GOVERNMENT OF WESTERN AUSTRALIA

Environmental Protection Authority

West Musgrave Copper and Nickel Project

OZ Minerals Musgrave Operations Pty Ltd

Report 1720

January 2022

This assessment report has been prepared by the Environmental Protection Authority (EPA) under s. 44 of the *Environmental Protection Act 1986* (WA) (EP Act). It describes the outcomes of the EPA's assessment of the West Musgrave Copper and Nickel Project proposed by OZ Minerals Musgrave Operations Pty Ltd.

This assessment report is for the Western Australian Minister for Environment and sets out:

- what the EPA considers to be the key environmental factors identified in the course of the assessment
- the EPA's recommendations as to whether or not the proposal may be implemented and, if the EPA recommends that implementation be allowed, the conditions and procedures, if any, to which implementation should be subject
- other information, advice and recommendations as the Authority thinks fit.

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Contents

Summary 1
1 Proposal 9
2 Assessment of key environmental factors 14
2.1 Social surroundings 14
2.2 Flora and vegetation 24
2.3 Inland waters 35
2.4 Greenhouse gas emissions 49
2.5 Terrestrial Fauna 56
3. Holistic assessment 67
4. Recommendations 70
5. Other advice 71

Tables

Table 1: Location and proposed extent of proposal elements 12
Table 2: Summary of assessment for social surroundings 22
Table 3: Summary of assessment for flora and vegetation 33
Table 4: Summary of assessment for inland waters 47
Table 5: Summary of assessment for greenhouse gas emissions 54
Table 6: Summary of assessment for terrestrial fauna 65

Figures

Figure 1: Project location 10
Figure 2: Development envelope and footprint 11
Figure 3: Figure 3: Intrinsic interactions between environmental factors 69

Appendices

Appendix A: Recommended Conditions 73
Appendix B: Decision-making authorities 92
Appendix C: Consideration of Environmental Protection Act principles 94
Appendix D: Other environmental factors 98
Appendix E: Relevant policy, guidance and procedures 101
Appendix F: List of submitters 102
Appendix G: Assessment timeline 103

References 104

Summary

Proposal

The West Musgrave Copper and Nickel Project is a proposal to develop a copper and nickel mine in the West Musgrave Ranges of Western Australia.

The proposal is located approximately 1,300 kilometres (km) north-east of Perth, near to the intersection of the borders between Western Australia, South Australia and the Northern Territory. The nearest towns include the Indigenous Communities of Jameson (Mantamaru) 26 km north, Blackstone (Papulankutja) 50 km east, and Warburton (Milyirrtjarra) 110 km west of the proposal.

The proponent for the proposal is OZ Minerals Musgrave Operations Pty Ltd.

The proposal would include the development of two copper and nickel deposits via two open pits, with processing facilities, a borefield, temporary and permanent waste landforms, a tailings storage facility, accommodation, airstrip and power infrastructure. The proposal would require the clearing of up to 3,830 hectares (ha) of native vegetation within a development envelope of 20,852 ha. The proposed mine life is 26 years.

Context

The project represents the first mine within the Musgrave Province. The geological province is extensive, covering large areas of central-eastern Western Australia, Northern Territory and South Australia. The Musgrave Province has to date, remained unexplored due to the challenges of remoteness and land access.

The Ngaanyatjarra Council has advised traditional laws and customs are still followed on Ngaanyatjarra Lands and a project of this scale has never been constructed and operated there.

Consultation

The EPA published the proponent's referral information for the proposal on its website for 7 days public comment. The EPA also published the proponent's additional information on its website for public review for three weeks (from 28 June 2021 to 19 July 2021). The EPA considered comments received during these public consultation periods in its assessment.

Mitigation hierarchy

The mitigation hierarchy is a sequence of proposed actions to reduce adverse environmental impacts. The sequence commences with avoidance, then moves to minimisation, rehabilitation, and offsets are considered as the last step in the sequence.

The proponent has considered the mitigation hierarchy in the development and assessment of its proposal, and as a result has:

- Avoided impacts to socially important landforms and cultural heritage sites. The proposal is designed to exclude all identified cultural heritage (ethnographic) sites identified by the Ngaanyatjarra People (the traditional owners). The proposal development envelope has been refined to minimise the intersection with tracks known as dreaming trails.
- Avoided areas containing priority flora and fauna species. The proposed western access road and parts of the borefield alignment were avoided due to the presence of short-range endemic species, flora and fauna.
- Followed the EPA's recommendation to address potential indirect impacts to flora and vegetation, including the impact of fire and weeds.
- Refined the development envelope to avoid and reduce the amount of disturbance to habitat for the great desert skink (*Liopholis kintorei*).
- Proposed measures to avoid or minimise impacts to inland waters by ensuring, where possible, project infrastructure avoids impacts to surface drainage. Further, the proposal includes a commitment to backfill Nebo mine pit to above watertable to reduce the extent of groundwater drawdown.
- Minimised the impact of greenhouse gas emissions and dependence on non-renewable energy sources by committing to the use of renewable energy (wind turbines and solar) and a target of net-zero greenhouse gas emissions by 2040 through the implementation of additional abatement measures.
- Consulted with the Ngaanyatjarra People and, with their agreement, formulated a Cultural Heritage Management Plan which addresses their concerns regarding:
    - identification and avoidance of sites of ethnographic and archaeological significance
    - restriction of access to land
    - potential impacts on visual amenity
    - potential impacts to vegetation which may be dependent on groundwater, or contain cultural associations
    - availability and quality of community water supplies
    - potential impact to food resources.

Assessment of key environmental factors

The EPA has identified the key environmental factors (listed below) in the course of the assessment:

Social surroundings

Residual impact	Assessment finding
Several significant ethnographic sites and dreaming trails identified in the development envelope.	All ethnographic sites have been proposed as exclusion areas. The EPA has assessed there will be no known impacts to cultural heritage (ethnographic) sites if subject to recommended condition 2.

An archaeological investigation and site recording identified potential archaeological sites within development envelope.	The EPA advises that this is a residual impact that is unlikely to be significant given the comprehensive extent of surveys and the nature of the sites identified. The EPA considers the Cultural Heritage Management Plan developed in consultation with the Ngaanyatjarra Council and the Ngaanyatjarra People, if implemented under recommended condition 2, will be able to manage archaeological sites which may be found during implementation in a way which is consistent with the EPA's objective for social surroundings.
Potential loss of traditional owner access to land.	The EPA advises that this is a residual impact that is likely to be able to be regulated through reasonable conditions (recommended condition 2) to require ongoing access be provided subject to reasonable health and safety requirements. The EPA considers the Cultural Heritage Management Plan will facilitate ongoing access for traditional use and custom. The EPA also considers the Plan will facilitate ongoing consultation about all relevant cultural heritage matters in a way which is consistent with the EPA's objective for social surroundings.
Indirect impacts of dust, noise, lighting and visual amenity.	The EPA considers the Cultural Heritage Management Plan, if implemented under recommended condition 2, will be able to manage indirect impacts to cultural heritage consistent with the EPA objective for social surroundings by requiring indirect impacts to be avoided where possible and otherwise minimised.

Flora and vegetation

Residual impact	Assessment finding
Clearing of up to 3,830 ha of good to excellent condition of native vegetation within a development envelope of 20,852 ha.	The clearing of 3,830 ha of vegetation represents 8 percent of the total area of vegetation associations surveyed, and 18 percent of the vegetation within the development envelope. The disturbance areas do not have significant qualitative value, compared to surrounding vegetation or vegetation in the development envelope. The EPA considers the Flora and Vegetation Management Plan, if implemented under recommended condition 3, will be able to manage impacts from clearing

	consistent with the EPA objective for flora and vegetation.
Loss of one population of priority 1 (P1) flora species *Aenictophyton anomalum* due to project land clearing.	The proposal clears one population of this P1 species out of 49 populations recorded within the development envelope. This clearing represents 0.3 percent loss to the known mapped species. The EPA considers loss of more than one population of this P1 species should be prohibited in the conditions (condition 3). This, combined with implementation of the Flora and Vegetation Management Plan to avoid and minimise further impacts, means impacts are likely to be consistent with the EPA's objective for flora and vegetation.
Loss of populations of up to 10 percent of two species of priority 3 (P3) flora due to project land clearing. Loss of 5.2 (or less) percent of four other P3 species.	The disturbance areas do not have significant qualitative value, compared to surrounding vegetation or vegetation in the development envelope. The P3 species are expected to be widespread, and impacts are not likely to be significant. The EPA considers loss of P3 species when compared to known populations should be limited in conditions to ensure a significant impact is not likely. This, combined with implementation of the Flora and Vegetation Management Plan (under recommended condition 3) to avoid and minimise further impacts, means impacts are likely to be consistent with the EPA's objective for flora and vegetation.
Potential loss of, or degradation of, quality vegetation condition due to project-related indirect impacts from altered fire regimes, and an increase in abundance and/or diversity of weeds. The Musgrave Province has to date, remained unexplored and relatively undisturbed.	The Flora and Vegetation Management Plan contains measures to mitigate the indirect impacts of fire and weeds on flora and vegetation, including additional measures recommended by the Department of Water and Environmental Regulation to include monitoring and surveillance of high-risk weeds. The EPA considers a condition (recommended condition 3) requiring the proponent to manage the proposal to avoid, where possible and otherwise minimise impacts to native flora, combined with a requirement to implement the Flora and Vegetation Management Plan will be able to manage indirect impacts, consistent with the EPA's objective for flora and vegetation.

Inland waters

Residual impact	Assessment finding

Groundwater abstraction and mine dewatering may result in reduced availability and access to groundwater for groundwater users (including traditional owners) at Linton bore located approximately 3 km from the proposal development envelope.	The proponent has committed to limit groundwater drawdown to 1 m at Linton Bore, which is used by the community for cultural purposes. This limit has been applied as a threshold and would result in contingency actions being applied if this limit is reached, to ensure no significant adverse impact to other users. The EPA recommends a 1 m drawdown limit be included in implementation conditions (condition 4) as a required environmental outcome, and that the Groundwater Monitoring and Management Plan be revised to reflect achievement of this outcome. Subject to these conditions, the proposal is likely to be able be implemented consistent with the EPA's objective for inland waters.
Groundwater abstraction may impact on potential groundwater dependent ecosystems (GDEs), including GDEs of significance to traditional owners, located with the predicted 2 m drawdown of the borefield.	The Groundwater Monitoring and Management Plan contains measures to avoid, minimise and mitigate the impact of project related activities on surface and groundwater, and potential GDEs. The *Rights in Water and Irrigation Act 1914* will also regulate impacts on GDEs from groundwater abstraction. In addition to these measures, the EPA recommends a condition which prohibits drawdown related impacts to GDEs which are culturally important to traditional owners. Subject to revision of the Plan to reflect achievement of this recommended condition (condition 4), the EPA considers the Groundwater Monitoring and Management Plan will be able to manage impacts, consistent with the EPA's objective for inland waters.
Pit voids that remain after closure may result in reduced availability and access to groundwater for beneficial uses, and potential GDEs. Seepage from waste landforms and pit voids may impact on groundwater quality.	The EPA considers the Groundwater Monitoring and Management Plan, combined with regulation by other decision-making authorities under the *Mining Act 1978* and Part V *Environmental Protection Act 1986* will be able to manage impacts, consistent with the EPA's objective for inland waters.

Greenhouse gas (GHG) emissions

With no mitigation the proposal is estimated, over the 26-year life of the proposal, to emit:

- a total scope 1 GHG emissions estimated at 9.481 million tonnes (Mt) of CO_2-e

- scope 1 GHG emissions are estimated at 364,675 tonnes of CO_2-e per annum
- scope 3 emissions generated over the life of mine are predicted to be approximately 7,722,260 tonnes of CO_2-e.

With the proposed mitigation (including wind turbine generators, bifacial solar PV arrays and battery Energy Storage System) and implementation of a greenhouse gas management plan, GHG emissions from the proposal are estimated to reduce as follows:

- commence at 196,500 of scope 1 CO_2-e per annum
- reduce to achieve net-zero GHG emissions by 2040, by reducing emissions over subsequent 5-year intervals, including scope 1 emissions not to exceed 75,000 tonnes CO_2-e per year after year 10 (2033)
- result in total scope 1 emissions for the life of the proposal of 4.06 Mt CO_2-e.

The proponent has prepared a Greenhouse Gas Management Plan (GHGMP) which details the company's intended reductions and strategies to achieve those reductions.

The EPA recommends condition 5-1 be imposed to require achievement of scope 1 GHG emission limits (as a minimum). The EPA recommends additional conditions (in condition 5) to require implementation of the GHGMP in a way which is flexible enough to be able to ensure continued innovation and improvement in emissions reduction and avoidance.

The EPA advises that, with the application of the recommended conditions, and the proponent's adoption of renewables and efficient technology, continuous improvement, and commitment to delivering against a trajectory of net-zero GHG emissions by 2040, the proposal is generally consistent with the EPA's *Environmental Factor Guideline – Greenhouse Gas Emissions*.

Terrestrial fauna

Residual impact	Assessment finding
Removal of 6.7 ha of spinifex sandplains habitat for the great desert skink – listed as Vulnerable under *Environment Protection and Biodiversity Conservation Act 1999* and the *Biodiversity Conservation Act 2016* (BC Act).	The proponent excluded mapped spinifex sandplain habitat from most of the development envelope to minimise the impact on the great desert skink. The residual impact to this species, through the clearing of 6.7 ha of habitat represents 0.1 percent of the surveyed area of spinifex sandplain habitat (4,919.5 ha). The EPA advises that this is a residual impact that is likely to be able to be regulated through reasonable conditions (recommended condition 6) to limit disturbance to spinifex sandplain habitat and otherwise avoid and minimise impacts to native fauna so that the environmental outcome is

	consistent with the EPA's objective for terrestrial fauna.
Impact of between 0.8 and 16.7 percent of the habitats within the development envelope of three Priority 4 species habitat listed under the BC Act.	The habitats for the species in the local area outside the development envelope are extensive. The Department of Biodiversity, Conservation and Attractions advised that implementation of the Terrestrial Fauna Management Plan is likely to be consistent with management of the conservation significance of the species. The EPA considers that the Terrestrial Fauna Management Plan, if required to be implemented in accordance with recommended condition 6, will be able to manage impacts, consistent with the EPA's objective for terrestrial fauna.
Impact to culturally important fauna identified through consultation with the Ngaanyatjarra People.	The EPA considers that the Terrestrial Fauna Management Plan will be able to manage impacts, consistent with the EPA's objective for terrestrial fauna. The EPA also recommends annual reporting to the Ngaanyatjarra People of impacts to culturally significant fauna (condition 6).

Holistic assessment

Given the link between social surroundings, flora and vegetation, inland waters, GHG emissions and terrestrial fauna, the EPA has also considered the connections and interactions between relevant environmental factors to inform a holistic view of impacts to the whole environment. The EPA formed the view that the holistic impacts would not alter the EPA's conclusions about consistency with the EPA's factor objectives. The EPA has recommended several conditions which support the holistic management of impacts, including protection of groundwater dependent ecosystems and fauna which are culturally important to the traditional owners.

Conclusion and recommendations

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

- environmental values which may be affected by the proposal
- residual impacts, emissions and effects in relation to the key environmental factors, separately and holistically
- likely environmental outcomes (taking into account the EPA's recommended conditions) and the consistency of these outcomes with the EPA's objectives for the key environmental factors
- the EPA's confidence in the proponent's proposed mitigation measures
- whether other statutory decision-making processes can mitigate the potential impacts of the proposal on the environment
- principles of the *Environmental Protection Act 1986*.

The EPA has recommended that the proposal may be implemented subject to conditions recommended in Appendix A.

1 Proposal

The West Musgrave Copper and Nickel Project is a proposal to develop two copper and nickel deposits (Babel pit and Nebo pit) within the West Musgrave Ranges of Western Australia. The nearest towns include the Indigenous Communities of Jameson (Mantamaru) 26 kilometres (km) north, Blackstone (Papulankutja) 50 km east, and Warburton (Milyirrtjarra) 110 km west of the proposal (see Figure 1).

The proposal includes two open pits, processing facilities, a borefield, temporary and permanent waste landforms, a tailings storage facility and renewable power infrastructure supported by fossil fuel power generation. The proposal would be supported by an accommodation village and an airstrip (see Figure 2).

The proponent for the proposal is OZ Minerals Musgrave Operations Pty Ltd. The proponent referred the proposal to the Environmental Protection Authority (EPA) on 15 December 2020 (OZ Minerals 2020). The referral information was published on the EPA website for seven days public comment. On 23 March 2021, the EPA decided to assess the proposal at the level 'Referral information with additional information required under section 40(2)(a) of the EP Act'. The EPA published the additional information, including a revised referral supporting document (OZ Minerals 2021a) and five Environmental Management Plans on its website for public review for three weeks (28 June 2021 to 19 July 2021).

The proposal is set out in section ES1 and section 2.3 of the proponent's referral supporting document (OZ Minerals 2021a), which is available on the EPA website.

The elements of the proposal which have been subject to the EPA's assessment are included in Table 1.

