application is a heterogeneous process, meaning complete neutralisation of acid sulfate soils is only theoretically possible. No consideration of these processes has been acknowledged by Doral. Additionally, Doral has not provided any contaminant transport modelling which could quantity the rate, distribution and magnitude of post-mining NORM mobilisation. Given these non-trivial uncertainties, it is unclear how Doral can claim the risk of the proposed action to the Vasse Wonnerup Ramsar Wetlands is low. **Government Agency** The proponent has not provided any information regarding the assessment of NORMs. The department notes that some level of radioactivity via radionuclides entering the groundwater system is possible as groundwater levels in the mine pit are likely to recover and because of the lack of lined pit	therefore any risk of mobilised metals and radionuclides will be detected within the first instance and therefore shall allow for early investigation and action well before any detrimental environmental impacts to the Vasse-Wonnerup Wetlands are possible. Other management procedures for NORMs relating to redox potentials would be through the proposed GDE and ASS Investigation and Management plans. Having Regard to: • the proponent's proposed monitoring and management plans • significance considerations in the *Statement of Environmental Principles, Factors and Objectives* (EPA 2020d) • the *Environmental Factor Guideline – Human Health* (EPA 2016b), the EPA considers that the proposal would meet its objective for human health and that the impacts to this factor are manageable. In addition, the EPA notes that the management of NORMs is regulated by the Radiological Council of WA under the *Radiation Safety Act 1975* and DMIRS (Mines Safety and Inspection

Environmental factor	Description of the proposal's likely impacts on the environmental factor	Government agency and public comments	Evaluation of why the factor is not a key environmental factor
		voids. This is because the pit will be backfilled with material (sand tails and clay fines) with varying contaminant concentrations and the Superficial aquifer (which the mine pit intercepts) is likely to have a relatively high hydraulic conductivity meaning groundwater will move through the pit, dissolving contaminants (including radionuclides) contained in the backfilled material over time and transport these into the aquifer. Therefore, impacts and management of radionuclide mobilisation (as well as PASS and PASS induced metal mobilisation) on downstream biota, including the Vasse-Wonnerup Ramsar Wetlands should be discussed as part of the groundwater numerical model, ecohydrological conceptual model and Groundwater Licence Operating Strategy.	Act 1994 and Mines Safety and Inspection Regulations, 1995). The State regulation of radiation includes the statutory appointment of a suitably qualified Radiation Safety Officer, the approval of a Radiation Management Plan and subsequent annual monitoring reports. Accordingly, the **EPA did not consider the factor Human Health to be a key environmental factor** at the conclusion of its assessment.

Appendix 4: Identified Decision-Making Authorities and Recommended Environmental Conditions

Identified Decision-Making Authorities

Section 44(2) of EP Act specifies that the EPA's report must set out (if it recommends that implementation be allowed) the conditions and procedures, if any, to which implementation should be subject. This Appendix contains the EPA's recommended conditions and procedures.

Section 45(1) requires the Minister for Environment to consult with decision-making authorities (DMAs), and if possible, agree on whether or not the proposal may be implemented, and if so, to what conditions and procedures, if any, that implementation should be subject.

The following decision-making authorities have been identified:

Decision-Making Authority	Legislation (and Approval)
1. Minister for Environment	*Biodiversity Conservation Act 2016* (Taking of flora and fauna)
2. Minister for Water	*Rights in Water and Irrigation Act 1914* (Water abstraction licence)
3. Minister for Mines and Petroleum	*Mining Act 1978* (Grant of mining lease)
4. Minister for Aboriginal Affairs	*Aboriginal Heritage Act 1972* (section 18 permit)
5. CEO, Department of Water and Environmental Regulation	*Environmental Protection Act 1986* (Works approval and licence)
6. Executive Director, Resource and Environmental Compliance Division Department of Mines, Industry Regulation and Safety	*Mining Act 1978* (Mining proposal)
7. Chief Dangerous Goods Officer, Department of Mines, Industry Regulation and Safety	*Dangerous Goods Safety Act 2004* (Storage and handling of dangerous goods)
8. State Mining Engineer, Department of Mines, Industry Regulation and Safety	*Mines Safety and Inspection Act 1994* (Mine safety and approval to commence mining)
9. The Secretary, Radiological Council	*Radiation Safety Act 1975* (Permit to mine radioactive materials)

Note: In this instance, agreement is only required with DMAs 1-4 since these DMAs are Ministers.