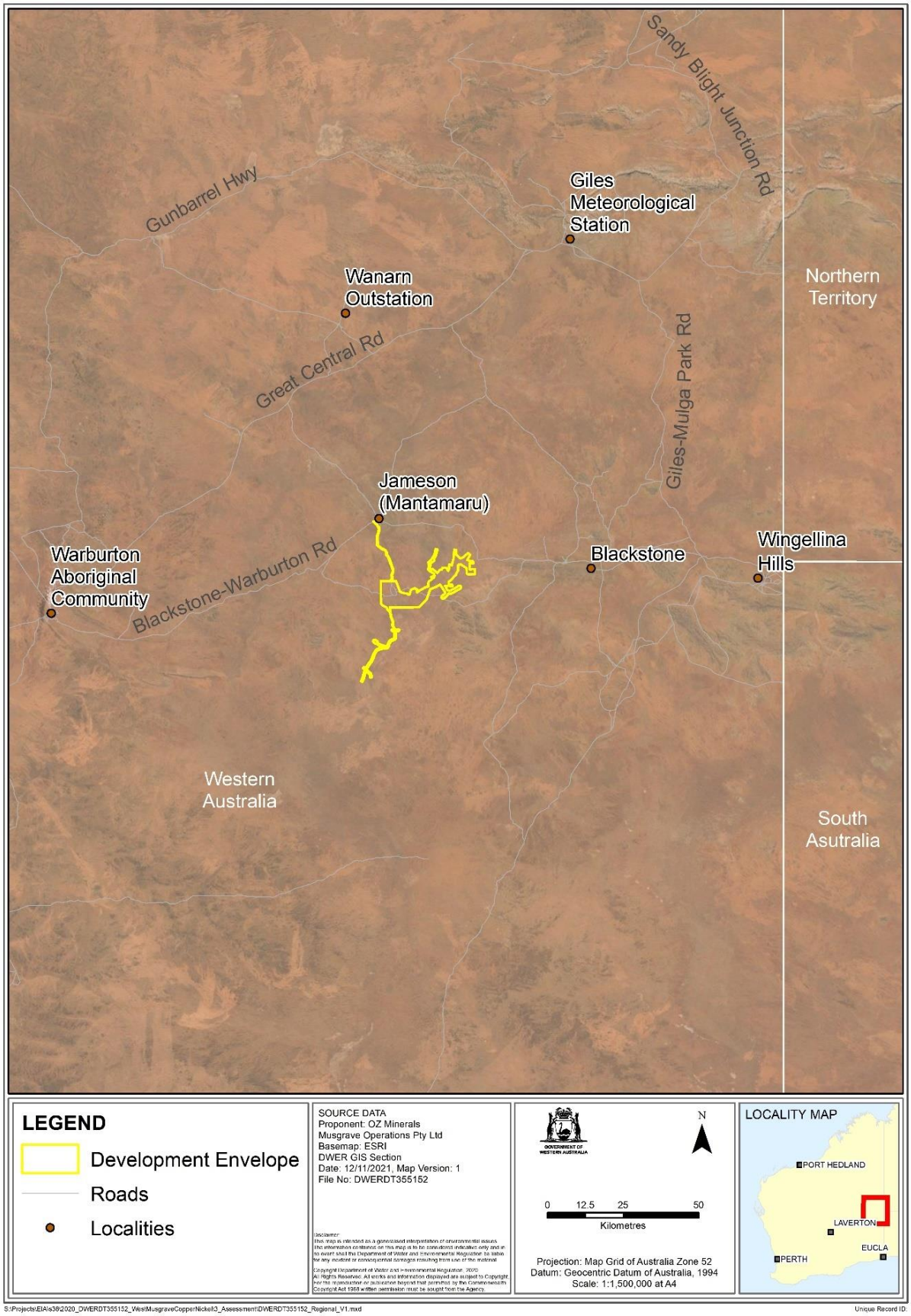

Figure 1: Project location

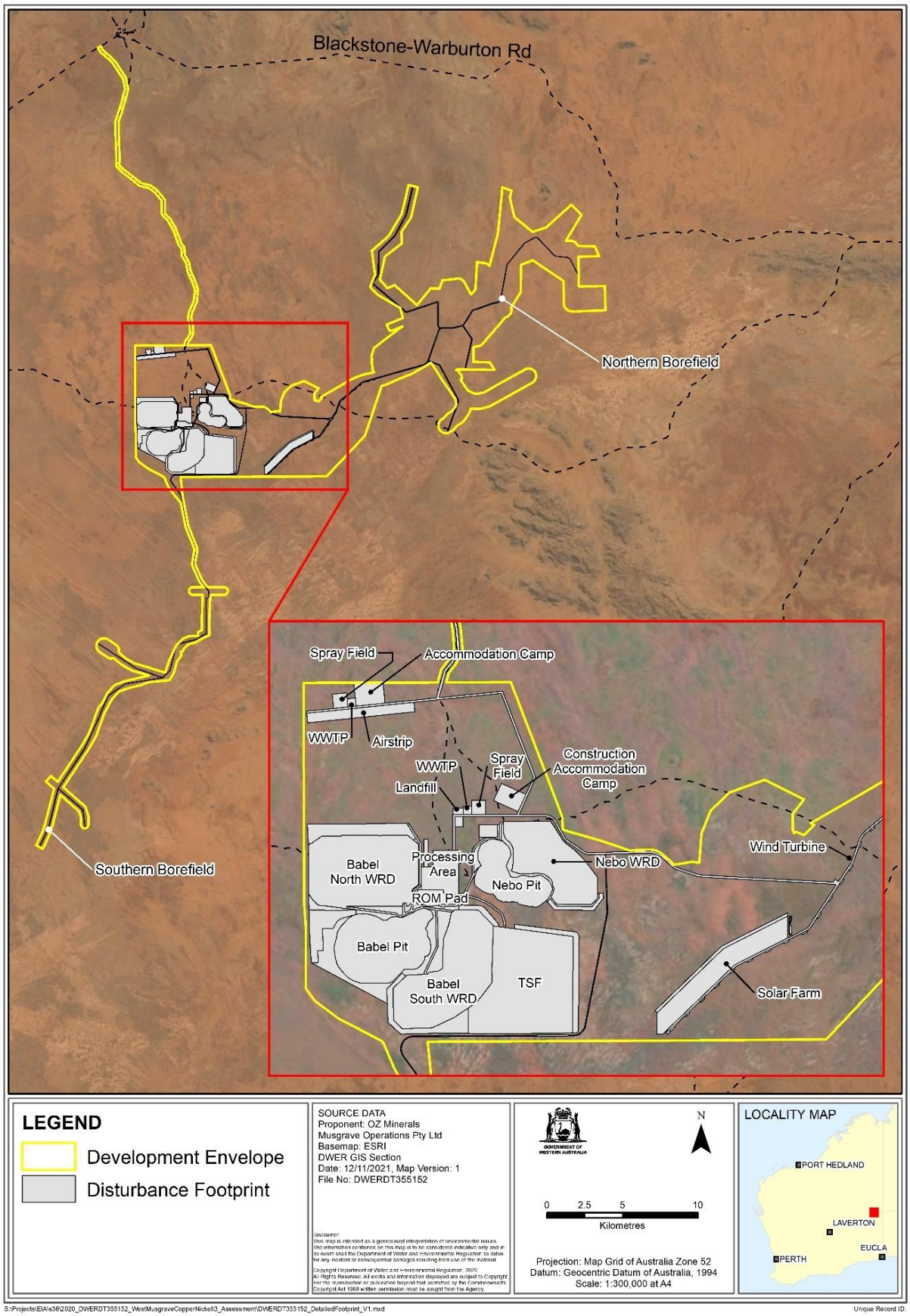

Figure 2: Development envelope and disturbance footprint

Table 1: Location and proposed extent of proposal elements

Proposal element	Location	Maximum extent or range
Physical elements		
Mine and associated infrastructure	Figure 2	Development envelope of 20,852 ha
Clearing	Figure 2	No more than 3,830 ha of native vegetation within a development envelope of 20,852 ha
Operational elements		
Mining voids	Figure 2	• Below watertable mining • Nebo pit to be backfilled above watertable post closure • Babel pit void to be a permanent and episodic pit lake post closure
Mining waste		Placement of up to 1,461 Mt of waste rock into permanent waste rock dumps
Ore processing waste (tailings)	Figure 2	Disposal of tailings into a tailings storage facility and/ or the Nebo pit void
Power supply		• Up to 60 MW (instantaneous load requirement) of fossil fuel electricity generation • Up to 100 MW of photovoltaic solar electricity generation • Up to 100 MW of wind electricity generation
Water supply		Abstraction of up to 7.5 GL/a of groundwater (borefield and dewatering)
Timing elements		
Mine life		26 years

Units and abbreviations
ha – hectare
GL/a – gigalitres per annum
Mt – Million tonnes
MW – mega watts

Proposal alternatives

A range of project options were considered by the proponent during the pre-feasibility study for the proposal. Some of the key options identified, and justification for inclusion or exclusion from the proposal are summarised in Table 2-1 of the proponents referral supporting document (OZ Minerals 2021a).

A significant study area was investigated as part of the proposal's environmental baseline program, to allow for design flexibility where constraints were identified. The study area included over 40,000 ha for environmental factors, and over 70,000 ha for heritage assessments. Based on the outcomes of the environmental and heritage

surveys, the development envelope and proposed project layout were refined to avoid potential environmental values (OZ Minerals 2021a).

In November 2020, the EPA encouraged the proponent to consider opportunities to further rationalise the then 25,210 ha development envelope. Based on the EPA advice the proponent refined and reduced the development envelope by a further 17 percent, to 20,852 ha prior to referral.

Proposal context

The West Musgrave Copper and Nickel Project represents the first mine within the Musgrave Province. The geological province is extensive, covering large areas of central-eastern Western Australia, Northern Territory and South Australia. The Musgrave Province has remained unexplored due to remoteness and land access (OZ Minerals 2021a).

The project is situated in the remote Ngaanyatjarra Lands of Western Australia, within the Shire of Ngaanyatjarraku. The proposal would be located within the Ngaanyatjarra Native Title determination and Class A Reserve No. 17614 (*for the Use and Benefit of Aboriginal Inhabitants*).

Ngaanyatjarra traditional owners and traditional knowledge holders maintain a deep, and serious cultural obligation to care for country and to protect cultural heritage sites (OZ Minerals 2021a). The Ngaanyatjarra Council has advised that traditional laws and customs are still followed on Ngaanyatjarra Lands and a project of this scale has never been constructed and operated there.

2 Assessment of key environmental factors

This section includes the EPAs assessment of the key environmental factors. The EPA also evaluated the impacts of the proposal on other environmental factors (landforms, terrestrial environmental quality and air quality) and concluded these were not key factors for the assessment. This evaluation is included in Appendix D.

2.1 Social surroundings

2.1.1 Environmental objective

The EPA's environmental objective for social surroundings is *to protect social surroundings from significant harm* (EPA 2016a).

2.1.2 Investigations and surveys

The EPA advises that the following investigations, surveys and peer reviews were undertaken to inform the assessment of the potential impacts to social surroundings:

- Heritage Survey – May 2018 (Commercial in Confidence) (Appendix J1 of the referral information, OZ Minerals 2020)
- Heritage Survey – October to December 2018 (Commercial in Confidence) (Appendix J2 of the referral information, OZ Minerals 2020)
- Social Surroundings Indirect Impacts (Commercial in Confidence) (Appendix J3 of the referral information, OZ Minerals 2020)
- *Archaeological investigations & site recording at the West Musgrave Project east of Warburton on Ngaanyatjarra Lands* (Commercial in Confidence) Appendix J4 of the referral information, OZ Minerals 2020)
- *Briefing report on the Ngaanyatjarra socio-cultural context for use in the preparation of the West Musgrave project's social impact and opportunities assessment* (Appendix J5 of the referral information, OZ Minerals 2020)
- *OZ Minerals West Musgrave Project Social impact and opportunities assessment (SIOA) – Demographic study* (Appendix J6 of the referral, OZ Minerals 2020)
- *Noise Characterisation and Effects Assessment* (Appendix J7 of the referral information, OZ Minerals 2020)
- *West Musgrave Project - Landscape visual impact assessment* (Appendix J8 of the referral information, OZ Minerals 2020)
- Air Quality Characterisation and Effects Assessment (Appendix H1 of the referral information, OZ Minerals 2020)

A summary of consultation activities and the related outcomes is detailed within the proponents referral information (section 6.1.3.1 and Appendix J9 of the referral supporting document, OZ Minerals 2021a). Appendix A4 of J9 details the outcomes of the September 2020 on-country consultation with West Musgrave traditional owners.

The EPA considers it has sufficient information to assess impacts on social surroundings.

2.1.3 Assessment context: existing environment

The proposal is entirely within the Ngaanyatjarra Lands of central Western Australia. The Ngaanyatjarra People have the following two forms of title over the project area:

- State Aboriginal Reserve - Class A Reserve No. 17614 (for the use and benefit of Aboriginal people) under the *Aboriginal Affairs Planning Authority Act 1972* (Figure 1-4 of referral supporting information, OZ Minerals 2020a)
- Native Title Determination (WCD2005/002) under the *Native Title Act 1993.*

The Ngaanyatjarra Land Council (NLC) hold leases over the Class A Reserve that relate to the care, control, and management. The Ngaanyatjarra Council (NGC) administrates the management of these leases, on behalf of the NLC.

The Ngaanyatjarra People maintain a strong sense of connection to the land (both physically and metaphysically or spiritually) – this connection is intrinsically linked to their 'Dreaming' also referred to by Ngaanyatjarra People as 'Tjukurrpa'. The Tjukurrpa can be described as an almost religious system of beliefs and meaning centred around stories that reveal the lives and deeds of powerful spiritual beings (Tjukurrpa beings). The Ngaanyatjarra People believe that as these Tjukurrpa beings lived and travelled through the country, the landscape as it is known today including rock holes, outcrops, sand dunes, vegetation and sites of cultural significance came into being (OZ Minerals 2021a).

The environment represents the medium by which Ngaanyatjarra People connect with these Tjukurrpa beings and stories of the Dreamtime. Changes to the West Musgrave landscape, or changes to the way it is accessed may therefore change the way Ngaanyatjarra People physically and metaphysically or spiritually connect with these spiritual beings, stories and with place (OZ Minerals 2021a).

The presence of Tjukurrpa throughout the West Musgrave landscape means that the Ngaanyatjarra People maintain a sense of connection and custodianship for these Lands. Ongoing access to the land (physically and spiritually), and in particular to the Tjukurrpa, is of importance to the Ngaanyatjarra People to ensure cultural connections and associations are maintained, and culturally important sites are protected; to ensure the continuation of knowledge between generations. The proponent has undertaken consultation with the Ngaanyatjarra People and NGC to identify and exclude all identified Tjukurrpa from the proposed development envelope (OZ Minerals 2021a).

The remote Aboriginal settlement of Jameson (Mantamaru) is located approximately 26 kilometres (km) north of the project (Figure 1).

2.1.4 Consultation

Consultation on the proposal raised concerns regarding the enforceability and legality of the proponents commitment to protecting Cultural heritage.

Concerns were also raised regarding water supply for the Jameson community, the continued use and supply of water at Linton Bore, the impact of reduced visual amenity and suitability of the country surrounding the proposal for maintaining cultural use, access and associations.

In September 2021, some members of the EPA visited the Jameson community to hear from the traditional owners on potential environmental impacts of the proposal. The Ngaanyatjarra People advised of the need to continue to fulfil their cultural obligations to the land, and also the desire to ensure future generations could maintain and engage in cultural activities on country, as well as maintain cultural associations with the lands and Tjukurrpa.

2.1.5 Potential impacts from the proposal

The proponent has identified that the proposal has the potential to impact on the EPA's objective for social surroundings through:

- direct impacts to ethnographic cultural heritage sites (i.e. Tjukurrpa sites) and archaeological sites (e.g artefacts, scatters) through land disturbance and clearing activities
- constraint or change in the nature of land access to cultural heritage sites, or areas of country used for customary uses by traditional owners
- indirect impacts to cultural heritage sites (and other social surroundings values) through:
    - deposition of unacceptable levels of dust
    - reduced amenity associated with noise
    - changes to visual amenity and aesthetics
    - disturbance as a result of the introduction of project-related night-time lighting
- drawdown of groundwater impacting on sensitive receptors including Linton bore, Mantamaru (Jameson) water supply and/or vegetation species that are culturally important – two specific areas of vegetation have been identified including a stand of desert oaks, and a specific stand of Mulga. This potential impact is addressed as part of the inland waters factor assessment in section 2.3.
- reduction in the health of trees outside of known ethnographic sites (particularly within, or in proximity to dreaming trails) may also be perceived as a potential impact, due to the all-encompassing nature of the way traditional owners value the landscape. This potential impact is addressed as part of the inland waters factor assessment in section 2.3.
- a loss of access to, or reduction in abundance of culturally important fauna.

2.1.6 Avoidance measures

The proponent has designed and refined the proposal to avoid impacts to social surroundings by:

1. excluding nine cultural heritage (ethnographic) areas identified during the cultural heritage surveys from the development envelope

2. relocating project infrastructure to avoid areas as requested by the Ngaanyatjarra People
3. using highly visible materials and where necessary physical barriers to avoid disturbance, unless otherwise agreed with the NGC.

2.1.7 Minimisation measures (including regulation by other DMAs)

The proponent has developed a Land Disturbance Permit and Permit to Work procedure in consultation with the NGC, so that prior to all land disturbing work, heritage surveys will be conducted with relevant traditional owners to inform the location of works. The proponent has also proposed measures to minimise impacts to social surroundings:

1. additional cultural heritage surveys or pre-clearance surveys are proposed to be undertaken in areas with lower levels of confidence (e.g. borefield areas) once further project definition occurs
2. in areas of low confidence, or as required by the traditional owner groups, monitors will be stationed at land disturbance activities to ensure that clearing activities are done in accordance with agreed heritage report requirements, and to ensure and manage chance finds
3. prior to the commencement of any clearing works, the Aboriginal Sites and Objects Register would be reviewed by the proponent as part of the NGC Land Disturbance Permit process and applied (as described in section 2.1.8 of this report)
4. appointment of a Cultural Heritage Management expert for the duration of the project to maintain communication with the NGC and ensure compliance with the NGC cultural heritage management plan, cultural heritage survey reports and the NGC issued Permit to Work (including any requirements for site demarcation)
5. further site-specific cultural heritage surveys will be commissioned through the NGC, to manage any uncertainties, and to ensure cultural associations are maintained and appropriate protection is afforded to cultural heritage sites
6. where cultural heritage survey gaps exist, the proponent would commission Ngaanyatjarra Senior Knowledge Holders and traditional owners, through the NGC, to undertake heritage surveys prior to works
7. establish new access tracks, facilitating access for Ngaanyatjarra People through the development envelope and ensuring that Ngaanyatjarra People can expeditiously (within 60 minutes) open (or have opened for them) locked gates and areas that require access passes, if safe to do so
8. on request from the NGC, facilitate access to the development envelope and project area for NGC staff and Ngaanyatjarra People subject to reasonable health and safety requirements
9. closure planning will be undertaken in consultation with traditional owners and ensure access considerations are taken into account
10. alternate tracks be developed in consultation with traditional owners and the NGC to ensure that access to sites and movement through the landscape remains as uninhibited as possible, noting that some traditional owners have nominated specific locations for alternative access tracks.

Ngaanyatjarra Cultural Heritage Management Plan

The NCG has prepared the Cultural Heritage Management Plan (Ngaanyatjarra Council 2021) (NGC CHMP).

The *Ngaanyatjarra Cultural Heritage Management Plan* (Revision 0, October 2021) applies to the West Musgrave Project 2021, with its main purpose '*to ensure that all parties associated with the Program abide by Ngaanyatjarra's rules and procedures to ensure that Tjukurrpa and other cultural heritage sites are protected during the program'* (NCG 2021).

The NGC CHMP is appended to the *OZ Minerals West Musgrave Copper and Nickel Project Cultural Heritage Management Plan* (Revision 3, 28 October 2021) (Appendix A of the CHMP).

2.1.8 Assessment of impacts to environmental values

The EPA considered that the key values for social surroundings likely to be impacted by the proposal include direct impacts to cultural heritage sites, loss of and/or restriction of access to land and indirect impacts of dust, noise, lighting and visual amenity.

Direct impacts to Cultural heritage (ethnographic) sites

Ethnographic sites are identified by Elders or senior spokespersons for Aboriginal communities and are sites generally classified as mythological, spiritual, ceremonial, historical or burial sites (Waru Consulting 2020).

Four cultural heritage surveys and associated consultation activities have been undertaken since April 2018. These cultural heritage surveys were coordinated by the NGC and included up to 50 Ngaanyatjarra Traditional Owners, male and female NGC anthropologists, and participants from OZ Minerals. These four cultural heritage surveys covered an area of over 70,000 ha (OZ Minerals 2021a). During cultural heritage surveys, several ethnographic sites and dreaming trails of importance were identified. These sites have been identified in cultural heritage reports within broader cultural heritage exclusion zones (OZ Minerals, 2021a) – the development envelope was oriented to avoid these cultural heritage exclusion zones.

In two areas where proposed project infrastructure intersected preliminary broad based exclusion zones, the NGC, in consultation with the traditional owners, have defined and excised corridors through the exclusion zones to enable infrastructure corridors that avoid cultural heritage sites.

The EPA considers that the proposal does not directly impact ethnographic cultural heritage sites due to the implementation and avoidance of exclusion zones which prevent direct disturbance. On this basis the EPA considers that the residual impact on ethnographic cultural heritage sites is consistent with the EPAs objective for social surroundings.

The EPA note that the NGC and Ngaanyatjarra People have requested that the nature and location of cultural heritage sites are not publicly disclosed (sites and exclusion zones). Whilst the Ngaanyatjarra People and the NGC have indicated their preference not to publicly disclose the location of these sites and exclusion zones, the EPA recommends a condition referring to these exclusion areas, and that the spatial location of these exclusion zones remain in confidence, held by the NGC, the proponent and the EPA and CEO.

Conclusion

1. The EPA has concluded that there is no direct impact to known cultural heritage (ethnographic) sites by the implementation of the proposal.
2. The EPA advises that the residual impact to cultural heritage (ethnographic) sites should be subject to the implementation condition 2 ‘Cultural Heritage’ to ensure protection of the identified sites, and adherence to exclusions zones to ensure the environmental outcome is consistent with the EPA’s objective for social surroundings.

Direct impacts to cultural heritage (archaeological) sites

Archaeological sites are places where there is substantial, in situ evidence of past Aboriginal occupation or activity. These are places which may be considered to have a degree of scientific significance (Waru Consulting 2020).

The proponent commissioned an archaeological investigation and site recording across the proposal are (Appendix J of the referral supporting information, OZ Minerals 2021a). An area of approximately 855.2 ha (4 percent of the 20,852 ha development envelope) in the northern borefield area is yet to be surveyed for cultural heritage sites (Figure 4 of the NGC CHMP) and the proponent has stated that no works in this area would progress without appropriate pre-clearances and issuing of a cultural heritage survey report from the NGC (OZ Minerals 2021a).

The investigation and site recording was conducted in 2 stages – initially, an archaeological site survey and inspection was carried out in June 2019, following a meeting with numerous Aboriginal community representatives organised by NGC. Subsequently, detailed recording of several archaeological sites was carried out in November 2019 (Waru Consulting 2020).

A total of 16 potential archaeological sites were identified in the development envelope. These sites may meet the criteria for an Aboriginal heritage site under the *Aboriginal Heritage Act 1972* and are subject to a determination to be made by the Aboriginal Cultural Material Committee, based on submission of related scientific information and consultation records (Waru Consulting 2020).

Archaeological sites and archaeological locations in the areas surveyed have been recorded and boundaries have been established for them. Polygons defining ‘no-go’ zones have been created that encompass these sites and locations. These are larger than the places and provide for site protection (Waru Consulting 2020).

Senior members of local Aboriginal communities were consulted regarding each of the archaeological sites and locations, and their possible significance to the

communities (Waru Consulting 2020). The overall conclusions of the archaeological survey were that no specific objections or concerns were raised about the significance of the archeological sites identified. Interaction with potential sites is further described below.

The proponent has made a commitment to collaborate with relevant cultural heritage custodians and NGC, to develop and maintain a register of identified tangible and intangible cultural heritage features and values within the development envelope. This commitment is detailed in the *West Musgrave Copper and Nickel Project Cultural Heritage Management Plan* (Revision 3, 28 October 2021) (CHMP). The register is proposed to inform the proposals land permitting processes. The CHMP defines the process and sets out a framework to identify potential areas of significance, including archaeological sites.

The proponent in consultation with the NGC has developed a process to control access and disturbance activities associated with the construction and operation of the proposal and their potential interaction with areas of cultural significance. The processes developed include the Permit to Work (PTW) and Land Disturbance Permit (LDP). This process will be followed through the implementation of the *West Musgrave Copper and Nickel Project Cultural Heritage Management Plan.*

The PTW process, implemented by the NGC, is required prior to any proposed activity (either non-land disturbing or land disturbing) to define work areas and set conditions of entry to work areas to protect cultural heritage. The PTW process will ensure that all work remains within known areas and avoids inadvertent impact on cultural heritage. The Ngaanyatjarra Council Land and Culture will function as the PTW issuer.

The LDP process will ensure that clearing activities are constrained to defined boundaries and apply specific environmental and cultural heritage conditions relating to clearing activities. Land disturbance activities will be regularly audited to ensure compliance with the PTW and LDP conditions. This will be especially so in areas with lower levels of confidence or closer proximity to known cultural heritage sites (OZ Minerals 2021a).

The NGC provided correspondence to the EPA in November 2021 stating their appreciation for the efforts the proponent has made to ensure the proposal has mitigations in place to avoid and otherwise minimise risks to Ngaanyatjarra's culture and heritage and noted (subject to concerns about funding and resources – see the EPA's other advice) that the NGC CHMP was satisfactory for mitigating risks to Ngaanyatjarra culture at this time.

The EPA considers the processes already undertaken to identify and record cultural heritage (archaeological) sites, the fact that no specific objections or concerns were raised about the significance of the archeological sites have been identified to date means the development of a process to avoid and mitigate impacts to cultural heritage sites in the future is appropriate and will ensure consistency with the EPA's objective for social surroundings.

Conclusion

1. The EPA advises that the residual impact to cultural heritage (archaeological) sites should be subject to the implementation conditions 2-2 and 2-3 to ensure the environmental outcome is consistent with the EPA's objective for social surroundings.

Loss of/or restriction of access to land

The proponent has undertaken consultation about the Ngaanyatjarra People's continuing access to land throughout the assessment process, to take into account the concerns and interests of the Ngaanyatjarra People have been addressed both through mine planning, and through the development of the CHMP.

The EPA requested (under section 40(2)(a) of the EP Act) that the CHMP be reviewed by a suitably qualified independent person. The CHMP was subject to a detailed peer review which concluded: '*… if OZ Minerals address the recommendations in this document, they will have a CHMP that both fulfils the specified requirements of the Notice and is a robust document for the management of cultural heritage'*. The proponent has addressed all feedback from the peer review in the final version of the CHMP. The peer review can be found in Appendix B of the proponent's CHMP.

The CHMP includes a consultation framework which maintains that Ngaanyatjarra People will be involved in decision-making processes on access issues that may impact them and the management and protection of Tjukurrpa, cultural heritage and country more broadly; and that the Ngaanyatjarra Council will be consulted with on matters relating to the implementation of the CHMP. The CHMP includes management targets to ensure that access to cultural heritage sites, or areas of the landscape used for customary uses by traditional owners is maintained (Table 7 of the CHMP). This includes various actions as described in section 2.1.7 of this report.

The EPA notes the consultation the proponent has undertaken to develop a CHMP with the Ngaanyatjarra People that they agree is satisfactory, which is consistent with the EPA's objective for social surroundings.

To ensure that consultation with the Ngaanyatjarra people and the NGC about access and management and protection of Tjukurrpa, cultural heritage and country more broadly is maintained, the EPA recommends a condition to ensure that any change or revision to the CHMP must be undertaken in consultation with the NGC, acting on behalf of the Ngaanyatjarra People.

Conclusions

1. The EPA has concluded that there is no direct impact to traditional owner access to known cultural heritage (ethnographic) sites by the implementation of the proposal.
2. The EPA advises that the residual impact to cultural heritage through the loss of access to, or restriction of access to land should be subject to implementation conditions 2-1, 2-2 and 2-3 to ensure access to land is maintained; and that any revisions to the CHMP are undertaken in consultation with the NGC, to ensure that the environmental outcome is consistent with the EPA's objective for social surroundings.

Indirect impacts of dust, noise, lighting and visual amenity

Although identified cultural heritage (ethnographic) sites have been excluded from the development envelope, there remains a residual risk of indirect impacts to Cultural heritage sites from noise, dust, lighting and visual amenity.

The EPA notes that the proponent has worked with the NGC to develop a CHMP which is acceptable to the Ngaanyatjarra People and contains mitigation measures to minimise the indirect impacts of dust, noise, lighting and impacts on visual amenity. These management actions have been designed to ensure the project meets the EPA's objective for social surroundings.

Conclusions

1. The EPA has concluded that there is the residual risk of indirect impacts to cultural heritage sites from noise, dust, lighting and visual amenity.
2. The EPA advises that the residual indirect impacts to social surroundings should be subject to the implementation of recommended condition 2-2(1) to ensure the environmental outcome is consistent with the EPA's objective for this factor.

2.1.9 Summary of key factor assessment and recommended conditions

The EPA has considered the likely residual impacts of the proposal on social surroundings to be:

1. potential impact to cultural heritage (ethnographic) sites
2. potential impacts to cultural heritage (archaeological) sites
3. potential loss of access/or restriction of access to land
4. potential indirect impacts of dust, noise, lighting and impact to visual amenity.

The EPA has considered the likely environmental outcomes of the proposed change to social surroundings environmental values. In doing so, the EPA has considered whether reasonable conditions could be imposed, or other decision-making processes can ensure consistency with the EPA's factor objective. The EPA assessment findings are presented in Table 2.

Table 2: Summary of assessment for social surroundings

Residual impact or risk to environmental value	Assessment finding	Recommended conditions and DMA regulation
Cultural heritage: Potential impacts to Cultural heritage (ethnographic) sites	The EPA has concluded that there is no direct impact to known cultural heritage (ethnographic) sites by the implementation of the proposal if exclusion zones are implemented. The is a residual impact of indirect impact to these sites through noise, dust, lighting and visual amenity.	Regulated through recommended conditions: Condition 2 (Cultural Heritage) Condition 2-1(1) - exclusion zones

Residual impact or risk to environmental value	Assessment finding	Recommended conditions and DMA regulation
	Residual impact should be subject to conditions so that the environmental outcome is likely to be consistent with the EPA's objective for social surroundings.	Condition 2-2(1) Condition 2-3 implementation of Cultural Heritage Management Plan
Cultural heritage: Potential impact to Cultural heritage (archaeological) sites	The EPA has concluded that there is not likely to be a significant residual impact to cultural heritage (archeological) sites by the implementation of the proposal. Residual impacts should be subject to conditions to require implementation of the CHMP to avoid where practicable and otherwise minimise disturbance so that the environmental outcome is likely to be consistent with the EPA's objective for social surroundings.	Regulated through recommended conditions: Condition 2 (Cultural Heritage) Condition 2-2(2) Condition 2-3 implementation of Cultural Heritage Management Plan
Cultural heritage: Potential loss of access, connection and custodianship to the land.	The EPA has concluded that there is no direct impact to traditional owner access to known cultural heritage (ethnographic) sites by the implementation of the proposal. There could be a residual impact of loss of access to sites within the development envelope. Residual impact should be subject to conditions to ensure no interruption of access, subject to reasonable health and safety requirements, so the environmental outcome is consistent with the EPA's objective for social surroundings.	Regulated through recommended conditions: Condition 2 (Cultural Heritage) Condition 2-1(2) – access to sites Condition 2-3 -Cultural Heritage Management Plan
Amenity: Potential indirect impact of noise, dust, lighting and visual amenity	The EPA has concluded that there is the residual risk of indirect impacts to impacts to cultural heritage sites from noise, dust, lighting and visual amenity. Residual impact should be subject to conditions to require implementation of the CHMP to avoid where possible and otherwise minimise indirect impacts ensure the environmental outcome is consistent with the EPA's objective for social surroundings.	Regulated through recommended conditions: Condition 2-2(1) Condition 2-3 –Cultural Heritage Management Plan

2.2 Flora and vegetation

2.2.1 Environmental objective

The EPA's environmental objective for flora and vegetation is *to protect flora and vegetation so that biological diversity and ecological integrity are maintained* (EPA 2016b).

2.2.2 Investigations and surveys

Twenty flora and vegetation surveys have been undertaken for the proposal, across the regional area, over the last 16 years, as outlined in Table 7-1 of the referral supporting document (OZ Minerals 2021a). The EPA notes that in addition to the past survey work undertaken, the following investigations and surveys were used to inform the assessment of the potential impacts to flora and vegetation:

- *Detailed Flora and Vegetation Survey* (Appendix B1 of the referral) (Western Botanical 2020)
- *West Musgrave Project Pre-feasibility Study – APPENDIX A - Assessment of potential GDEs in the West Musgrave Project area* (Appendix B2 of the referral) (CDM Smith 2020).

The surveys were consistent with the *Technical Guidance – Flora and vegetation surveys for environmental impact assessment* (EPA 2016c).

2.2.3 Assessment context: existing environment

The proposed project is situated within the Giles Botanical District of the Eremaean Province, which is characterised by ranges and hills interspersed in sand plains with rocky loams and red soils and sands with Mulga, Mallee and Spinifex dominating the vegetation (Beard 1990). The Interim Biogeographic Regionalisation for Australia (IBRA) locates the proposed project is within Mann-Musgrave Block sub-region of the Central Ranges Biogeographic Region (CER) (Beard, 1990) which extends from Northern Territory into South Australia and Western Australia, creating a cross-over of flora species throughout the region.

Vegetation

A desktop study was undertaken, followed by detailed flora and vegetation surveys over three survey periods (June 2018-June 2019) within an area of 41,519 ha - herein referred to as the 'survey area' (Appendix B1 of the referral supporting document, OZ Minerals 2021a).

No Threatened Ecological Communities (TECs) defined under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) or the *Biodiversity Conservation Act 2016* (BC Act); or Priority Ecological Communities (PECs) as listed by Department of Biodiversity, Conservation and Attractions (DBCA)(2019) occur within the development envelope, or within a 100 km radius of the proposal (Western Botanical 2020). Twenty-nine vegetation associations and ten mosaics were described within the survey area. The vegetation associations identified have been observed to be regionally widespread.

Evidence of human interaction within the area is limited to areas directly cleared for access roads, camp facilities and drilling operations, with vegetation condition across the survey area (41,519 ha) in excellent condition. Western Botanical (2020) identified two issues that detracted from the excellent-to-pristine vegetation conditions:

- frequent and regular fires in the area immediately south and adjacent to Jameson (Mantamaru) Community
- ingress of Buffel Grass (*Cenchrus ciliaris*) along sideroads, tracks the Jameson town site and the exploration accommodation village.

Groundwater dependent vegetation

Surveys undertaken by Western Botanical (2020) identified three associations as potential groundwater dependent ecosystems (GDEs) within the West Musgrave Project area, based on landscape position, species assemblage and the presence of species known to access deep water. The GDE associations do not include species or communities of conservation significance. These potential GDE communities identified were:

- Calcrete *Corymbia opaca* Woodland (CCoW)
- Low Mallee Woodland (LMW)
- Melaleuca glomerata Acacia kempeana Shrubland (MgAkS).

Flora

A total of 403 vascular plant taxa, representative of 71 genera and 51 families, were recorded within the flora survey area. A list of all species is reported in Appendix B1, including the most recent survey in Addendum 2 of the referral supporting information (OZ Minerals 2021a). The taxa recorded are generally widespread and well represented in the Central Ranges and Great Victoria Desert IBRA regions (Appendix B1 of the referral supporting information). A summary of the findings include:

- no Threatened flora as listed under the EPBC, or BC Act were recorded
- eight priority taxa were recorded in the survey area and within the development envelope, of which seven are proposed to be impacted:
    - *Aenictophyton anomalum* (P1)
    - *Amaranthus centralis* (P3)
    - *Aristida jerichoensis var. subspinulifera* (P3)
    - *Eragrostis* sp. Erect spikelets (P.K. Latz 2122) (P3)
    - *Eragrostis* sp. Limestone (P.K. Latz 5921) (P3)
    - *Goodenia asteriscus* (P3)
    - *Stackhousia clementii* (P3)

- four species of taxonomic significance were identified within the survey area and within the development envelope, with one species (*Triodia scariosa)* occurring within the disturbance footprint
- 17 range extensions were identified within the development envelope.

Table 7-11 of the referral supporting information details the predicted percentage loss of the above populations due to direct clearing. A total of 208 populations of *Aenictophyton anomalum* (P1) were identified during the survey, with 49 of these populations occurring within the development envelope. One population is proposed to be cleared for the proposal.

Weeds

Eight weed species were recorded within the flora survey area (Table 7-7). All weeds recorded are widespread throughout the CR and GDV bioregions and none represent Weeds of National Significance (WoNS). No weeds were Declared Organisms under the *Biosecurity and Agriculture Management Act 2007* (WA) and *Biosecurity and Agriculture Management Regulations 2013.*

2.2.4 Consultation

During the public consultation on the proposal, concerns were raised regarding weed control management, the assessment methodology and statistical analysis of impacts, and the contingencies proposed for surplus dewatering disposal – including the potential impacts of this surplus. These issues were addressed by the proponent in their response to submissions document (which can be found on the EPA website).

The matter of groundwater drawdown impacting potential GDEs was also raised by the traditional owners during consultation. This matter is further discussed in section 2.3 (inland waters).

The EPA requested that the proponent prepare a flora and vegetation management plan detailing the mitigation hierarchy include measures to void, where possible, otherwise minimise direct impacts to priority flora and vegetation species.

2.2.5 Potential impacts from the proposal

The proposal has the potential to impact on flora and vegetation from:

- clearing of 3,830 ha of native vegetation within the 20,852 ha development envelope
- clearing of priority flora within the development envelope
- generation of acidic metalliferous drainage from mine landforms which may cause loss of degradation of vegetation condition
- generation of dust emissions, hazardous material spillages, altered fire regimes, and changes in surface water flow which may cause loss of or degradation of vegetation

- increase in the abundance and diversity of weeds which may cause a loss or degradation of vegetation condition
- impacts of groundwater abstraction and drawdown which may cause a loss or reduction in health and condition of GDEs (also considered in inland waters section 2.3).