Recommended Environmental Conditions

STATEMENT THAT A PROPOSAL MAY BE IMPLEMENTED
***(Environmental Protection Act 1986*)**

YALYALUP MINERAL SANDS PROJECT

Proposal: The proposal is to construct and operate the Yalyalup mineral sands mine located 11 kilometres southeast of Busselton. The proposal includes the development of mine pits and associated infrastructure, a wet concentration processing plant, solar evaporation ponds, groundwater abstraction and water management infrastructure and a process water dam. The life of mine is expected to be up to five years.

Proponent: Doral Mineral Sands Pty Ltd
Australian Company Number 096 342 451

Proponent Address: 25 Harris Rd, Picton WA 6229

Assessment Number: 2141

Report of the Environmental Protection Authority: 1695

Pursuant to section 45 of the *Environmental Protection Act 1986,* it has been agreed that the proposal described and documented in Table 2 of Schedule 1 may be implemented and that the implementation of the proposal is subject to the following implementation conditions and procedures:

1 Proposal Implementation

1-1 When implementing the proposal, the proponent shall not exceed the authorised extent of the proposal as defined in Table 2 of Schedule 1, unless amendments to the proposal and the authorised extent of the proposal have been approved under the EP Act.

2 Contact Details

2-1 The proponent shall notify the CEO of any change of its name, physical address or postal address for the serving of notices or other correspondence within twenty-eight (28) days of such change. Where the proponent is a corporation or an association of persons, whether incorporated or not, the postal address is that of the principal place of business or of the principal office in the State.

3 Time Limit for Proposal Implementation

3-1 The proponent shall not commence implementation of the proposal after five (5) years from the date of this Statement, and any commencement, prior to this date, must be substantial.

3-2 Any commencement of implementation of the proposal, on or before five (5) years from the date of this Statement, must be demonstrated as substantial by providing the CEO with written evidence, on or before the expiration of five (5) years from the date of this Statement.

4 Compliance Reporting

4-1 The proponent shall prepare and maintain a Compliance Assessment Plan which is submitted to the CEO at least six (6) months prior to the first Compliance Assessment Report required by condition 4-6, or prior to implementation of the proposal, whichever is sooner.

4-2 The Compliance Assessment Plan shall indicate:

(1) the frequency of compliance reporting;

(2) the approach and timing of compliance assessments;

(3) the retention of compliance assessments;

(4) the method of reporting of potential non-compliances and corrective actions taken;

(5) the table of contents of Compliance Assessment Reports; and

(6) public availability of Compliance Assessment Reports.

4-3 After receiving notice in writing from the CEO that the Compliance Assessment Plan satisfies the requirements of condition 4-2 the proponent shall assess compliance with conditions in accordance with the Compliance Assessment Plan required by condition 4-1.

4-4 The proponent shall retain reports of all compliance assessments described in the Compliance Assessment Plan required by condition 4-1 and shall make those reports available when requested by the CEO.

4-5 The proponent shall advise the CEO of any potential non-compliance within seven (7) days of that non-compliance being known.

4-6 The proponent shall submit to the CEO the first Compliance Assessment Report fifteen (15) months from the date of issue of this Statement addressing the twelve (12) month period from the date of issue of this Statement and then annually from the date of submission of the first Compliance Assessment Report, or as otherwise agreed in writing by the CEO.

The Compliance Assessment Report shall:

(1) be endorsed by the proponent's Chief Executive Officer or a person delegated to sign on the Chief Executive Officer's behalf;

(2) include a statement as to whether the proponent has complied with the conditions;

(3) identify all potential non-compliances and describe corrective and preventative actions taken;

(4) be made publicly available in accordance with the approved Compliance Assessment Plan; and

(5) indicate any proposed changes to the Compliance Assessment Plan required by condition 4-1.

5 Public Availability of Data

5-1 Subject to condition 5-2, within a reasonable time period approved by the CEO of the issue of this Statement and for the remainder of the life of the proposal, the proponent shall make publicly available, in a manner approved by the CEO, all validated environmental data (including sampling design, sampling methodologies, empirical data and derived information products (e.g. maps)), management plans and reports relevant to the assessment of this proposal and implementation of this Statement.

5-2 If any data referred to in condition 5-1 contains particulars of:

(1) a secret formula or process; or

(2) confidential commercially sensitive information,

the proponent may submit a request for approval from the CEO to not make these data publicly available. In making such a request the proponent shall provide the CEO with an explanation and reasons why the data should not be made publicly available.