2.2.6 Avoidance measures

The proponent has designed the proposal to avoid impacts to flora and vegetation by:

- reorientation and reduction in size of the development envelope to avoid impacts to environmental values – including a reduction in size of the original development envelope from 25,200 ha to 20,852 ha (17 percent reduction)
- reorientation and reduction in size of the disturbance footprint from 3,961 ha to 3,830 ha – reducing the impact to native vegetation
- reorientation and reduction in size of the development envelope to avoid 48 populations of and of *Aenictophyton anomalum* (P1)
- the project footprint has been designed to avoid P3 flora populations
- the proponent has committed to clearly demarcate and erect exclusion zones around *Aenictophyton anomalum* (P1).

2.2.7 Minimisation measures (including regulation by other DMAs)

The proponent has proposed the following minimisation measures:

1. minimise land clearing necessary for development and utilise existing disturbed areas wherever possible to minimise total ground disturbance
2. fire management practices would be developed and implemented in consultation with the Department of Fire and Emergency Services (DFES) and the NGC, including installation and maintaining firebreaks if required
3. detailed design would consider the location of drainage lines and flood levels with the aim of minimising disturbance of these areas, and downstream vegetation
4. development and implementation of a site-specific internal clearing/disturbance procedure and associated permit to prevent clearing outside approved boundaries
5. a site induction program which would provide information on priority species, exclusion zones, protection of vegetation and ground disturbance authorisation procedures, and information on prevention and management of fire
6. implementation of a vehicle hygiene procedure for vehicles and equipment coming onto, or returning to, the site for earthmoving to prevent the introduction and spread of weeds
7. implementation of weed control measures on areas to be disturbed for infrastructure.

The impacts of dust deposition and hazardous material spillages have been assessed as having a low to medium risk in section 7.1.5 of the referral supporting document.

2.2.8 Rehabilitation measures

The proponent has proposed the following rehabilitation measures:

1. progressive rehabilitation is to be undertaken on disturbed areas
2. monitoring of analogue and rehabilitated areas would be undertaken to ensure short, medium and long-term rehabilitation objectives are achieved. Regular monitoring to assess the success of revegetation in rehabilitated areas
3. ongoing development of monitoring methodology and rehabilitation techniques would occur during the life of the project. Further assessments to plot the development of rehabilitated areas against analogue sites and progression towards completion targets
4. topsoil and vegetation (including woody debris) would be re-spread over rehabilitated areas to act as a seed source and to protect the soil from erosion
5. local provenance seed and propagated material would be used, if required, to rehabilitate disturbed areas.

Mining Act 1978

In accordance with the *Mining Act 1978* (Mining Act), the proponent would be required to prepare a Mine Closure Plan consistent with the *Statutory Guidelines for Mine Closure Plans* (DMIRS 2020) which includes requirements for rehabilitation of land and closure objectives and commitments. A Mining Proposal would also be required, which is required to include information relevant to rehabilitation.

The Department of Mines, Industry Regulation and Safety (DMIRS) advised that for mining activities, there is an Environmental Objectives Policy which details the environmental objectives which are factored into decision making, including for rehabilitation and closure requirements.

The DMIRS overarching objective is '*resource industry activities are designed, operated, closed, decommissioned and rehabilitated in an ecologically sustainable manner, consistent with agreed environmental outcomes and end land-uses without unacceptable liability to the state*'. The DMIRS objective for rehabilitation and mine closure is '*Mining activities are rehabilitated and closed in a manner to make them physically safe to humans and animals, geo-technically stable, geo-chemically non-polluting/non-contaminating, and capable of sustaining an agreed post-mining land use, and without unacceptable liability to the State'*. This objective is also a standard mining tenement condition.

In addition, the following DMIRS objective applies to the factor of biodiversity: '*to maintain representation, diversity, viability and ecological function at the species, population and community level'* (DMIRS 2020).

The mine closure plan required by DMIRS is required to consider rehabilitation and closure for the proposal and to align with the above objectives.

2.2.9 Assessment of impacts to environmental values

The EPA considered that the key environmental values for flora and vegetation likely to be impacted by the proposal are priority flora species, and vegetation.

Priority flora species

The following priority flora species would be impacted within the development envelope, with the percentage loss being to known populations:

- one population of *Aenictophyton anomalum* (P1) would be cleared from a known population of 317 (0.3 percentage loss)
- thirty-one of populations of *Goodenia asteriscus* (P3) would be cleared from a known population of 324 (9.6 percentage loss)
- ten populations of *Amaranthus centralis* (P3) are proposed to be cleared from a known population of 124 (8.1 percentage loss).
- one population of *Aristida jerichoensis var. subspinulifera* (P3) would be cleared from a known population of 645 (0.2 percentage loss)
- 63 populations of *Eragrostis sp.* Erect spikelets (P.K. Latz 2122) (P3) would be cleared from a known population of 1,636 (3.9 percentage loss)
- 17 populations of *Eragrostis sp*. Limestone (P.K. Latz 5921) (P3) would be cleared from a known population of 328 (5.2 percentage loss)
- 5 populations of *Stackhousia clementii* (P3) would be cleared from a known population of 446 (1.1 percentage loss).

The disturbance areas do not have significant qualitative value, compared to surrounding vegetation or vegetation in the development envelope.

The potential impact to proposal are *Aenictophyton anomalum* (P1) and *Goodenia asteriscus* (P3) and *Goodenia asteriscus* (P3) are considered below due to the potential significance.

Impacts to the remaining P3 species above are not considered significant due to the percentage impact on known populations being equal to or less than 5.2 percent.

Aenictophyton anomalum (Priority 1)

Approximately 4,662 *Aenictophyton anomalum* (P1) individuals were recorded across the survey area, with 49 populations recorded inside the proposed development envelope. The proposal clears one population of this P1 species out of 49 populations recorded within the development envelope. The population impacted is located within the proposed Babel pit area and cannot be avoided. The removal of this single population has been calculated to represent 0.3 percentage loss to the known mapped species based on survey data and known populations (OZ Minerals 2021a).

The proponent has committed to erect exclusion zones around the remaining populations of *Aenictophyton anomalum,* and to include the location of the remaining

population within the sites GIS database to ensure that locations are avoided during future activities.

Goodenia asteriscus (Priority 3)

Goodenia asteriscus (P3) is known to occur in both Western Australia and north-western South Australia with a mapped population of 324 populations. A total of 299 populations of *Goodenia asteriscus* (P3) were recorded within the survey area, with 94 populations recorded within the development envelope(Western Botanical 2020). The proposal impacts on 31 populations of this species which represents 9.6 percent of the known population and one third of the populations within the development envelope.

Amaranthus centralis (Priority 3)

Amaranthus centralis (P3) demonstrates a distribution across Western Australia, Northern Territory and South Australia with 124 populations. There are currently ten records of this species on Flora Base from the Central Ranges and Pilbara IBRA regions in Western Australia. The spread of records of this species to the east and west of the proposal indicates that the limited number of records in Western Australia may represent the limited survey effort for this species rather than inherent rarity (OZ Minerals 2021a).

The survey area is known to support 21 populations of *Amaranthus centralis* (P3), with 11 populations within the development envelope. The proposal impacts on 10 populations resulting in an 8.1 percent loss of the mapped populations.

In accordance with the EPA's request, the proponent prepared a *Flora and Vegetation Management Plan* (Revision 1, September 2021) which includes measures to avoid and minimise impact to priority flora, as detailed in section 2.2.6 and 2.2.7 of this report. These measures include the development and implementation of a site-specific internal clearing/disturbance procedure and associated Land Disturbance Permit and Permit to Work procedure to prevent clearing outside approved boundaries.

The EPA consulted with DBCA regarding the potential impacts to flora and vegetation. The department advised that subject to full implementation of the proposed avoidance and management measures, it considers the proponent should be able to effectively manage the potential impacts on identified conservation significant values.

The EPA considers that the avoidance and mitigation of impacts to priority flora species can be achieved, and this can be enforced and regulated through implementation conditions:

- limiting the removal of *Aenictophyton anomalum* to one population
- excluding the removal of remaining populations of *Aenictophyton anomalum*
- limiting the removal of P3 species to no more than 10 percent of known populations of *Goodenia asteriscus* or *Amaranthus centralis* or more than 5.2 per cent of any other priority flora species

- requiring the implementation of the proponent's FVMP.

Conclusion

1. The EPA has assessed that there is a residual impact to priority flora, and with the implementation of exclusion areas for priority species, and the implementation of the FVMP the impact is unlikely to impact the ecological integrity priority flora species
2. The EPA has recommended that the residual impact should be subject to implementation conditions (condition 3) to ensure the environmental outcome is consistent with the EPA objective for flora and vegetation.

Vegetation

The survey area (approximately 46,263 ha) comprises of approximately 46,250 ha of native vegetation with disturbed areas limited to approximately 13 ha. The majority of vegetation in the survey area is considered to be in 'Excellent' or better condition, with only the areas in proximity to the Jameson Community and exploration accommodation village considered to be degraded to 'Good' to 'Very Good' condition. The 20,852 ha development envelope is recorded with no areas of disturbance with the entirety supporting native vegetation in 'Excellent' condition. The proposal impacts on 3,830 ha of native vegetation in 'Excellent' condition with the proposal retaining approximately 17,022 ha (approximately 82 per cent) of vegetation recorded as 'Excellent' condition within the development envelope.

The vegetation surveys identified 29 associations and 10 mosaics across the 46,263 ha survey area, which includes the 20,852 ha development envelope. Total areas and relative percentages of proposed clearing for each vegetation association are presented in Table 7-9 of the referral supporting information (OZ Minerals 2021a). To summarise the impact to vegetation associations and mosaics:

- nine of the 29 vegetation associations and three of the ten mosaics are outside of the development envelope and would not be impacted
- eleven of the 29 vegetation associations and four of the ten mosaics would not be impacted
- vegetation associations and mosaics are well represented outside of the development envelope
- no single vegetation association or mosaic would experience more than 20.4 per cent clearing of the total mapped area (46,263.3 ha).

The clearing of 3,830 ha of vegetation represents 8 percent of the total area of vegetation associations surveyed, or 18 percent of the vegetation within the development envelope. None of the vegetation associations were determined to be important for supporting significant flora species (OZ Minerals 2021a). Vegetation associations in excellent condition remain intact outside the development envelope, given the Central Ranges bioregion is remote, sparsely populated and undisturbed.

The EPA has assessed that although the proposal would remove 3,380 ha of native vegetation, 92 percent of the mapped extent of vegetation associations would

remain. The EPA considered that the proposed change would impact a small percentage of the regional and local vegetation associations.

Conclusion

1. The EPA considers that a limit on the extent of clearing (3,830 ha) would ensure the environmental outcome is consistent with the EPA's objective for flora and vegetation.
1. The EPA has also considered the requirement for the proponent to prepare a mine closure plan consistent with the *Statutory Guidelines for Mine Closure Plans* (DMIRS 2020). The EPA considers that the standards required for rehabilitation and mine closure to meet the DMIRS objectives for biodiversity, would be consistent with the EPA's objective for flora and vegetation.

Vegetation loss due to indirect impact an increase in weed abundance

No weeds of national significance were recorded during the flora and vegetation surveys; two species are known to occur within the area, including *Cenchrus ciliaris* (Buffel Grass) and *Rumex vesicarius* (Ruby Dock). These two species are considered to be highly invasive, and there is potential for project activities to introduce and increase the spread of weed species.

The EPA encouraged the proponent to include further detailed information in the FVMP describing surveillance and monitoring of weeds, particularly in areas at specific high-risk of weeds annually after rainfall. The proponent updated the FVMP to include these additional measures, as detailed in Table 10: Weed monitoring and surveillance program (OZ Minerals 2021c).

The proponent has committed to establishing a project specific vehicle hygiene and ground disturbance procedure, and topsoil management practices to prevent the introduction of new species and the spread of weeds.

The EPA considered the risk of weeds to impact on this relatively undisturbed area with excellent vegetation condition. The EPA assessed the proponent's proposed controls and determined they would be sufficient to ensure the EPA's objective would be met, given all suggested recommendations from the Department of Water and Environmental Regulation (DWER) were included into the FVMP.

Conclusion

1. The EPA has determined that with the implementation of the mitigation measures outlined in the proponent's FVMP; the residual impact of weeds is unlikely to impact on the ecological integrity of the vegetation. The EPA has recommended the residual impact should be subject to implementation condition 3, implementation of the 'Flora and Vegetation Management Plan' to ensure that the environmental outcome is consistent with the EPA Objective for flora and vegetation.

Groundwater dependent vegetation

Groundwater drawdown has the potential to impact on groundwater dependent vegetation, depending on the reliance of that vegetation/species on groundwater.

Impacts to potential GDEs are assessed in section 2.3.8 of this report.

2.2.10 Summary of key factor assessment and recommended regulation

The EPA has considered the likely residual impacts of the proposal on flora and vegetation values to be:

- clearing of one population of *Aenictophyton anomalum* (priority 1)
- clearing of two P3 flora species populations with no more than 10 per cent loss of the known populations.
- clearing of four P3 flora species populations with no more than 5.2 per cent loss of the known populations
- clearing of up to 3,830 ha of excellent condition vegetation representing 18% of the excellent condition vegetation in the development envelope.
- a potential indirect impact of increase in weed abundance.

The EPA has considered the likely environmental outcomes of the residual impacts flora and vegetation environmental values. In doing so, the EPA has considered whether reasonable conditions could be imposed, or other decision-making processes can ensure consistency with the EPA's factor objective. The EPA assessment findings are presented in Table 3.

The EPA has also considered the principles of the EP Act in assessing whether the residual impacts will be consistent with its environmental factor objective and whether reasonable conditions can be imposed (see Appendix C).

The EPA has also had regard to its conclusions in other recent assessments, including the Perdaman Urea Project (EPA Report 1705) and the Mardie Project (EPA Report 1704).

Table 3: Summary of assessment for flora and vegetation

Residual impact or risk to environmental value	Assessment finding	Recommended conditions and DMA regulation
Direct impact of clearing: Potential for direct impacts to: • 1 population of priority 1 flora species *Aenictophyton anomalum*	The proposal impacts on P1 species out of 49 populations recorded within the development envelope, this clearing represents 0.3 percentage loss to the known mapped species. The EPA considers loss of more than population of this P1 species should be prohibited in the conditions. This, combined with implementation of the Flora and Vegetation Management Plan to avoid and minimise further impacts, means impacts are likely to be consistent with the EPA's objective for flora and vegetation.	Regulated through recommended conditions: 3-1(1) limit on extent of disturbance 3-2 – avoid and minimise impacts 3-3 implement Flora and Vegetation Management Plan
Direct impact of clearing:	The disturbance areas do not have significant qualitative value, compared to	Regulated through recommended conditions:

Residual impact or risk to environmental value	Assessment finding	Recommended conditions and DMA regulation
Potential for direct impacts to: • Two priority 3 flora species, however not exceeding ten percent of the known populations • Four priority 3 flora species, however not exceeding 5.2 per cent known populations	surrounding vegetation or vegetation in the development envelope. The P3 species are expected to be widespread, and impacts are not likely to be significant. The EPA considers loss of P3 species should be limited in conditions by reference to known populations to ensure a significant impact is not likely. This, combined with implementation of the Flora and Vegetation Management Plan to avoid and minimise further impacts, means impacts are likely to be consistent with the EPA's objective for flora and vegetation	3-1limit on extent of disturbance 3-2 - avoid and minimise impacts 3-3 implement Flora and Vegetation Management Plan
Direct impact of clearing: The clearing of 3,380 ha of 'Excellent' quality vegetation within the development envelope.	The clearing represents 18 per cent of the development envelope. Vegetation associations are well represented outside the development envelope. EPA recommends a limit on the extent of clearing of native vegetation. The proponent would be required to prepare a mine closure plan to deal with rehabilitation and which meets the DMIRS objective for biodiversity. This would support achievement of the EPA's objective for flora and vegetation.	Regulated through recommended conditions Limit on extent of clearing of native vegetation. Other DMA processes Mining Act – Mining proposal and Mine closure plan
Indirect impact: Indirect impacts to excellent quality vegetation through the potential for the introduction or spread of weeds on vegetation.	The proponent has proposed mitigation measures in the FVMP to manage indirect impacts weeds on vegetation, including additional measures on advice of DWER. Environmental outcome likely to be consistent with the EPA's objectives for this factor, subject to the recommended condition to require the proponent to implement proposal to avoid and minimise indirect impacts and to implement the Flora and Vegetation Management Plan.	Regulated through recommended conditions: Condition 3-2 avoid and minimise impacts to flora and vegetation Condition 3-3 – Flora and vegetation management plan

2.3 Inland waters

2.3.1 Environmental objective

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* (EPA 2018).

2.3.2 Investigations and surveys

The EPA advises the following investigations were used to inform the assessment of the potential impacts to inland waters:

- *Environmental and Pilot Water Supply Drilling, Construction and Testing Completion Report* (Appendix D1 of the referral supporting document) (CDM Smith 2020)
- *West Musgrave Project Pre-feasibility Study – Groundwater baseline report* (Appendix D2 of the of the referral supporting document) (CDM Smith 2020)
- *Assessment of Potential GDEs in the West Musgrave Project Area* (Appendix B2 of the referral supporting document) (CDM Smith 2020)
- *West Musgrave Project (10 Mtpa) Pre-feasibility Study- Groundwater flow modelling* (Appendix D3 of the referral supporting document) (CDM Smith 2020)
- *West Musgrave Project Pre-feasibility Study – Groundwater effects assessment report* (Appendix D4 of the referral supporting document) (CDM Smith 2020).
- *West Musgrave Project Pre-feasibility Study – Surface water baseline* (Appendix D5 of the referral supporting document) (CDM Smith 2020)
- *West Musgrave Project Pre-feasibility Study – Surface water effects assessment* (Appendix D6 of the referral supporting document) (CDM Smith 2020)
- Waste Rock and Tailings Static and Kinetic Leach Testing (Appendix F2, Appendix F3 and Appendix F5 of the referral supporting document)
- *West Musgrave Project Pre-feasibility Study - Hydrogeochemical study* (Appendix D7 of the referral supporting document) (CDM Smith 2020)
- *West Musgrave Project Pre-feasibility Study Site wide water balance* (Appendix D8 of the referral supporting document) (OZ Minerals 2020)
- *West Musgrave Project Hydrological and Hydrogeological Peer Review* (Appendix D9 of the referral supporting document) (EMM Consulting 2020)
- *WMP Groundwater Baseline Survey review – Technical memorandum* (Appendix D10 of the referral supporting document) (MBS Environmental 2020)
- *Qualitative review of changes to hydrology resulting from the alternate TSF location – interim report* (Appendix D11 of the referral supporting document) (CDM Smith 2020)
- *West Musgrave Project water study update: assessment of alternative TSF location* (Appendix D12 of the referral supporting document) (CDM Smith 2020).

DWER advised that the groundwater investigations undertaken were suitable for estimating aquifer characteristics, and that the information collected from the investigations was used to develop a robust conceptual model. The DWER also advised that the work was technically sound, and appropriate to inform the environmental impact assessment.