6 Flora and Vegetation (Outcome Based)

6-1 The proponent shall ensure there are no project attributable direct impacts to **Threatened Ecological Communities** within the development envelope delineated in Figure 2 of Schedule 1.

6-2 The proponent shall ensure that no more than 2.72 ha of native vegetation will be cleared within a 924.84 ha development envelope.

7 Flora and Vegetation (Management Based)

7-1 The proponent shall implement the proposal to meet the following environmental objective:

(1) avoid where possible, otherwise minimise indirect impacts to conservation significant flora and **Threatened Ecological Communities** within the development envelope delineated in Figure 2 of Schedule 1.

7-2 In order to meet the requirements of condition 7-1, prior to **ground disturbing activities** within the development envelope delineated in Figure 2 of Schedule 1, unless otherwise agreed by the CEO, the proponent shall implement the *Yalyalup Mineral Sands Project: Flora and Vegetation Environmental Management Plan (November 2020).* This plan shall:

(1) when implemented, substantiate and ensure that condition 7-1 is being met;

(2) include details of the timing and methods of preclearance surveys and demonstrate how the findings of the survey(s) would be considered, including provision of mitigation measures;

(3) present objectives for conservation significant flora and **Threatened Ecological Communities** to minimise indirect impacts;

(4) specify trigger criteria that will trigger the implementation of management and/or contingency actions to prevent further indirect impacts to flora and vegetation;

(5) specify threshold criteria to demonstrate compliance with condition 7-1;

(6) specify monitoring to determine if trigger criteria and threshold criteria have been met;

(7) specify management and/or contingency actions to be implemented if trigger criteria required by condition 7-2(4) have not been met; and

(8) provide the format and timing for the reporting of monitoring results against trigger criteria and threshold criteria to demonstrate that condition 7-1 has been met over the reporting period in the Compliance Assessment Report required by condition 4-6.

7-3 The proponent shall implement the most recent version of the *Yalyalup Mineral Sands Project: Flora and Vegetation Environmental Management Plan (November 2020)* which the CEO has confirmed by notice in writing, addresses the requirements of condition 7-1.

7-4 In the event that monitoring, or investigations indicates exceedance of threshold criteria specified in the *Yalyalup Mineral Sands Project: Flora and Vegetation Environmental Management Plan (November 2020)*, the proponent shall:

(1) report the exceedance in writing to the CEO within seven (7) days of the exceedance being identified;

(2) implement the threshold contingency actions specified in the *Yalyalup Mineral Sands Project: Flora and Vegetation Environmental Management Plan (November 2020)* within twenty-four (24) hours of the exceedance being reported as required by condition 7-4(1) and continue implementation of those actions until the CEO has confirmed by notice in writing that it has been demonstrated that the threshold criteria are being met and the implementation of the threshold contingency actions is no longer required;

(3) investigate to determine the cause of the threshold criteria being exceeded;

(4) investigate to provide information for the CEO to determine potential environmental harm or alteration of the environment that occurred due to threshold criteria being exceeded;

(5) provide a report to the CEO within twenty-one (21) days of the exceedance being reported as required by condition 7-4(1). The report shall include:

(a) details of threshold contingency actions implemented;

(b) the effectiveness of the threshold contingency actions implemented against the threshold criteria;

(c) the findings of the investigations required by conditions 7-4(3) and 7-4(4);

(d) measures to prevent the threshold criteria being exceeded in the future;

(e) measures to prevent, control or abate the environmental harm which may have occurred; and

(f) justification of the threshold remaining, or being adjusted based on better understanding, demonstrating that objectives of *Yalyalup Mineral Sands Project: Flora and Vegetation Environmental Management Plan (November 2020)* will continue to be met.

7-5 The proponent:

(1) may review and revise the *Yalyalup Mineral Sands Project: Flora and Vegetation Environmental Management Plan (November 2020)*; or

(2) shall review and revise the *Yalyalup Mineral Sands Project: Flora and Vegetation Environmental Management Plan (November 2020)* as and when directed by the CEO.

7-6 The proponent shall continue to implement the *Yalyalup Mineral Sands Project: Flora and Vegetation Environmental Management Plan (November 2020)*, or any subsequent revisions as approved by the CEO in condition 7-3, until the CEO has confirmed by notice in writing that the proponent has met the objective specified in condition 7-1.

8 Terrestrial Fauna

8-1 The proponent shall implement the proposal to meet the following environmental objective:

(1) avoid where possible, otherwise minimise, direct and indirect impacts to conservation significant fauna and fauna habitat within the development envelope delineated in Figure 2 of Schedule 1.