2.3.3 Assessment context: existing environment

The key aquifers relevant to the project are associated with the tertiary sediments of the Kadgo Palaeovalley. The Kadgo Palaeovalley is represented by a main arterial palaeovalley with multiple smaller tributaries along its length that are incised into weathered and fractured basement rocks. A detailed hydrogeological baseline assessment is provided in Appendix D2 of the referral supporting information (Oz Minerals 2021a).

Groundwater

The groundwater flow system is dominated by throughflow originating from the north-east of the development envelope, flowing south, meandering through the project area, before discharging to Officer Basin sediments – approximately 50 km south of the development envelope (CDM Smith 2020a).

The hydrostratigraphy (including the Kadgo Palaeovalley) comprises three hydrostratigraphic units (HSUs) and a series of overlaying geology and confining layers. These layers include the calcrete formation (1 to 15 m thick) Garford Formation and Pidinga Formation in the Kadgo Palaeovalley, and weathered and fractured basement (refer to Appendix D2 of the referral supporting information) information (Oz Minerals 2021a).

Depth to groundwater ranges between four and nine metres depending on topography, with the quality ranging from fresh to brackish (OZ Minerals 2021d).

Surface water

The proposal is located in the Nullarbor surface catchment, within the Western Plateau Australian drainage division as shown in Figure 7-18 of the referral supporting document (OZ Minerals 2021a). No permanent or semi-permanent wetlands, seeps, springs or partially saturated playas have been identified in any of the areas where project groundwater investigations have been undertaken (CDM Smith 2020).

The hydrology of the proposal area is characterised by ill-defined ephemeral drainages, high evaporation rates and low annual rainfall, which results in little to no surface water flow except during and after short intense storm events. Sheet flow following storm events is likely to be typical in the region (CDM Smith 2020).

Water supply for the proposal

Water would be required for construction dust suppression, ore processing and potable supply. The combined (dewatering and abstraction) water requirements for the proposal are 7.5 Gigalitres per annum (GL/a).

The orebody targets for the Nebo and Babel pit occur below the water table and will require active dewatering to allow safe and efficient access to ore.

A dedicated borefield known as the Northern Borefield, would be located in the Kadgo Palaeovalley 15 to 30 km north-east of the main infrastructure area (Figure 2 of this report). In addition, a network of monitoring bores is proposed south of the Northern Borefield (southern monitoring bores), shown on Figure 6 of the *West Musgrave Copper and Nickel Project Groundwater Monitoring and Management Plan* (Revision 2, September 2021).

Community water supplies

The nearest community to the project, Jameson (Mantamaru), obtains water via community bores, approximately 26 km north of the development envelope. The water from these community bores is treated using reverse osmosis to remove naturally occurring nitrates prior to reticulation.

Linton Bore is located approximately 3 km from the development envelope, south-west of the most southern production bore of the Northern Borefield and is used from time to time by the community when visiting the area for cultural activities. The locations of these community water bores are shown on Figure 6 of the *West Musgrave Copper and Nickel Project Groundwater Monitoring and Management Plan* (Revision 2, September 2021).

Rockholes

OZ Minerals consulted with traditional owners to understand whether there were springs located in the project area or broader landscape. The traditional owners did not identify any springs and indicated there are a number of rockholes in the region that are associated with basement outcrops. Two of these rockholes occur within the proposed mine development envelope and one occurs within 25 km of the proposed mine (CDM Smith 2020a).

Further investigation of these rockholes concluded that the rockholes were unlikely to interact with groundwater given that they appeared to be ephemeral, they occur on weathered basement outcrops that are typically elevated than the surrounding landscape (e.g, above water table), and are all located such that weathered outcrop surfaces form, small surface water catchments that drain to the rockholes following rain events (Appendix D2 of the referral supporting information, OZ Minerals 2021a).

2.3.4 Consultation

During the public consultation on the proposal, concerns were raised regarding impact to community water supplies; long term integrity of groundwater quantity, quality and recharge capacity; impact to the groundwater system from the pits, waste rock and tailings facility; and impact to groundwater dependent ecosystems.

Through consultation specifically with the traditional owners the following areas were identified as areas of concern to Ngaanyatjarra People:

Community drinking water supplies and access for cultural activities

- During dedicated on-country consultations, traditional owners raised the concern of impacts to the availability and quality of the community water supply at Jameson (Mantamaru), and of the difficulty in understanding the complexities of the groundwater modelling.
- The NGC and traditional owners noted, that while Linton Bore, located 3 km south-east of the development envelope, is not inherently significant, it is located on the edge of the Cavanaugh Range, which is an important ethnographic area. Reduction in access to water at Linton Bore may be perceived as a reduction in the health and vitality of the land to which traditional owners feel custodianship and responsibility (OZ Minerals 2021a).

Groundwater dependent vegetation

- Potential impacts to tree species resulting from water abstraction was raised as a concern, and a stand of desert oaks which form part of a significant dreaming trail (Marlu dreaming trail) were identified – located immediately west and south of the development envelope. Further, it was noted that impacts to other potential GDEs may be perceived negatively by the traditional owners due to broader cultural associations and custodianship of the land.

Water contamination

- The potential of exposure to mine chemicals or through the production of leachate generated from waste rock materials was raised as a concern.

The EPA requested the proponent to provide a groundwater monitoring and management plan which describes how impacts to groundwater levels, groundwater quality and the health of GDEs will be managed in accordance with the EPAs mitigation hierarchy.

2.3.5 Potential impacts from the proposal

The proponent has identified the following potential impacts on inland waters:

- reduced availability and access to groundwater for current and/or future beneficial groundwater users, due to groundwater abstraction and mine dewatering
- localised groundwater drawdown in perpetuity, resulting in reduced availability and access to groundwater for future beneficial users
- altered surface water flows resulting in adverse physical changes to local or regional hydrology as a result of increased/ decreased flow velocities, erosion, flooding and sedimentation
- changes to groundwater quality due to seepage from waste landforms (tailings storage facility (TSF) and waste rock dumps (WRD)) resulting in irreversible reduction in beneficial use
- contamination of surface water due to solutes and/or sediments in runoff (from operational areas including waste)
- contamination of groundwater due to poor pit lake water quality post-closure

- reduction in health, richness and abundance of terrestrial fauna due to poor water quality that develops in pit lakes post-closure.

2.3.6 Minimisation measures (including regulation by other DMAs)

The risk of contamination of and alteration to surface water flows have been assessed as having a low to medium risk in Table 7-35 of the proponent's referral supporting document (OZ Minerals 2021a). The EPA found the risk assessment and resulting rating, based on the investigations and studies undertaken suitable.

Remaining impacts to inland waters would be minimised by the following:

2. additional pump testing and recalibration of the hydrogeological model prior to water abstraction commencing
3. appropriate bore spacing in borefield design to minimise extent of potential drawdown to any identified significant values
4. manage bore pumping rates to minimise extent of potential drawdown to any identified significant values
5. minimise borefield abstraction by utilising dewatered water from mine pits to supplement project water supply
6. maximise water recovery from tailings dam
7. backfill Nebo pit to above the water table to greatly reduce the potential drawdown extent
8. TSF is proposed to be constructed with an underdrainage system to assist with consolidation, seepage capture and to manage groundwater mounding
9. supernatant water from the decant facility would be returned to the processing plant for reuse, reducing the requirement for groundwater from the borefield
10. Nebo pit would be back filled to above water table, negating the development of a pit lake post closure
11. tailings produced at the completion of mining of Nebo pit would be backfilled into the pit void, to assist in reducing groundwater drawdown.

Rights in Water and Irrigation Act 1914

The proponent would be required to obtain a *Rights in Water and Irrigation Act 1914* (RiWi Act) groundwater licence which would contain conditions to help mitigate the impacts of taking the water and describe how closely the water resource must be managed. One of the primary objects of this legislation is the management of water resources, including regulation of activities which are detrimental to that water resource, protection of the water resource ecosystems and protection of the environment in which the water resource is situated.

An Operating Strategy would be needed to supplement the conditions of this licence. The Operating Strategy would contain monitoring and reporting requirements, and the proponent would need to verify the results against the hydrogeological model to ensure the results align with predictions. If the monitoring shows that the proposal is having unintended impacts on the aquifer, the environment, or other users, or that

the impacts of taking the water are significantly different to those originally predicted, the DWER may require the Operating Strategy to be amended (DWER 2019).

Environmental Protection Act 1986 Part V

The proponent would be required to obtain a works approval and licence to construct and operate a prescribed premises defined under Schedule 1 of the Environmental Protection Regulations 1987. This would include:

- Category 5: Processing or beneficiation of metallic or non-metallic ore
- Category 12: Screening of material
- Category 52: Electric power generation
- Category 54: Sewage facility
- Category 57: Used tyre storage (general)
- Category 62: Solid waste depot
- Category 64: Class II or III putrescible landfill site
- Category 73: Bulk storage of chemicals.

All works approvals and licences are issued with conditions that are related to the purposes of the EP Act: *to prevent, control, abate or mitigate pollution or environmental harm* (DER 2015).

A works approval would authorise the construction, commissioning and time limited operations for the processing facility, tailings disposal facility and ancillary infrastructure. A works approval and subsequent licence would include monitoring conditions relating to impacts to groundwater at the processing and waste disposal facilities, associated with prescribed activities.

Mining Act 1978

The proposed activities are located on a number of Mining Leases and Miscellaneous Licences and as such, consistent with the *Mining Act 1978*, the proposed activities will require the assessment and approval of a Mining Proposal (which includes a Mine Closure Plan) by the Department of Mines, Industry Regulation and Safety (DMIRS). The stability and rehabilitation of waste rock dumps, pits and tailings storage facility (TSF) would be reviewed by DMIRS as part of the Mining Proposal assessment process. The geotechnical design and stability of the TSF would also be considered during the assessment of the Mining Proposal and Mine Closure Plan. The DMIRS would verify proposed design and appropriateness of the management methodology to achieve consistency with the DMIRS Statutory Guidelines as part of the assessment process. These Guidelines consider biodiversity, water resources and land and soils and would generally be consistent with aspects of the EPA's inland waters objectives.

2.3.7 Rehabilitation measures

The proponent has proposed the following rehabilitation measures:

1. preparation and regular update of a Mine Closure Plan consistent with the *Statutory Guidelines for Mine Closure Plans* (DMIRS, 2020)
2. decommissioning of project infrastructure to reinstate pre-development catchments and flow paths and appropriate consideration of hydrological processes in closure design
3. backfilling of Nebo pit to above the water table to reduce potential drawdown extent.

2.3.8 Assessment of impacts to environmental values

The EPA considered that the key environmental values for inland waters likely to be impacted by the proposal are community water supplies, potential GDEs and impacts to water quality.

Community water supplies

The EPA considers that the issue raised during the public consultation in relation to potential impacts to community water supplies is likely to be a residual impact for the proposal and is assessed further in this section.

Jameson community (Mantamaru)

The Jameson (Mantamaru) bores occur approximately 20 km north of the predicted worse-case 2 m water table drawdown contours associated with mine-related activities (Figure 6 of the *Groundwater Monitoring and Management Plan* (OZ Minerals 2021d).

Publicly available data indicates that the Jameson bores are hosted within fractured rock aquifers which represents a different hydrogeological system to those of the project water supply and dewatering bores. Groundwater flow modelling (Appendix D3 of the referral supporting information) (OZ Minerals 2021a) indicates that the predicted 0.5 m groundwater drawdown contour will not reach the Jameson community 26 km north of the development envelope, and 50 km upstream. Publicly available bore completion data for the Jameson bores also indicates that the Jameson bore draws water from a fractured rock aquifer, and not the palaeochannel aquifer associated with mining.

The EPA has considered whether the proposed change is likely to meet its objective for inland waters by considering the likelihood that drawdown would impact on community water supplies.

The EPA noted that modelling indicates that the Jameson community water supply bore draws from a different aquifer to that of the mine (fractured rock as opposed to the paleochannel) and the distance and gradient difference between the two. The EPA considers it unlikely that drawdown from dewatering and abstraction will impact on the community water supplies for the Jameson (Mantamaru) community.

Linton Bore

Linton Bore is located within the life-of-mine 2 m water table drawdown contour that is predicted to develop around the Northern Borefield. The Linton Bore is frequently

visited and considered by Ngaanyatjarra People to be significant owing to its proximity to the Cavanagh Ranges. Although studies are not conclusive as to the connection between the Linton Bore and the palaeochannel, the proponent has proposed a precautionary approach, and assumed that Linton Bore water levels may experience drawdowns of up to 2 m based on modelled contours (OZ Minerals 2021a). Based on current knowledge it is predicted that a drawdown of 2 m would still result in 2 m of available water in Linton Bore (OZ Minerals 2021a).

In accordance with the EPA request to prepare a Groundwater Monitoring and Management Plan (GMMP), the proponent has prepared the *West Musgrave Copper and Nickel Project Groundwater Monitoring and Management Plan* (Revision 2, September 2021) which contains an approach to avoiding and minimising drawdown impacts at Linton Bore.

The GMMP contains triggers and thresholds to monitor the progression of drawdown from the northern borefield toward the Linton Bore as water abstraction progresses.

The proponent has proposed a trigger level at Linton Bore for drawdown greater than 0.1 m /year (over and above natural variation) and considers that this early indicator will allow sufficient time to implement actions to prevent the threshold being met. The threshold limit has been set at 1 m drawdown at Linton Bore (or greater than 0.2 m/year (over and above natural variation).

The proponent has committed that should monitoring indicate an effect of drawdown at Linton Bore, a deeper bore would be drilled to ensure a continuous supply at this location. This commitment is formalised in the proponent's GMMP (Table 10 and 11). Approval for this alternative well would be required and this process would assess impacts at that time.

The proponent also revised the borefield configuration, moving the southern-most bore (from the northern borefield) to further reduce the potential for drawdown at this location. The Ngaanyatjarra People have confirmed support for the 1 m threshold as part of the GMMP.

The EPA notes the proponent's commitment to set a threshold limit of 1 m drawdown at the Linton Bore, formalised through the GMMP. The EPA considers that the triggers and thresholds provided in the GMMP would allow the proponent sufficient warning to initiate a response action, to ensure no interruption to the use of the area for traditional use and custom.

The EPA also notes the proponent's commitment to drill a replacement bore if drawdown exceeds 1 m at Linton Bore, to ensure continuous supply at this location – however there is still uncertainty regarding the groundwater connection of the Linton Bore to the paleochannel aquifer, and therefore uncertainty on the residual impact to Linton Bore.

Conclusion

1. The EPA advises that the residual impact to Linton Bore should be subject to an implementation condition environmental outcome restricting drawdown at Linton Bore to 1 m, (recommended condition 4-1(1)) to ensure the environmental outcome is consistent with the EPA objective for inland waters and social surroundings.
2. The EPA advises the GMMP should be revised to ensure consistency with the environmental outcome, with monitoring and contingency measures to ensure it can be achieved, including changes to operations, reduction in extraction and consideration of alternative sources (subject to regulatory assessment and approval)

Impact of drawdown to potential GDEs

The EPA considers that the issue raised during the public consultation about potential impacts of drawdown on GDEs may be a residual impact of the proposal and is assessed.

While all potential terrestrial GDE associations identified during surveys (see section 2.2.3) are considered widespread in the landscape, as they do not include species or communities of conservation significance. However, a reduction in health and/or death of vegetation as a result of groundwater drawdown may be perceived as an impact to the cultural landscape from the perspective of traditional owners. The traditional owners have identified a specific stand of desert oaks and a specific stand of Mulga as culturally important, however the groundwater dependence of these has not been confirmed.

The proponent conducted an additional GDE review (Appendix B2, Addendum 1 of the referral supporting information, OZ Minerals 2021a) to improve understanding of the potential groundwater dependence and to determine an approach to reduce uncertainties. The review concluded that the initial GDE assessment may have overestimated the area of GDEs and that additional studies would be required to reduce the level uncertainty.

In accordance with the EPA request to prepare a Groundwater Monitoring and Management Plan (GMMP), the proponent prepared a groundwater monitoring and management plan to describe the approach to avoiding and minimising impacts of groundwater drawdown on the identified potential GDEs. The GMMP contained triggers, thresholds and contingencies for groundwater levels and groundwater quality.

Table 4 of the GMMP (OZ Minerals 2021d) lists the vegetation associations and mosaics comprising key vegetation species that may be potentially reliant on some degree of water, located within the 2 m water table drawdown contour for the proposal, which include:

- calcrete *Corymbia* opaca Woodland
- sand plains with Wattles other than Mulga over Spinifex and Calcrete Platform Hummock Grassland.

On review of the GMMP, the EPA encouraged the proponent to consider the rate of drawdown, in addition to the maximum extent of drawdown on potential GDEs when applying triggers and thresholds in the GMMP. The EPA also recommended a review of the proposed frequency of monitoring and timeframe for action, should groundwater triggers and thresholds be breached.

The proponent updated these components and submitted a revised GMMP to the EPA - *West Musgrave Copper and Nickel Project Groundwater Monitoring and Management Plan* (Revision 2, September 2021).

The proponent has employed a precautionary approach of assuming potential impacts to GDEs at a drawdown of 0.5 m. The proponent has proposed provisional triggers based on hydrogeological model predictions (trigger at 68 percent of the water table drawdown predicted in the hydrogeological assessment), with the rate of drawdown not to exceed 0.2 m/year (above natural variation). Table 9 of the GMMP details the triggers and thresholds for water quality, water quantity, as well as contingencies for potential terrestrial GDEs.

The NGC raised concerns regarding the uncertainty that remained regarding the potential GDE that were mapped within the 2 m and 0.5 m water table drawdown contours. The proponent has committed to further actions to reduce uncertainties associated with the existing GDE assessment, including conducting the following analysis on a minimum of ten potential terrestrial GDE trees, within each identified potential GDE:

- leaf water potential (LWP) measurements
- stand/stem basal area calculation
- measure isotopic composition of groundwater, soil water and plant (xylem) water.

This additional work is to be undertaken prior to the commencement of dewatering and borefield abstraction, and the commitment is formalised within the GMMP. To further mitigate any uncertainty with regard to groundwater dependence, the proponent will monitor drawdown and its effect on the potential GDEs as abstraction progresses.

DWER have confirmed that a groundwater licence and operating strategy would be required for the proposal, to manage and regulate the following aspects of the proposal:

- dewatering of the pits
- drawdown from groundwater abstraction and dewatering
- groundwater monitoring.

The DWER has confirmed that the proposed monitoring locations in Figure 6 of the GMMP are appropriate, and that the triggers, thresholds and management actions are suitable for managing the probable impacts on groundwater level and groundwater quality changes.

The EPA considers, based on the advice of DWER, that the proposed mitigation and contingency measures are technically and practically feasible. The EPA has determined on advice of the DWER, that the impact of drawdown on GDEs can be adequately managed and regulated under the RiWI Act via a water licence and groundwater operating strategy, and through implementation of the GMMP to meet the EPAs objective for inland waters and flora and vegetation.

The EPA considers there remains uncertainty regarding the dependence of the stand of desert oaks and the stand of Mulga that were identified by the traditional owners. The EPA recommends a condition to ensure that there are not drawdown related impacts to culturally important vegetation species from the impact of groundwater drawdown.

Conclusions

1. The EPA recommends condition 4-1(2) to ensure that the proponent meet the environmental outcome that there is no drawdown related impacts to culturally important vegetation
2. The EPA recommends implementation of the 'Groundwater Monitoring and Management Plan' (condition 4-2) to ensure that drawdown on potential GDEs is appropriately monitored and contingency actions implemented, to ensure the EPA's objective for inland waters can be achieved.

Impacts to water quality

The EPA considers that the issue raised during the public consultation in relation to potential impacts to water quality through contamination is potentially a residual impact of the proposal and is assessed in this section.

A hydrogeochemical study was undertaken to predict the movement of potential solutes originating from landforms and their concentrations over time (Appendix D7 of the referral supporting information). The geochemical transit model developed for the hydrogeochemical study demonstrated that the vertical migration of solutes through the unsaturated profile significantly reduced the load of dissolved solutes to groundwater (OZ Minerals 2021a). The Predicted Seepage Fate Particle Tracks (Steady State) is shown on Figure 7-26 of the proponent's referral supporting document.

The proposal is predicted to develop a permanent pit lake at the Babel pit post closure, which has been modelled to be a groundwater-driven pit lake. Studies have shown that although solutes do concentrate over time in pit lakes, the pits act as in perpetuity groundwater sinks due to the high net evaporation (OZ Minerals 2021a).

The proponent has proposed baseline monitoring and a trigger-location bore monitoring network to mitigate and manage impacts to water quality. The monitoring bore locations are detailed in the GMMP (Table 12). Provisional triggers for water quality based on the hydrochemistry numerical modelling and baseline water quality data are proposed as a precautionary approach. Table 8 of the GMMP presents the adopted trigger and threshold criteria.

In addition, the proponent has made a commitment that all reporting discussed in the GMMP would be made available to the Ngaanyatjarra People through the Ngaanyatjarra Council, including where necessary periodic face-to-face meetings to discuss the results and outcomes of monitoring. The Ngaanyatjarra Council would be made aware of any trigger or threshold exceedances within 48 hours of the proponent becoming aware of them (OZ Minerals 2021d).

The EPA sought advice from DMIRS on the potential for impacts to water quality from the mine pits, waste rock dumps and TSF. DMIRS advised that the testing methodology used to determine the risk of acid mine drainage from waste rock and tailings are appropriate, and that the proposal to encapsulate potentially acid forming material should reduce the risk of AMD affecting land, rehabilitation and water quality. DMIRS also advised that the studies show the tailings are unlikely to generate AMD, and that the geotechnical design and stability of the TSF would be considered during the DMIRS assessment of the projects mining proposal and mine closure plan.

The DMIRS environmental objective for water resources is '*to maintain the hydrological regimes, quality and quantity of groundwater and surface water to the extent that existing and potential uses, including ecosystem maintenance, are protected'* (DMIRS 2020b).

The DMIRS has advised that the risk of lateral seepage and pond-wall breach of the tailings storage facility can be regulated by DMIRS under the *Mining Act 1978*, and that the geotechnical design of the pond wall will be reviewed and considered prior to approval of the mining proposal. DMIRS considers that this risk can be adequately managed under the *Mining Act 1978*.

The EPA has determined, on the advice of DMIRS, that impacts to inland waters through contamination associated with pits, waste rock landforms and tailings facilities can be adequately assessed, managed and regulated under the Mining Act, to meet the EPA's objective for inland waters.

The EPA sought advice from DWER regarding the regulation of emissions and discharges associated with the proposal. DWER confirmed that the proponent would need to apply for a works approval and licence, and that the following aspects of the proposal could be adequately managed under Part V of the EP Act, Prescribed Premises Schedule 1, *Part 1 Environmental Protection Regulations 1987*:

- dewatering
- emissions and discharges from prescribed facilities.

The EPA has determined, on advice of DWER, that impacts to inland waters through contamination associated with prescribed premises (such as the TSF) could be adequately assessed, managed and regulated under Part V of the EP Act to meet the EPA's objective for inland waters.

Conclusions

1. The EPA advises that the residual impact to water quality can be subject to recommended conditions and statutory decision-making processes (Mining Act and Part V of the EP Act) to ensure the environmental outcome is consistent with the EPA objective for inland waters.

2.3.9 Summary of key factor assessment and recommended regulation

The EPA has considered the likely residual impacts of the proposal on inland waters environmental values. In doing so, the EPA has considered whether reasonable conditions could be imposed, or other decision-making processes can ensure consistency with the EPA's factor objective. The EPA assessment findings are presented in Table 4.

The EPA has also considered the principles of the EP Act in assessing whether the residual impacts will be consistent with its environmental factor objective and whether reasonable conditions can be imposed (see Appendix C).

The EPA has also had regard to its conclusions in other recent assessments, including Bunbury Outer Ring Road Southern Section proposal (Assessment No. 1714).

Table 4: Summary of assessment for inland waters

Residual impact or risk to environmental value	Assessment finding	Recommended conditions and DMA regulation
Direct impact of drawdown on other users, including traditional owners: Potential 2 m drawdown of community water supplies at Linton Bore of cultural significance.	Limiting drawdown from the northern borefield at Linton Bore and setting a threshold limit at 1 m drawdown would meet EPA objectives because current knowledge predicts that a 2 m drawdown would still result in 2 m of available water in the bore. Additional contingency actions would ensure no interruption to the use of the area for traditional owner use and custom. Residual impact can be regulated through conditions, so the environmental outcome is likely to be consistent with the EPA's objective for inland waters.	Regulated through recommended conditions: Condition 4-1(1): Inland Waters - Limit on the extent of drawdown at Linton Bore to 1 m Condition 4-2 Implementation of the Groundwater monitoring and management plan

Residual impact or risk to environmental value	Assessment finding	Recommended conditions and DMA regulation
Direct impact of drawdown on GDEs: Potential residual impact to groundwater dependent ecosystems, including GDEs that are culturally significant	The Groundwater Monitoring and Management Plan contains measures to avoid, minimise and mitigate the impact of project related activities on surface and groundwater, and potential GDEs. The *Rights in Water and Irrigation Act 1914* will also regulate impacts on GDEs from groundwater abstraction. In addition to these measures, the EPA recommends a condition which prohibits drawdown related impacts to GDEs which are culturally important to traditional owners. Residual impact can be regulated through conditions, so the environmental outcome is likely to be consistent with the EPA's objective for inland waters.	Regulated through recommended conditions: Condition 4-1(2) avoid drawdown related impacts to GDEs Condition 4-2 – implementation of groundwater monitoring and management plan Other DMA processes: *RiWI Act 1914* – groundwater licence and operating strategy
Impact to quality: Potential residual Impact to water quality from emissions and discharges and seepage from waste landforms	GMMP contains monitoring and management approach for water quality. DMA legislation (Part V & and Mining Act) will undertake review and assessment of the impacts from prescribed facilities and waste landforms and regulate the construction design and operation of these facilities, and condition emissions and discharges. Residual impacts can be regulated through conditions and can be subject to other statutory decision-making processes, so the environmental outcome is consistent with the EPA's objective for inland waters.	Regulated through recommended conditions: Condition 4-2 Implementation of the Groundwater monitoring and management plan Other DMA processes: Part V of the *Environmental Protection Act* – works approval and licence to manage emissions and discharges from prescribed premises *Mining Act 1978* – Mining proposal and mine closure plan

2.4 Greenhouse gas emissions

2.4.1 Environmental objective

The EPA's environmental objective for greenhouse gas (GHG) emissions is *to reduce net greenhouse gas emissions in order to minimise the risk of environmental harm associated with climate change* (EPA 2020a).

2.4.2 Potential emissions from the proposal

The proposal will produce GHG emissions from:

- scope 1 – emissions associated with the use of diesel electricity generation, diesel-powered mining and earth moving vehicles
- scope 3 – emissions associated with fuel and energy use, processing of sold products, upstream and downstream transportation, use and end-life of sold products and waste generation during concentrate production.

The *Environmental Factor Guideline – Greenhouse Gas Emissions* (EPA 2020a) provides that, generally, GHG emissions from a proposal will be assessed where they exceed 100,000 tonnes of scope 1 emissions each year measured in tonnes of CO_2-e. This is currently the same as the threshold criteria for designation of a large facility under the Australian Government's *Safeguard Mechanism.*

The proponent has provided the following baseline estimates of GHG emissions, exceeding the threshold of 100,000 t CO_2-e per annum:

- scope 1 emissions[1] from diesel consumption of between 128,870-165,770 tCO_2-e/annum
- total scope 1 GHG emissions of 9.481 million tonnes CO_2-e with no mitigation, over the 26-year life of the proposal, with an emission intensity of 0.03684 CO_2-e / tonne of ore mined
- scope 3 emissions generated over the life of mine are predicted to be approximately 7,722,260 t CO2-e.

The proponent is seeking to reduce GHG emissions to achieve net zero scope 1 emissions by 2040 and is also seeking to explore opportunities to accelerate this timeframe (OZ Minerals 2021e).

To mitigate greenhouse gas emissions (scope 1) the electricity supply for the proposal will utilise:

[1] The contractual arrangements regarding electricity supply for the WMP have yet to be finalised. The electricity supply solution may be owned and operated by OZ Minerals (in which case the emissions would be scope 1) or electricity may be subject to a Build-Own-Operate-Maintain (BOOM) contract or similar, with OZ Minerals purchasing electricity 'over the fence', in which case, emissions may be classified as scope 2. To present a conservative assessment and ensure that this GHGMP reflects all major sources of GHG emissions, this GHGMP assumes that the electricity supply at WMP is under the operational control of OZ Minerals and emissions associated with this supply are therefore scope 1.

- wind turbine generators with a total installed capacity of approximately 70 to 80 MW
- bifacial solar PV arrays with a total installed capacity of 40 to 50 MW
- battery Energy Storage System inverter/converter nominally rated at 20 to 30 MW (power) and 25 to 35 MWh (energy)
- diesel gensets (total installed capacity of 45 to 55 MW).

The proponent has recognised that some uncertainty exists relating to the availability and consistency of renewable energy sources such as wind and sun, and as such, GHG emissions at the proposal have been considered across a range of scenarios.

A summary of these projected emissions is presented in Table 3 and the lifetime emissions profile for the base case (20 percent diesel / 80 percent renewable - Scenario 2) is shown in Figure 5 of the proponent's *West Musgrave Copper and Nickel Project Greenhouse Gas Management Plan* (Revision 2, 28 October 2021).

2.4.3 Consultation

Consultation on the proposal raised concerns relating to climate change.

2.4.4 Minimisation measures (including regulation by other DMAs)

The proponent has identified the following measures to minimise GHG emissions:

1. as a base case, the project is targeting 70–80 percent of its power supply from renewable sources that would offset significant GHG generation
2. implementation of an Energy Strategy, the focus of which is to increase load flexibility and energy efficiency to align with variable renewable energy
3. pursue lower energy generation machinery such as vertical roller mills to minimise the overall project electricity requirements as part of ongoing value optimisation
4. investigate mechanisms to decarbonise the project, particularly the mobile fleet
5. energy efficiency and GHG emissions would be considered as part of equipment selection and purchase
6. appropriate emission control mechanisms would be selected to ensure that emissions comply with statutory requirements and acceptable standards
7. implementation of the *West Musgrave Copper and Nickel Project Greenhouse Gas Management Plan* (GHGMP) with a target to achieve net zero scope 1 emissions by 2040.

The proponent submitted version 1 (May 2021) of the GHGMP with the additional information. During the assessment process, the EPA has encouraged the proponent to revise and improve the Greenhouse Gas Management Plan. The proponent revised and improved the GHGMP, submitting a revised GHGMP (Revision 2, 28 October 2021), which the EPA has used as the basis for its assessment. Both versions of the GHGMP are available on the EPA website.

- The GHGMP includes:

- emissions targets
- reduction targets and trajectory
- management actions and monitoring
- measurement of trajectory
- transparency
- adaptive management and review
- continuous improvement.

With these mitigation measures, the proponent estimates that the lifetime (26 years) would result in emissions that are up to 136 percent less (equivalent to 5.42 Mt CO_2- e over the life of mine) than a standard business as usual approach to electricity supply (OZ Minerals 2021a).

The EPA notes that, until emissions are under 100,000 CO_2-e per year, the proponent will be subject to reporting requirements of the Clean Energy Regulator to comply with the *National Greenhouse and Energy Reporting Act 2007* (NGER Act), and also subject to the NGER *Emissions Reduction Fund Safeguard* which requires facilities whose net emissions exceed the safeguard threshold to keep emissions at or below baseline.

2.4.5 Assessment of impacts to environmental values

Total unabated scope 1 GHG emissions from the proposal over 26 years, would be 9.48 million tonnes CO_2-e under the worst-case scenario (100 percent diesel). With mitigation, the proposal will result in GHG emissions estimated at 4.06 Mt CO_2-e over 26 years.

With mitigation the proposal is committing to meet the following Scope 1 GHG emission targets (OZ Minerals 2021e):

- at year 0 (2023), scope 1 emissions not to exceed 196,500 t CO_2-e per year, equivalent to base-case emissions estimates.
- after year 5 (2028), scope 1 emissions not to exceed 156,000 t CO_2-e per year, equivalent to base-case emissions estimates.
- after year 10 (2033), scope 1 emissions not to exceed 75,000 t CO_2-e per year equating to an approximate 50% reduction on base-case emission estimates
- after year 15 (2038), scope 1 emissions not to exceed zero t CO_2-e per year, a 100% reduction on base-case emission estimates.

The estimated Scope 1 GHG emissions from the proposal (with mitigation) of 196,000 t CO_2-e per annum, at commencement, constitute approximately 0.2 percent of Western Australia's total emissions (based on total emissions CO_2-e) and 0.03 percent of Australia's total reported GHG emissions for 2019 based on the *National Greenhouse Accounts 2019* (Commonwealth of Australia 2021).

There is an established link between GHG emissions and the risk of climate change. The EPA recognises that climate change will impact on Western Australia's

environment and environmental values. The IPCC *The Physical Science Basis* report August 2021 shows Southern Australia as already having observed change in hot extremes and agricultural and ecological drought, that 1.5 degrees of global warming is more likely than not to be exceeded in the near term (2021-2040) even under low and very low GHG emissions scenarios, and that global temperatures could decline back toward 1.5 degrees of global warming by the end of 2021 under a very low GHG emissions scenario (IPCC 2021).

The intent of the EPA's GHG Guideline is to inform the development and assessment of proposals, not determine the outcome of the EPA's assessment. Consistent with this, the EPA assesses proposals where GHG emissions are a key environmental factor on a case-by-case basis and recognises that a flexible approach is important to drive innovation and improvement in best practice technologies.

The EPA notes that the GHG Guideline does not mandate net zero emissions over the life of a proposal. Rather, its objective is reduction of emissions to minimise the risk of environmental harm associated with climate change. When assessing proposals where greenhouse gas emissions are a key environmental factor, the EPA therefore usually considers a proposal's annual and total contributions to GHG emissions, but also assesses the proponent's contribution and trajectory towards the achievement of the goal of net zero by 2050, having regard to the *United Nations Framework Convention on Climate Change* (UNFCC) *Paris Agreement* and the *Intergovernmental Panel on Climate Change's (IPCC) 1.5 report*.

In relation to the proposal, the EPA had particular regard to annual and total contributions to GHG emissions (see above); the emissions intensity of the proposal (including by considering industry benchmarking); whether the proponent has committed to achieving reduction targets over time in accordance with a linear trajectory (based on 5 yearly targets) to achieve net zero by 2050; whether it has incorporated continual improvement; transparency and reporting; and whether it has considered offsetting emissions.

In considering these, the EPA has noted:

- the proponent's benchmarking assessment which found that its emissions intensity against similar operating projects is significantly less emissions intensive than comparable base-metal (copper and nickel) projects (0.01560 tCo2-e/tonne of ore mined)
- the proponent's target of delivering a GHG trajectory (based on 5 yearly targets) towards net zero greenhouse gas emissions by 2040, which results in less emissions than a linear trajectory to net zero by 2050
- the proponent's adoption of a continuous improvement approach to ensure improvement opportunities are identified and implemented every 5 years
- the proponent's commitment to provide offsets as required to reduce scope 1 emissions to a level equal to the trajectory, if the emission reduction interim aspirational targets cannot be achieved by the nominated date
- the proponent's consideration of best practice design to reduce impacts.

The GHG Guideline acknowledges GHGs from a cumulative range of sources may have an impact on WA's environment, even if the specific impact of a particular proposal's emissions may not be known with certainty. In response to this, and to minimise cumulative impacts to WA's environment, the GHG guideline therefore generally applies to proposals emitting greater than 100,000 tonnes CO_2-e per year of scope 1 emissions, so the GHG Guideline's objective to reduce emissions can be applied to those particular proposals. The EPA's consideration of the GHG Guideline in its assessment of this proposal therefore means the impact of cumulative emissions on WA's environment have been taken into account for this proposal.

2.4.6 Consideration of conditions

The EPA is of the view it is reasonable to recommend a condition which requires the proposal to achieve GHG emissions limits along a trajectory (based on 5 yearly limits) to net zero by 2040. To provide certainty and transparency, the recommended condition is based on the proposal achieving (or bettering) emission reduction limits.

The EPA is also recommending the proponent implement the GHGMP (Revision 2, October 2021), provided it is subject to the emission reduction limits as a maximum, and also subject to continuous improvement by going through ongoing 5 yearly reviews. Conditions relating to reporting, audits, peer reviews, and summary plans and reports are also recommended to increase transparency and continuous improvement of the proposal's GHG emissions and emissions intensity.

The GHG conditions recommended by the EPA require achievement of GHG emission limits but are flexible enough to be able to ensure the GHGMP include innovation and improvement in best practice technologies.

The EPA notes the science and policy of GHG emissions and climate change is rapidly evolving. The EPA advises the GHG conditions are expected to be able to be responsive to this, particularly by enabling reviews of the GHGMP to reflect any significant changes (for example, if there are material changes to relevant State, Commonwealth or international GHG science or policy). The EPA also notes the Minister can direct the EPA to inquire into Ministerial Statement conditions (including GHG conditions) at any time.

The EPA believes the GHG conditions recommended will be responsive to take account of changes in this evolving area as well as provide the need for innovation and improvement in best practice technologies. The conditions are also consistent with the GHG Guideline which is based on a continuous improvement approach to emissions reduction.