8-2 To achieve the objective of condition 8-1, prior to **ground disturbing activities** within the development envelope delineated in Figure 2 of Schedule 1, unless otherwise agreed in writing by the CEO, the proponent shall implement the *Yalyalup Mineral Sands Project: Fauna Environmental Management Plan (November 2020).* This plan shall:

(1) outline how the pre-clearance surveys will be undertaken;

(2) outline protocols for the relocation of threatened fauna prior to habitat clearing;

(3) specify trigger criteria that must provide an early warning that the environmental objectives identified in condition 8-1 may not be met;

(4) specify threshold criteria to demonstrate compliance with the environmental objectives specified in condition 8-1;

(5) specify monitoring to determine if trigger criteria and threshold criteria are exceeded;

(6) specify trigger level actions to be implemented in the event that trigger criteria have been exceeded;

(7) specify threshold contingency actions to be implemented in the event that threshold criteria are exceeded; and

(8) provide the format and timing for the reporting of monitoring results against trigger criteria and threshold criteria to demonstrate that condition 8-1 has been met over the reporting period in the Compliance Assessment Report required by condition 4-6.

8-3 The proponent shall implement the most recent version of the *Yalyalup Mineral Sands Project: Fauna Environmental Management Plan (November 2020)* which the CEO has confirmed by notice in writing addresses the requirements of conditions 8-1.

8-4 In the event that monitoring, or investigations indicate any exceedance of threshold criteria specified in the *Yalyalup Mineral Sands Project: Fauna Environmental Management Plan (November 2020)*, the proponent shall:

(1) report the exceedance in writing to the CEO within seven (7) days of the exceedance being identified; and

(2) implement the contingency actions required by condition 8-2(7) within seven (7) days of the exceedance being reported, as required by condition 8-4(1) and continue implementation of those actions until the CEO has confirmed by notice in writing that it has been demonstrated that the threshold criteria are being met and implementation of threshold contingency actions are no longer required.

8-5 The proponent:

(1) may review and revise the *Yalyalup Mineral Sands Project: Fauna Environmental Management Plan (November 2020)*; or

(2) shall review and revise the *Yalyalup Mineral Sands Project: Fauna Environmental Management Plan (November 2020)* as and when directed by the CEO.

8-6 The proponent shall continue to implement the *Yalyalup Mineral Sands Project: Fauna Environmental Management Plan (November 2020),* or any subsequent revisions as approved by the CEO in condition 8-3, until the CEO has confirmed by notice in writing that the proponent has demonstrated the environmental objective detailed in condition 8-1 has been met.

9 Acid Sulfate Soils

9-1 The proponent shall implement the proposal to achieve the following environmental objective:

(1) avoid where possible, otherwise minimise impacts associated with potential acid sulfate soils to conservation significant flora, fauna and inland waters within the development envelope delineated in Figure 2 of Schedule 1.

9-2 To achieve the objective of condition 9-1, prior to groundwater abstraction within the development envelope delineated in Figure 2 of Schedule 1, unless otherwise agreed in writing by the CEO, the proponent shall prepare and submit an Acid Sulfate Soils Management Plan. This plan shall:

(1) when implemented, substantiate and ensure that condition 9-1 is being met;

(2) be prepared on the advice of the **Department**;

(3) specify trigger criteria that will trigger the implementation of management and/or contingency actions to prevent further direct or indirect impacts as a result of potential acid sulfate soils;

(4) specify threshold criteria to demonstrate compliance with condition 9-1;

(5) specify monitoring methodology to determine if trigger criteria and threshold criteria have been met;

(6) specify management and/or contingency actions to be implemented if the trigger criteria required by condition 9-2(3) and/or the threshold criteria required by condition 9-2(4) have not been met; and

(7) provide a format and timing for the reporting of monitoring results against trigger criteria and threshold criteria to demonstrate that condition 9-1 has been met over the reporting period in the Compliance Assessment Report required by condition 4-6.

9-3 The proponent shall implement the most recent version of the Acid Sulfate Soils Management Plan which the CEO has confirmed by notice in writing addresses the requirements of conditions 9-1 and 9-2.

9-4 In the event that monitoring, or investigations indicate an exceedance of threshold criteria specified in the Acid Sulfate Soils Management Plan, the proponent shall:

(1) report the exceedance in writing to the CEO within seven (7) days of the exceedance being identified; and

(2) implement the contingency actions required by condition 9-2(6) within seven (7) days of the exceedance being reported, as required by condition 9-4(1) and continue implementation of those actions until the CEO has confirmed by notice in writing that it has been demonstrated that the threshold criteria are being met and implementation of threshold contingency actions are no longer required.

9-5 The proponent:

(1) may review and revise the Acid Sulfate Soils Management Plan; or

(2) shall review and revise the Acid Sulfate Soils Management Plan as and when directed by the CEO.

9-6 The proponent shall implement the Acid Sulfate Soils Management Plan, or any subsequent revisions as approved by the CEO in condition 9-3, until the CEO has

confirmed by notice in writing that the proponent has demonstrated the environmental objective detailed in condition 9-1 has been met.

10 Groundwater Dependent Ecosystems

10-1 The proponent shall implement the proposal to achieve the following environmental objectives:

(1) avoid where possible, otherwise minimise, indirect impacts to groundwater dependent ecosystems within the development envelope delineated in Figure 2 of Schedule 1; and

(2) avoid causing deleterious changes to the health of western ringtail possum (*Pseudocheirus occidentalis*) habitat.

10-2 To achieve the objectives of condition 10-1, prior to groundwater abstraction within the development envelope delineated in Figure 2 of Schedule 1, unless otherwise agreed in writing by the CEO, the proponent shall implement the *Yalyalup Mineral Sands Project: DMS-YAL-EMP-2.4 GDE Management Plan (October 2020).* This plan shall:

(1) when implemented, substantiate and ensure that condition 10-1 is being met;

(2) specify trigger criteria that will trigger the implementation of management and/or contingency actions to prevent further direct or indirect impacts to groundwater dependent ecosystems;

(3) specify threshold criteria to demonstrate compliance with condition 10-1;

(4) specify monitoring methodology to determine if trigger criteria and threshold criteria have been met;

(5) specify management and/or contingency actions to be implemented if the trigger criteria required by condition 10-2(2) and/or the threshold criteria required by condition 10-2(3) have not been met; and

(6) provide a format and timing for the reporting of monitoring results against trigger criteria and threshold criteria to demonstrate that condition 10-1 has been met over the reporting period in the Compliance Assessment Report required by condition 4-6.

10-3 The proponent shall implement the most recent version of the *Yalyalup Mineral Sands Project: DMS-YAL-EMP-2.4 GDE Management Plan (October 2020)* which the CEO has confirmed by notice in writing addresses the requirements of conditions 10-1 and 10-2.

10-4 From the commencement of groundwater abstraction, the proponent shall prepare and submit a Groundwater Dependent Ecosystems Performance Report to be

provided with the Compliance Assessment Report required by condition 4-6. The Groundwater Dependent Ecosystems Performance Report shall include:

(1) monitoring results against trigger criteria and threshold criteria to demonstrate that condition 10-1 has been met;

(2) detail whether the groundwater dependent ecosystems are showing signs of deleterious health;

(3) detail impacts to known groundwater dependent ecosystems related to western ringtail possum habitat where trigger threshold criteria have been exceeded and provide an analysis of changes to vegetation health, particularly noting deleterious changes to health; and

(4) detail any changes to groundwater pH in proximal locations to groundwater dependent ecosystems.

10-5 In the event that monitoring, or investigations indicate an exceedance of threshold criteria specified in the *Yalyalup Mineral Sands Project: DMS-YAL-EMP-2.4 GDE Management Plan (October 2020)*, the proponent shall:

(1) report the exceedance in writing to the CEO within seven (7) days of the exceedance being identified; and

(2) implement the contingency actions required by condition 10-2(5) within seven (7) days of the exceedance being reported, as required by condition 10-5(1) and continue implementation of those actions until the CEO has confirmed by notice in writing that it has been demonstrated that the threshold criteria are being met and implementation of threshold contingency actions are no longer required.

10-6 The proponent:

(1) may review and revise the *Yalyalup Mineral Sands Project: DMS-YAL-EMP-2.4 GDE Management Plan (October 2020)*; or

(2) shall review and revise the *Yalyalup Mineral Sands Project: DMS-YAL-EMP-2.4 GDE Management Plan (October 2020)* as and when directed by the CEO.

10-7 The proponent shall continue to implement the *Yalyalup Mineral Sands Project: DMS-YAL-EMP-2.4 GDE Management Plan (October 2020),* or any subsequent revisions as approved by the CEO in condition 10-3, until the CEO has confirmed by notice in writing that the proponent has demonstrated the environmental objective detailed in condition 10-1 has been met.