2.4.7 Summary of key factor assessment and recommended regulation

The EPA has considered whether the residual emissions from the proposal are consistent with the principles of the EP Act (see Appendix C) and with the EPA factor objective for GHG emissions.

In doing so, the EPA has also considered whether reasonable conditions could be imposed to reduce potential inconsistency with the EP Act principles and EPA's factor objective.

The EPA has also had regard to its conclusions in other recent assessments, including Report 1705.

The EPA summary findings are in Table 5.

The EPA advises that, with the application of the recommended conditions, and the proponent's adoption of efficient technology, continuous improvement, and commitment to delivering against a trajectory of net zero greenhouse gas emissions by 2040, the proposal is generally consistent with the EPA's GHG Guideline.

Residual emissions remain estimated to add a potential 4.06Mt of CO_2-e over 26 years to WA emissions. Although this represents a significant reduction in the 9.48 million CO_2-e tonnes which were estimated from the proposal without mitigation, whether this reduction is sufficient to minimise the risk to climate change impacts to WA's environment depends on the state of cumulative emissions over time (such as whether any current emission sources discontinue).

Table 5: Summary of assessment for greenhouse gas emissions

Residual impact or risk to environmental value	Assessment finding	Recommended conditions and DMA regulation
Scope 1 emissions are expected to commence at 196,500 tpa CO_2-e and reduce to net zero by 2040. Emissions at commencement are estimated to represent 0.2 percent WA annual emissions (based on 2019-year data). Scope 3 emissions generated over the life of mine are predicted to be approximately 7,722,260 t CO2-e GHG emissions contribute to climate change, which impacts on WA's environment.	4.06 Mtpa scope 1 GHG emissions over 26 years. The following aspects of the proposal are generally consistent with the GHG Guideline: • reduction of scope 1 emissions to net zero by 2040, and a trajectory (based on 5 yearly targets / projections) from commencement of operations to achieve this • continuous improvement approach • use of efficient technology • industry benchmarking • the use of offsets in accordance with the mitigation hierarchy. The EPA recommends the proposal should be subject to conditions to achieve progressive emission reduction limits, including achievement of net zero by 2040, associated conditions dealing with management, reporting and transparency.	Direct regulation through conditions: Condition 5: GHG Management Complementary reporting requirements to the Clean Energy Regulator to comply with the *National Greenhouse and Energy Reporting Act 2007* (NGER Act). Complementary application of the NGER *Emissions Reduction Fund Safeguard* which requires facilities whose net emissions exceed the safeguard threshold to keep emissions at or below baseline.

2.5 Terrestrial Fauna

2.5.1 Environmental objective

The EPA environmental objective for terrestrial fauna *to protect fauna so that biological diversity and ecological integrity are maintained* (EPA 2016d).

2.5.2 Investigations and surveys

The EPA advises the following investigations, surveys and peer reviews were used to inform the assessment of the potential impacts to terrestrial fauna:

- *West Musgrave Copper and Nickel Project: Level 2 Vertebrate Fauna Survey 2018/2019* (Appendix G1 of the referral supporting information, OZ Minerals 2021a) (Western Wildlife 2020)
- *West Musgrave Copper and Nickel Project: Targeted Great desert skink Survey 2018/2019* (Appendix G2 of the referral supporting information, OZ Minerals 2021a) (Western Wildlife 2019)
- *Avian and microbat baseline characterisation associated with the proposed wind turbine electricity generators* (Appendix G3 of the referral supporting information, OZ Minerals 2021a) (Donato Environmental Services 2019)
- Night Parrot peer review and desktop habitat analysis (Appendix G3 Addendum 1 of the referral supporting information, OZ Minerals 2021a) (OZ Minerals 2021)
- *Avian and microbat risk assessment associated with the proposed wind turbine electricity generators* (Appendix G4 of the referral supporting information, OZ Minerals 2021a) (Donato environmental Services 2019)
- *Regional Habitat and Targeted Survey for Great desert skink and Targeted Survey for Petrogale Lateralis (Warru)* – unpublished report (Appendix G5 of referral supporting information, OZ Minerals 2021a)(Jennifer Timbs 2020)
- *Short-range Endemic Survey for the West Musgrave Copper and Nickel Project* (Appendix G6 of the referral supporting information, OZ Minerals 2021a) (Alacran Environmental Science 2020).

The surveys were consistent with the *Technical Guidance – Terrestrial vertebrate fauna surveys for environmental impact assessment* (EPA 2020b); and Technical Guidance - *Sampling of short range endemic invertebrate fauna* (EPA 2016e).

2.5.3 Assessment context: existing environment

Fauna habitat

Eleven fauna habitats were identified during fauna surveys (Appendix G1). These fauna habitats were identified based on observations made in the field, vegetation mapping and from the interpretation of aerial photography. Of the 11 habitats identified, two of the eleven habitats are ‘mosaics’, where the Spinifex Sandplain or Mallee Sandplain occur in association with outcropping calcrete, at a scale too fine to be separately mapped (Figure 7-49 of the proponent’s referral supporting document, OZ Minerals 2021a). All habitats present in the fauna survey area are considered to be widely represented in the CR or GVD Bioregions (OZ Minerals 2021a).

Significant fauna

The survey effort focussed on identifying presence of significant fauna, as defined by the BC Act and EPBC Act. Fifteen species of significant fauna were identified across the survey area (Table 7-68 of the proposal's referral supporting document), comprising:

- the great desert skink (*Liopholis kintorei*) listed as Vulnerable under the BC Act and EPBC Act
- six species listed under the EPBC Act were listed as Marine of which one is also listed as Migratory under the BC Act and EPBC Act
- three Specially Protected (Priority 4) species under the BC Act:
    - striated grasswren (*Amytornis striatus striatus*)
    - brush-tailed mulgara (*Dasycercus blythi*)
    - southern marsupial mole (*Notoryctes typhlops*)
- a single locally significant species, the woma (*Aspidites ramsayi*) which is not listed under the BC Act or EPBC Act
- four species observed that represent range extensions (however not listed under EPBC or BC Act):
    - spiny-tailed goanna (*Varanus acanthurus*)
    - ribbon slider skink (*Lerista taeniata*)
    - ornate soil-crevice skink (*Notoscincus ornatus*)
    - beaked blind snake (*Anilios grypus*).

Table 7-69 of the referral supporting document (OZ Minerals 2021a) provides a list of significant species (listed under the BC Act and/or EPBC Act) that were identified through desktop surveys as potentially occurring in the fauna survey area, however, not found within the survey area. Table 7-69 of the referral supporting document (OZ Minerals 2021a) also summarises the likely status of these species within in the survey area. The six EPBC Act species listed as Marine species with one listed as Marine and Migratory are not considered to be impacted from the proposal implementation as the species are not likely to exist within the proposal area and surrounds.

The night parrot was identified as potentially occurring within the proposal area and is discussed further below.

Night parrot (*Pezoporus occidentalis*)

The night parrot is a medium sized ground dwelling bird associated with mature spinifex habitat in arid and semi-arid regions. Presumed extinct for a century, a population was rediscovered in 2013, but it remains one of Australia's most cryptic species (DAWE 2021). It is listed as 'endangered' under the EPBC Act and 'critically endangered' under the BC Act.

Potential foraging habitat for this species was identified within the development envelope. Following referral of the proposal, the EPA requested a peer review of the night parrot survey methodology, as part of the EPA's request for additional information.

The proponent commissioned a peer review (Adaptive NRM 2021) of the information used to assess the likelihood of night parrot occurring within the development envelope. The peer review concluded '*that methodological shortcomings employed in the initial WMP Night Parrot surveys presented limitations to detection of Night Parrots, and that conclusions pertaining to Night Parrot occupancy were not supported*' (OZ Minerals 2021f).

Based on recommendations from the EPA to conduct further review of the night parrot survey, the proponent commissioned an independent habitat analysis to further determine the likelihood of the presence of night parrot (Appendix G3, Addendum 1). In accordance with the EPA's request the proponent commissioned an independent habitat analysis (Adaptive NRM 2021, Appendix G3, Addendum 1) which concluded that '*Night Parrot roosting habitat is unlikely to occur within the Development Envelope, reducing uncertainties in previous assessments….'*

The results are discussed in section 2.5.9 of this report.

Great desert skink (*Liopholis kintorei*)

The great desert skink is a large burrowing lizard, endemic to Australian arid regions, and restricted to sandy and gravelly habitats in the western desert region of Central Australia (OZ Minerals 2021f). The species is listed as 'vulnerable' under both the EPBC Act and the BC Act. The great desert skink has a scattered distribution across its range, and is known to have disappeared from former habitats, particularly in the Gibson Desert, Great Victoria Desert and Great Sandy Desert Regions. Threats to the great desert skink include predation after loss of vegetation cover from fire and possibly habitat degradation from feral camels and rabbits (TSSC 2016). Both cats and foxes are known to prey on the great desert skink.

Two studies relating to the presence and habitat of the great desert skink were undertaken, including:

- targeted walking transects, of 767.3 km, within the fauna survey area to identify signs of the great desert skink, primarily burrows in association with a scat latrine (Appendix G2 of the referral supporting information)
- regional survey for great desert skink within a 200 km radius surrounding the area proposed for the West Musgrave project. This regional survey undertaken by the Ngaanyatjarra Ranger team through the Land and Cultural division of the NGC aimed to identify the regional occurrence of the Great desert skink to contextualise the importance of the findings within the fauna survey area (Appendix G5 of the referral supporting information).

Species of cultural importance

Through consultation with Ngaanyatjarra People, a number of fauna species of cultural importance were identified. These included totem species representative of story lines or dreamtime stories or those used as food resources (OZ Minerals 2021f). These included:

- bardi grubs (witchetty grub) which are generally associated with *Acacia kempeana* and are widely eaten by Ngaanyatjarra People
- Australian bustard (*Ardeotis australis*) known locally as Nganurti which is actively hunted and also the subject of dreamtime stories
- goanna (all of the Varanus genus), which are commonly hunted and the subject of dreamtime stories
- emus (*Dromaius novaehollandiae*) known locally as Karlaya which are both actively hunted, and form part of a nearby dreaming story
- macropods including western grey kangaroo (*Macropus fuliginosus*), Euro (*Osphranter robustus*) and red kangaroo (*Osphranter rufus*). The kangaroo, known as Marlu to the Ngaanyatjarra People is a preferred food source, however, is also representative of one of the most important dreamtime stories within the vicinity of the proposed project area.

2.5.4 Consultation

Terrestrial fauna in the context of changes to amenity, food availability and access to country was raised during consultation on the proposal.

The EPA requested the proponent provide a terrestrial fauna management plan detailing the mitigation hierarchy concerning avoidance and minimisation of direct and indirect impacts to significant terrestrial fauna species. The EPA also requested that the Plan incorporate the review of the night parrot methodology, as an appendix.

2.5.5 Potential impacts from the proposal

The proposal has the potential to significantly impact on terrestrial fauna from:

- decrease in poorly represented fauna habitat as a result of project-related land clearing
- decrease in richness and abundance of fauna, including of significant fauna, as a result of interactions with project-related vehicles and machinery or entrapment
- increase richness and abundance of predator species resulting from project-related attractants (water and food sources) resulting in high levels of predation of native fauna
- decrease in the richness and abundance of poorly represented fauna habitat and significant fauna species as a result of project-related altered fire regimes.

2.1.6 Avoidance measures

Great desert skink

Detailed studies of preferred habitat for the great desert skink in the fauna survey area found that their occurrence was exclusive to spinifex sandplains (section 7.6.3.4 of the proponent's referral supporting document). The modelled distribution of the species is shown on Figure 7-51 of the referral supporting document (OZ Minerals 2021a), and the location of records with the survey area is shown in Figure 7-53 of the referral supporting document. The majority of the great desert skink burrows were present in spinifex sandplain. As a result, the proponent excluded mapped spinifex sandplain habitat from the development envelope – apart from an area within the Northern Borefield area of 6.7 ha, to minimise potential impacts to the species. Three of the four identified clusters of skink burrows or sub-populations were excluded from the development envelope. The remaining single cluster of burrows within the development envelope occurs in the northern extent of the Northern Borefield (Figure 7-66 of referral supporting document).

In the Northern Borefield area, up to 6.7 ha of spinifex sandplain habitat may be subject to minor and temporary impacts associated with the construction of the borefield pipeline and associated infrastructure (e.g. service tracks, pipeline and bore infrastructure). This direct impact of 6.7 ha represents a 0.8 percent impact of spinifex sandplain habitat within the development envelope (881.7 ha) and 0.1 percent of the spinifex sandplain habitat mapped in the survey area (4,919.5 ha) .

In addition to avoiding areas of great desert skink habitat, the proponent has designed the proposal to avoid impacts to other terrestrial fauna including:

1. reorientation and reduction in size of the development envelope to avoid impacts to native vegetation, including reducing the development envelope from 25,200 ha to 20,852 ha (17 percent reduction), reducing the size of the disturbance footprint from 3,961 ha to 3,830 ha
2. informed design by avoiding clearing of habitat for conservation significant species and, where practicable, micro-sighting infrastructure during construction to avoid significant habitats
3. siting of wind turbines outside of habitats known to support significant fauna species
4. consideration of the swept height of wind turbine blades above the vegetation canopy for wind farm design and development.

The issue of potential impacts to the great desert skink (Vulnerable) has been addressed through avoidance measure 1 (above) which has reduced the potential disturbance of preferred habitat to 6.7 ha (82 percent of spinifex sandplain habitat within the survey area has been excluded from the development envelope.

2.5.7 Minimisation measures (including regulation by other DMAs)

The proponent has proposed the following measures to minimise impacts to terrestrial fauna:

5. avoidance through informed design by minimising clearing to the smallest area possible and placing waste in-pit where practicable
6. development and implementation of Land Disturbance Permits and Permits to Work procedures, a site-specific internal clearing/disturbance procedure and associated permit to prevent clearing outside approved boundaries, and to minimise disturbance to only that required
7. site induction program to provide information on protection of significant fauna habitats and ground disturbance authorisation procedures
8. pre-clearance surveys to be undertaken in Spinifex Sandplain to ensure that proposed clearing is aligned away from signs of great desert skink
9. conceptual and detailed design of the wind farm and individual turbines would take into account the following design features to reduce the risk of avian fauna and bat mortalities:
    - design of turbine towers with solid structure turbines, as opposed to lattice style structures to prevent birds, particularly raptors, using the turbines as perching and/or nesting locations, increasing the likelihood of rotor collision
    - size of turbines would be as large as practicable to allow the turbines to be more visible to avian fauna species and have lower blade rotational speeds than smaller turbines
    - turbines would be designed to create less edges where possible
    - provision of visibility enhancement devices
10. maintenance of fire breaks and fire equipment
11. fire management protocols and land management would be consulted with the NGC to ensure that aligned fire management outcomes are achieved.

2.5.8 Rehabilitation measures

The proponent has proposed the following rehabilitation measures for terrestrial fauna:

1. progressive rehabilitation would be undertaken on disturbed areas
2. monitoring of analogue and rehabilitated areas would be undertaken to ensure short, medium and long-term rehabilitation objectives are achieved
3. ongoing development of monitoring methodology and rehabilitation techniques would occur during the life of the project. Further assessments over time would plot the development of rehabilitated areas against analogue sites and progression towards completion targets
4. preparation and regular update of a Mine Closure Plan consistent with the *Statutory Guidelines for Mine Closure Plans* (DMIRS 2020).

2.5.9 Assessment of impacts to environmental values

The EPA considered that the key environmental values for terrestrial fauna likely to be impacted by the proposal are conservation significant fauna species and species of significance to the Ngaanyatjarra People. The potential impact to terrestrial fauna

is likely to be a residual impact for the proposal and is assessed further in this section.

Significant fauna species

Night parrot

In accordance with the EPAs request the proponent commissioned an independent habitat analysis (Adaptive NRM 2021, Appendix G3, Addendum 1) which concluded that:

'Night Parrot roosting habitat is unlikely to occur within the Development Envelope, reducing uncertainties in previous assessments…. Therefore, additional acoustic surveys (or re-analysis of sound data collected by Donato Environmental Services (2019)) are unlikely to detect the presence of roosting Night Parrots within the Development Envelope. Acoustic surveys within potential foraging habitat are unlikely to detect Night Parrots, due to the small and fragmented extent of potentially suitable habitat available, and the relatively large distance Night Parrots would need to travel to access potential foraging habitat within the Development Envelope'.

This analysis provides a strong conclusion of the low likelihood of night parrot occurrence at the WMP. The EPA does not consider there would be a residual impact on the night parrot.

Great desert skink

The proponent has revised and reconfigured the proposal development envelope to avoid habitat for the great desert skink. Whilst spinifex sandplain habitat will be avoided, there remains a residual impact to the great desert skink in the northern borefield area, where 6.7 ha of deep sand spinifex habitat would be removed through direct clearing.

There also remains a residual impact from vehicles strikes, post-wildfire predation by foxes, cats and dogs, and direct through predation as a result of the creation of new tracks and cleared areas.

The EPA notes the proponent has revised the development envelope to reduce the impact to the great desert skink, excluding 4,030 ha (82 percent) of the surveyed habitat for this species from the development envelope. A total of 881 ha of spinifex sandplain habitat remains within the development envelope.

The proposal will directly impact on 6.7 ha of great desert skink spinifex sandplain habitat which represents a 0.8 percent of the spinifex sandplain habitat within the development envelope (881.7 ha) and 0.1 percent of the spinifex sandplain habitat mapped in the survey area (4,919.5 ha).

The disturbance areas do not have significant qualitative value compared to surrounding vegetation or vegetation in the development envelope.

Conclusion

1. The residual impact from habitat loss is likely to be regulated through conditions limiting the extent of habitat loss, and the implementation of objectives and management measures to avoid where possible, and otherwise minimise impacts, so that the environmental outcome is consistent with the EPA's objective for terrestrial fauna.

Priority four species

There remains a residual impact to the three priority four (P4) species recorded during surveys, through habitat removal and increased animal predation:

- southern marsupial mole
- brush-tailed mulgara
- striated grasswren.

Surveys for habitat type were conducted over 46,263.3 ha within and outside DE with the following results:

Southern marsupial mole

- the southern marsupial mole is widespread across the deserts of central Australia, occurring where its sand dune habitat is present (Woinarski et al., 2014). There is no evidence of on-going population decline and it is listed as of 'Least Concern' in the *Action Plan for Australian Mammals 2012* (Woinarski et al., 2014).
- up to 16.7 percent (477.4 ha) of surveyed sand dune habitat within development envelope is proposed to be cleared. This represents 9.5 percent of the total sand dune habitat (5,045.4 ha) mapped across survey area.