11 Offsets

11-1 The proposal shall limit proposal impacts to no more than:

(1) 0.34 ha indirect impact of Shrublands on southern Swan Coastal Plain ironstones (Busselton area) **Threatened Ecological Community**;

(2) indirect impact of nine individuals of *Banksia squarrosa* subsp. *argillacea*; and

(3) 1.78 ha direct impact of potential breeding and foraging habitat for forest red-tailed black cockatoo (*Calyptorhynchus banksii naso*), Baudin's cockatoo (*Calyptorhynchus baudinii*) and Carnaby's cockatoo (*Calyptorhynchus latirostris*)

as a result of the implementation of the proposal, and undertake offsets set out in conditions 11-2 to 11-9 to achieve the objective of counterbalancing the significant residual impact on the abovementioned environmental values.

11-2 Prior to **ground disturbing activities** or clearing of vegetation and within six (6) months of the publication of this Statement, the proponent shall prepare and submit the *Yalyalup Mineral Sands Project Land Acquisition Offset Strategy* to the requirements of the CEO.

11-3 The *Yalyalup Mineral Sands Project Land Acquisition Offset Strategy* shall:

(1) demonstrate that the outcome in condition 11-1 will be met;

(2) be prepared on advice of the Department of Agriculture, Water and the Environment and the Department of Biodiversity, Conservation and Attractions;

(3) identify an area, or areas, to be acquired which contains the environmental value/s identified in condition 11-1, or similar values of equivalent conservation significance agreed by the CEO;

(4) demonstrate how the environmental values within the Proposed Offset Conservation Area counterbalances the significant residual impact to the environmental values identified in condition 11-1 through application of the principles of the *WA Environmental Offsets Policy (2011)* and completion of the WA Offsets Template, as described in the *WA Environmental Offsets Guidelines (2014)*, and the *Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy Assessment Guide (2012)*, or any subsequent revisions of these documents;

(5) identify how the Proposed Offset Conservation Area will be acquired and specify:

(a) a timeframe and works associated with establishing the Proposed Offset Conservation Area, including a contribution for maintaining the offset for at least twenty (20) years after completion of purchase; and

(b) each relevant management body for the on-going management of the Proposed Offset Conservation Area, including its role, and confirmation in writing that the relevant management body accepts responsibility for its role.

11-4 The proponent:

(1) may review and revise the *Yalyalup Mineral Sands Project Land Acquisition Offset Strategy*; or

(2) shall review and revise the *Yalyalup Mineral Sands Project Land Acquisition Offset Strategy* as and when directed by the CEO by a notice in writing.

11-5 The proponent shall implement the latest revision of the *Yalyalup Mineral Sands Project Land Acquisition Offset Strategy* approved by the CEO.

11-6 The proponent shall report to the CEO on the outcomes of the actions, objectives, and targets in the *Yalyalup Mineral Sands Project Land Acquisition Offset Strategy* within sixty (60) days of completion of those outcomes.

11-7 The proponent shall continue to implement the *Yalyalup Mineral Sands Project Land Acquisition Offset Strategy* until the CEO has confirmed by notice in writing that the proponent has demonstrated that the outcome in condition 11-1 has been met.

11-8 Should the actions, objectives, or targets in *Yalyalup Mineral Sands Project Land Acquisition Offset Strategy* be unable to be met, the proponent shall notify the CEO within seven (7) days of it being identified and provide details and timing of contingency actions to be undertaken, to the satisfaction of the CEO.

11-9 The proponent shall report to the CEO on the outcomes of the contingency actions as required by condition 11-8 within sixty (60) days of completion.

12 Offsets – Western Ringtail Possum Habitat

12-1 If, after receiving the Groundwater Dependent Ecosystems Performance Report required by condition 10-4, the CEO determines that the proposal has resulted in an additional significant residual impact to habitat for the western ringtail possum, and notifies the proponent in writing, the proponent must undertake an additional offset to counterbalance the significant residual impact from the loss of habitat for the western ringtail possum on the McGibbon Track, as a result of dewatering for mine pits within the development envelope delineated in Figure 2 of Schedule 1.

12-2 Within twelve (12) months of receiving notice in writing that an additional offset is required under condition 12-1, the proponent shall update the *Yalyalup Mineral Sands Project Land Acquisition Offset Strategy* required by condition 11-2 to include additional offsets to counterbalance the significant residual impact from the loss of habitat for the western ringtail possum.

12-3 The proponent shall implement the latest revision of the *Yalyalup Mineral Sands Project Land Acquisition Offset Strategy,* which the CEO has confirmed in writing satisfies the requirements of conditions 11 and 12.

13 Abba River

13-1 The proponent shall implement the proposal to meet the following environmental objective:

(1) avoid where possible, otherwise minimise, direct and indirect impacts to the ecological and hydrological functions of the Abba River from construction activities including but not limited to erosion, sedimentation, pollutants, weed introduction, vegetation clearing, loss of habitat and changes to ecological values.

13-2 To achieve the objective of condition 13-1, prior to **ground disturbing activities** for the purposes of constructing the Abba River crossing, unless otherwise agreed in writing by the CEO, the proponent shall prepare and submit an Abba River Management Strategy. This Strategy shall:

(1) when implemented, substantiate and ensure that condition 13-1 is being met;

(2) be prepared in consultation with the South West Aboriginal Land and Sea Council on the advice of the **Department**;

(3) specify trigger criteria that will trigger the implementation of management and/or contingency actions to prevent further direct or indirect impacts to the Abba River crossing;

(4) specify threshold criteria to demonstrate compliance with condition 13-1;

(5) specify monitoring methodology to determine if trigger criteria and threshold criteria have been met;

(6) specify management and/or contingency actions to be implemented if the trigger criteria required by condition 13-2(3) and/or the threshold criteria required by condition 13-2(4) have not been met; and

(7) provide a format and timing for the reporting of monitoring results against trigger criteria and threshold criteria to demonstrate that condition 13-1 has been met over the reporting period in the Compliance Assessment Report required by condition 4-6.

13-3 The proponent shall implement the most recent version of the Abba River Management Strategy which the CEO has confirmed by notice in writing addresses the requirements of conditions 13-1 and 13-2.

13-4 In the event that monitoring, or investigations indicate an exceedance of threshold criteria specified in the Abba River Management Strategy, the proponent shall:

(1) report the exceedance in writing to the CEO within seven (7) days of the exceedance being identified; and

(2) implement the contingency actions required by condition 13-2(6) within seven (7) days of the exceedance being reported, as required by condition 13-4(1) and continue implementation of those actions until the CEO has confirmed by notice in writing that it has been demonstrated that the threshold criteria are being met and implementation of threshold contingency actions are no longer required.

13-5 The proponent:

(1) may review and revise the Abba River Management Strategy; or

(2) shall review and revise the Abba River Management Strategy as and when directed by the CEO.

13-6 The proponent shall implement the Abba River Management Strategy, or any subsequent revisions as approved by the CEO in condition 13-3, until the CEO has confirmed by notice in writing that the proponent has demonstrated the environmental objective detailed in condition 13-1 has been met.

Schedule 1

Table 1: Summary of the proposal

Proposal title	Yalyalup Mineral Sands Project
Short description	The proposal is to construct and operate the Yalyalup mineral sands mine. The proposal includes the development of mine pits and associated infrastructure, wet concentration processing plant, solar evaporation ponds, groundwater abstraction, water management infrastructure and process water dam. The life of mine is expected to be up to five years.

Table 2: Location and authorised extent of physical and operational elements

Element	Location	Proposed extent
Physical elements		
Mine pits and supporting infrastructure (disturbance footprint)	Figure 2	No more than 451.33 ha of disturbance (which includes no more than 2.72 ha of native vegetation) within a 924.84 ha development envelope
Operational elements		
Groundwater abstraction	-	Abstraction of up to 1.6 gigalitres per annum from the Yarragadee aquifer
Ore processing heavy mineral concentrate	-	No more than 250,000 tonnes per annum

Table 3: Abbreviations and definitions

Acronym or abbreviation	Definition or term
CEO	The Chief Executive Officer of the Department of the Public Service of the State responsible for the administration of section 48 of the *Environmental Protection Act 1986*, or his delegate.
Department	The Western Australian government department responsible for the administration of the EP Act, which at the time of these conditions being approved, is the Department of Water and Environmental Regulation.
Dewatering	Means removing underground water to facilitate excavation for the purposes of carrying out works, construction or other similar activities.
EP Act	*Environmental Protection Act 1986*
Ground-disturbing activities	Activities that are associated with the substantial implementation of a proposal including, but not limited to, digging (with mechanised equipment), blasting, earthmoving, vegetation clearance, grading, gravel extraction, construction of new or widening of existing roads and tracks.
ha	Hectare
Threatened Ecological Community	A Threatened Ecological Community is a vegetation community which is found to fit into one of the following categories; “presumed totally destroyed”, “critically endangered”, “endangered” or “vulnerable” under the *Biodiversity Conservation Act 2016* and/or *Environment Protection and Biodiversity Conservation Act 1999*.

Figures (attached)

Figure 1: Regional location
Figure 2: Development envelope and disturbance footprint

Figure 1: Regional location

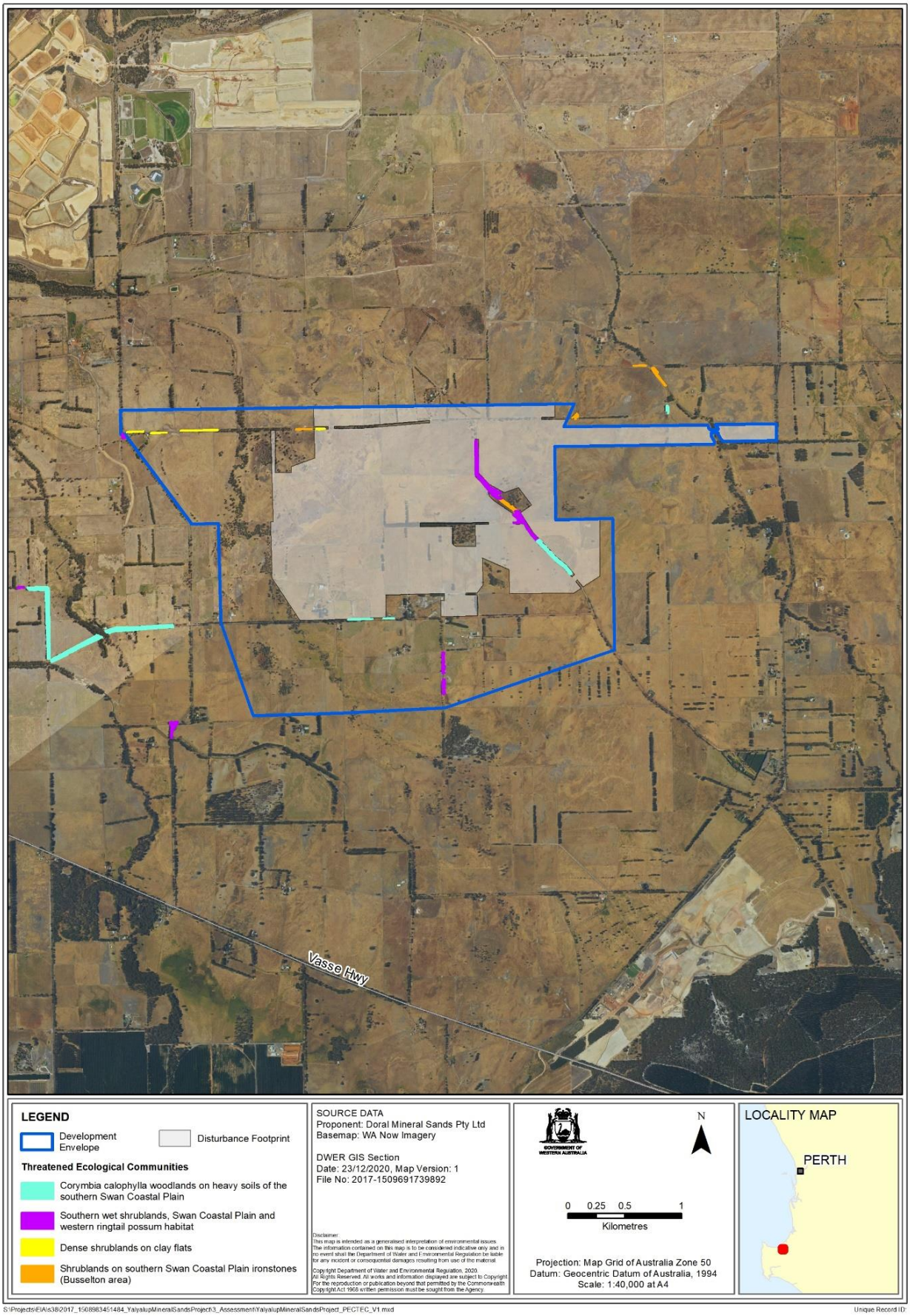

Figure 2: Development envelope and disturbance footprint

Schedule 2

Coordinates defining the areas shown in Figures 1 and 2 are held by the Department of Water and Environmental Regulation, under reference numbers DWERDT390364.

All coordinates are in metres, listed in Map Grid of Australia Zone 50 (MGA Zone 50), datum of Geocentric Datum of Australia 1994 (GDA94).