Brush-tailed mulgara and striated grasswren

- the brush-tailed mulgara and striated grasswren are found within similar habitat, being that containing spinifex grasslands and spinifex sandplains usually with an overstorey of shrubs or mallee eucalypts.
- the fauna survey concluded that the brush-tailed mulgara is likely to occur in the following impacted habitat types:
    - the spinifex sandplain with 4,919.5 ha in the survey area and 881.7 ha within the development envelope. A total of 6.7 ha is proposed to be impacted representing 0.8 percent and 0.1 percent of the development envelope and survey area respectively
    - mulga sandplain with 2113.9 ha in the survey area and 797.3 ha in the development envelope. A total of 120 ha is proposed to be impacted representing 15.2 percent and 5.7 percent of the development envelope and the survey area respectively
    - mallee sandplains with 6,310.1 ha in the survey area and 3,445.7 ha in the development envelope. A total of 524.7 ha is proposed to be impacted representing 15.2 percent and 8.3 percent of the development envelope and the survey area respectively

- The striated grasswren is likely to favour mallee and spinifex sandplains.
- The total habitat of these areas mapped during the survey is 13,339.5 ha.

Sand dunes and spinifex sandplain habitat is found immediately south-west of the proposed development envelope. This habitat, near to, but outside of the development envelope, is extensive and totals over 20,000 ha, representing an area 400 percent larger than the area mapped within the development envelope.

Table 7-75 of the referral supporting document (OZ Minerals 2021a) lists disturbance by habitat type from the proposal and describes the areas of habitat mapped during the survey, areas within the development envelope, habitat to be cleared and the percentage impact both within the survey area and within the development envelope.

The EPA consulted with the DBCA regarding the potential impacts of the proposal. DBCA advised that subject to full implementation of the proposed avoidance and management measures, the DBCA considers the proponent should be able to effectively manage the potential impacts on identified conservation significant values.

In accordance with the EPAs request, the proponent has prepared the *West Musgrave Copper and Nickel Project Terrestrial Fauna Management Plan* (Revision 1, September 2021) (TFMP) which details the application of the mitigation hierarchy concerning avoidance and minimisation of direct and indirect impacts to significant terrestrial fauna species, including but not limited to, scheduled species.

The EPA considers the management approach detailed in the plan is suitable for minimising impacts to terrestrial fauna, to ensure the EPA's objective for terrestrial fauna can be met.

Conclusion

1. The residual impact to priority four species through habitat removal and increased animal predation can be regulated through condition 6 so that the environmental outcome is likely to be consistent with the EPA's objective for terrestrial fauna.

Species of significance to the Ngaanyatjarra People

Through consultation with the Ngaanyatjarra People, five fauna species were identified as significant from a cultural perspective (discussed in section 2.5.3).

Although outside of the EPA's Notice for the scope of the TFMP, consideration has also been given in the development of the management approach to the potential project-related impacts on all terrestrial fauna species, including those of significance to the Ngaanyatjarra People, and the subsequent development of management and mitigation measures (OZ Minerals 2021f).

In addition to the regulatory reporting requirements outlined in the TFMP the proponent has committed to report key data from the plan to the Ngaanyatjarra Council, including:

- fauna deaths attributable to the WMP, including mortalities of species considered significant to the Ngaanyatjarra people
- feral animal monitoring outcomes.

The EPA considers that impacts to species of cultural importance to the Ngaanyatjarra People has been adequately considered as part of the proposal, and the mitigation and management approach defined in the TFMP is appropriate to meet the EPAs objective for terrestrial fauna.

Conclusion

1. The EPA advises that the residual impact to species of cultural importance to the Ngaanyatjarra People should be subject to an implementation condition (recommended condition 6) to ensure the environmental outcome is consistent with the EPA objective for terrestrial fauna and social surroundings.
2. The EPA recommends in the annual compliance report required under condition 10, that the proponent shall detail the reporting to the NGC of any conservation significant fauna or culturally significant fauna deaths and feral animal monitoring outcomes attributable to the implementation of the proposal.

2.5.10 Summary of key factor assessment and recommended regulation

The EPA has considered the likely residual impacts of the proposal on terrestrial fauna environmental values. In doing so, the EPA has considered whether reasonable conditions could be imposed to ensure consistency with the EPA factor objective. The EPA assessment findings are presented in Table 6.

The EPA has also considered the principles of the EP Act in assessing whether the residual impacts will be consistent with its environmental factor objective and whether reasonable conditions can be imposed (see Appendix C).

The EPA has also had regard to its conclusions in other recent assessments, including the Revised proposal for the Roy Hill Iron Ore Mine (Assessment No 2214).

Table 6: Summary of assessment for terrestrial fauna

Residual impact or risk to environmental value	Assessment finding	Recommended conditions and DMA regulation
Conservation Significant Fauna (clearing of habitat) Clearing and disturbance of up to 6.7 ha of spinifex sandplain habitat for the great desert skink.	The proposal directly impacts on 0.8 percent of the spinifex sandplain habitat within the development envelope (881.7 ha) and 0.1 percent of the spinifex sandplain habitat mapped in the survey area (4,919.5 ha). Residual impact to great desert skink likely to be able to be regulated to ensure Environmental outcome likely to be consistent with the EPA factor objective through recommended conditions which limit disturbance to	Regulated through recommended conditions: Condition 6-1(1)- Loss of no more than 6.7ha of habitat Condition 6-2 Condition 6-3 – Terrestrial Fauna Management Plan

Residual impact or risk to environmental value	Assessment finding	Recommended conditions and DMA regulation
	spinifex sandplain habitat and otherwise require avoidance and minimisation of impacts to native fauna.	
Impact to significant fauna species (direct and indirect) Fragmentation of fauna habitat as a result of land clearing Death or injury as a result of interaction with project related vehicles or machinery Increased risk of predation of native fauna, including conservation significant fauna	The habitats for the species in the local area outside the development envelope are extensive. The DBCA has advised that implementation of the Terrestrial Fauna Management Plan is likely to be consistent with management of the conservation significance of the species Residual impact should be regulated through conditions which require avoidance and minimisation of impacts to native fauna, and implementation of the Terrestrial Fauna Management Plan, to ensure the environmental outcome is consistent with the EPA's factor objective.	Regulated through recommended conditions: Condition 6-2 and 6-3 Terrestrial Fauna Management Plan
Species of cultural significance to the Ngaanyatjarra People (direct and indirect impacts) Direct and indirect impact to culturally significant fauna	Implementation of Terrestrial Fauna Management Plan with objective to avoid and minimise direct and indirect impacts to fauna is likely to be sufficient to ensure environmental outcome is consistent with the EPA factor objective. The EPA also recommends annual reporting to the Ngaanyatjarra People of impacts to culturally significant fauna (condition 6).	Regulated through recommended conditions: Condition 6-2 and 6-3 -Terrestrial Fauna Management Plan

3. Holistic assessment

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

The EPA's evaluation of other environmental factors (that is, those which were not considered key factors for assessment) is included in Appendix D. The below diagram summarises the key relationships and links between the key environmental factors to inform the EPA's holistic assessment.

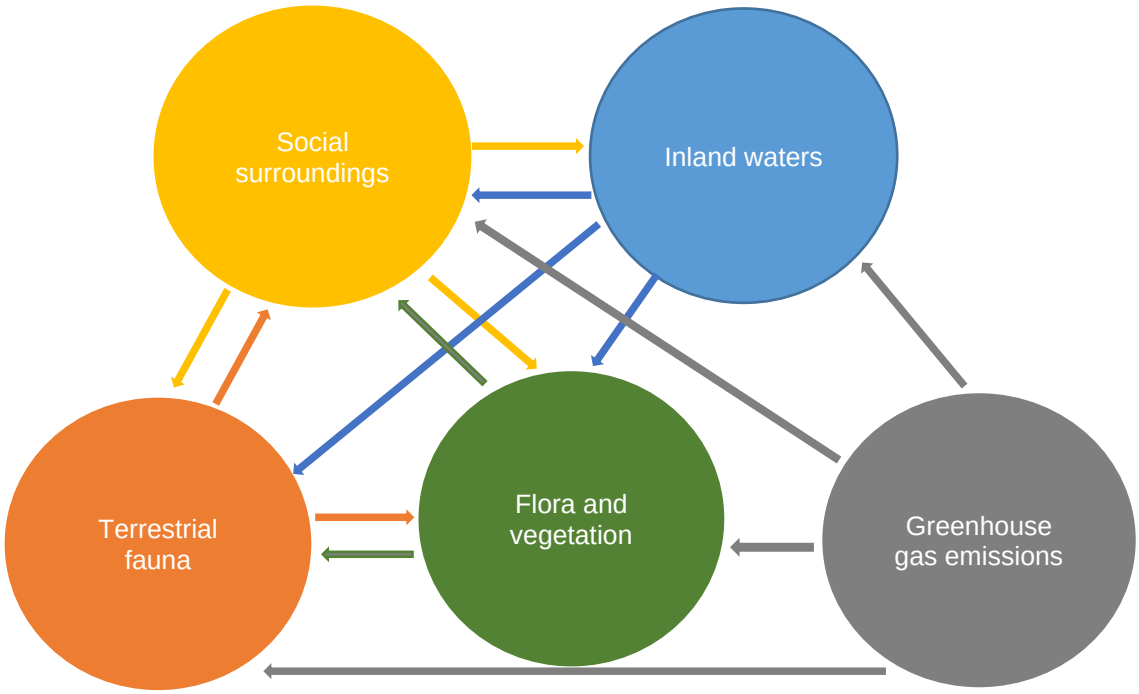

Figure 3: Intrinsic interactions between environmental factors

Social surroundings

Aboriginal cultural associations, including traditional Aboriginal customs, directly link to the physical or biological aspects of the environment. This may include, for example, traditional hunting and gathering activities for native fauna and flora as bush tucker. The impact assessment has considered the strong connection of the traditional owners to land, and the potential impact that water interruptions, interference with terrestrial fauna, groundwater drawdown and clearing of vegetation (including the impact of drawdown on vegetation) may have on this connection.

The EPA considers that the proposed mitigation and management measures and recommended conditions for impacts to social surroundings will also mean the inter-related impacts to the health of other factors of the environment including the values

associated with flora and vegetation, terrestrial fauna and inland waters are likely to be consistent with the EPA's environmental factor objectives.

The EPA has also recommended that the proponent consult with the traditional owners about proposed changes to management plans which protect social surroundings values associated with flora and vegetation, terrestrial fauna and inland waters.

Flora and vegetation and Terrestrial fauna

Flora and vegetation and Terrestrial fauna have a key reliance on inland waters to sustain and maintain growth, as well as providing a food and cultural resource to traditional owners. Social surroundings are also explicitly linked to flora and vegetation, terrestrial fauna and inland waters for the West Musgrave project, given the close connection the Ngaanyatjarra People have to the land.

The EPA has recommended restrictions to drawdown related impacts on culturally important vegetation, and annual reporting to the Ngaanyatjarra People of impacts to culturally significant fauna.

The EPA considers that the proposed mitigation and management measures and recommended conditions for impacts to flora and vegetation will also mean the inter-related impacts to the health of other factors of the environment including the values associated with flora and vegetation, terrestrial fauna, inland waters and social surroundings are likely to be consistent with the EPA's environmental factor objectives.

Inland waters

Groundwater aquifers support groundwater-dependent ecosystems such as vegetation, which are an important environmental and cultural asset. The EPA recognises that there are inherent links between the factor inland waters and other environmental factors. For example, changes to the quality or quantity of inland waters can affect flora and vegetation and social surroundings.

The ecosystem health values related to inland waters generally include ability to sustain vegetation, aquatic fauna and birdlife and the ecological processes that support them. The beneficial uses include cultural and aesthetic values, and the use of water for drinking.

The EPA considers that the recommended conditions and the proposed mitigation and management measures for impacts to inland waters will also mean the inter-related impacts to the health of other environmental factors, including the values associated with flora and vegetation and social surroundings are likely to be consistent with the EPAs environmental factor objectives.

Greenhouse gas emissions

There is an established link between GHG emissions and the risk of climate change. The EPA recognises that climate change will impact on Western Australia's environment and environmental values.

The residual impact associated with GHG emissions from the proposal is 4.06Mtpa Scope 1 emissions of CO_2-e generated over the life of the proposal. The proposal's GHG emissions are 196,500 tonnes of CO_2-e per annum at project commencement (2024). The proposal commits to a GHG reduction pathway to achieve net-zero GHG emissions by 2040 by reducing emissions by 40,500 tonnes of CO_2-e per annum after year 5 (2028), and by a further 81,000 tonnes of CO_2-e per annum after year 10 (2033) – with a reduction to net zero tonnes of CO_2-e per annum after year 15 (2038).

GHG emissions have the potential to impact on all other environmental factors through the effects of climate change.

The EPA considers that the proposed mitigation measures and recommended conditions to regulate GHG emissions will also mean that the impacts to the health of other factors of the environment including the values associated with flora and vegetation, terrestrial fauna, inland waters and social surroundings are likely to be consistent with the EPA's environmental factor objectives.

Summary of holistic assessment

When the separate environmental factors of the proposal were considered together in a holistic assessment, the EPA formed the view that the impacts from the proposal would not alter the EPAs views about consistency with the EPAs factor objectives.

The EPA considers that a 5 yearly environmental performance report should be required from the proponent, given the interconnected environmental values in the area likely to be affected by the proposal, the fact that the West Musgrave Project represents the first mine within the Musgrave Province, the Ngaanyatjarra Council has advised that traditional laws and customs are still followed on Ngaanyatjarra Lands and a project of this scale has never been constructed and operated there, and the 26 year life of the proposal. This environmental performance reporting will provide the proponent and the Minister with renewed and current information about the performance of the proposal with respect to environmental values over the life on the project.

4. Recommendations

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

- environmental values likely to be significantly affected by the proposal
- assessment of key environmental factors, separately and holistically (this has included considering cumulative impacts of the proposal where relevant)
- EPA's confidence in the proponent's proposed mitigation measures
- likely environmental outcomes which can be achieved with the imposition of conditions
- consistency of environmental outcomes with the EPA's objectives for the key environmental factors
- whether other statutory decision-making processes can mitigate the potential impacts of the proposal on the environment and
- principles of the EP Act.

The EPA recommends that the proposal may be implemented subject to the conditions recommended in Appendix A.

5. Other advice

The EPA may, if it sees fit, include other information, advice or recommendations relevant to the environment in its assessment reports, even if that information has not been taken into account by the EPA in its assessment of a proposal.

The EPA advises that progression of this project within the currently relatively undisturbed West Musgrave Region may open the area up to further progress and development, and the EPA would need to carefully consider cumulative impacts of future projects on the environmental and social values of the area.

The EPA advises that the Ngaanyatjarra Council has told the EPA that traditional laws and customs are still followed on Ngaanyatjarra Lands and a project of this scale has never been constructed and operated there.

The NGC has advised the EPA that it considers the Cultural Heritage Management Plan satisfactory to mitigate risks to Ngaanyatjarra culture and heritage arising from the proposal at this time. The NGC also supports conditions that will require the proponent to engage with them during the implementation and operation of proposals. However, NGC also advises that ongoing engagement and on ground activities and co-ordination require significant resources, and so considered that the Cultural Heritage Management Plan should contain additional mitigations related to the proponent providing funding and resourcing to enable this. The EPA advises that it does not consider it appropriate to recommend conditions requiring proponents to enter into arrangements with third parties, and so has not recommended the Cultural Heritage Management Plan be required to include these. The EPA advises that it understands that there are alternative agreements, including a Mining Agreement, which may deal with funding and resourcing issues.

The EPA notes that in addition to the proponent's adoption of a net zero by 2040 target (which the EPA recommends be required by implementation conditions), the proponent is also developing a decarbonisation roadmap to understand what would be needed to develop a net zero emissions mine. The proponent also has a strategic aspiration to emit zero scope 1 emissions and systematically reduce scope 2 and 3 emissions. EPA encourages this aspiration and notes the proponents commitment to continue to investigate opportunities to accelerate the timeframe to achieve zero emissions (that is, to achieve net zero emissions before 2040).

The EPA provides the following information for consideration by the Minister:

- The EPA notes that the proponent's commitment to the use of renewable energy and adoption of GHG emission reduction targets – setting a target of net zero emissions by 2040.
- The EPA also notes the significant consultation undertaken by the proponent to ensure that the concerns of the Ngaanyatjarra People and traditional owners have been considered and addressed.
- The construction, commissioning and time limited operations for the processing facility, tailings disposal facility and ancillary infrastructure would require a works approval under Part V of the EP Act. The EPA advises it expects this process

would consider emissions and discharges to the environment during construction of these facilities.

- The EPA notes that emissions and discharges from the West Musgrave Copper and Nickel Project would be assessed, managed and regulated under a Part V licence issued by the DWER. The EPA advises it expects emissions and discharges associated with the operation of a tailings storage facility and processing infrastructure, including air emissions and wastewater emissions, would be subject to strict monitoring and management measures. This may include monitoring conditions relating to groundwater at processing and waste disposal facilities, associated with prescribed activities. The EPA considers the impact of emissions and discharges to air and inland waters should be regulated under part V of the EP Act to meet the EPAs objective for air quality and inland waters.
- The EPA notes that the abstraction of groundwater and dewatering activities would be assessed, managed and regulation under a 5C groundwater licence under the RIWI Act to ensure that the impact of groundwater abstraction and dewatering mee the EPAs objective for inland waters. The EPA notes that regulation is expected to achieve protection of water resource ecosystems.
- The EPA also notes that the geotechnical design and stability of any tailings storage facility would be considered during the DMIRS assessment of the mining proposal and mine closure plan. The DMIRS will also assess the proponents waste characterisation and waste rock design, management and methodology as part of the mining proposal assessment. The EPA notes this regulation is expected to achieve the DMIRS principal objective for environmental regulation which is that '*Resource industry activities are designed, operated, closed, decommissioned and rehabilitated in an ecologically sustainable manner, consistent with agreed environmental outcomes and post-mining land-uses without unacceptable liability to the State'* (DMIRS 2020b).
- The EPA advises it is currently reviewing the GHG Guideline, with revised guidance expected after consultation with all stakeholders. The review will consider rapidly evolving science and policy. In the meantime, the EPA has recommended conditions which are designed to be able to be responsive to this, particularly by enabling reviews of the GHGMP to reflect any significant changes (for example, if there are material changes to relevant State, Commonwealth or international GHG science or policy).

Appendix A: Recommended Conditions

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

WEST MUSGRAVE COPPER AND NICKEL PROJECT

Proposal: The proposal is to develop two copper and nickel deposits (Babel pit and Nebo pit) within the West Musgrave Ranges of Western Australia.

Proponent: OZ Minerals Musgrave Operations Pty Ltd
Australian Company Number 640 213 341

Proponent Address: 2 Hamra Drive
ADELAIDE AIRPORT SA 5950

Assessment Number: 2286

Report of the Environmental Protection Authority: Report 1720

Pursuant to section 45 of the *Environmental Protection Act 1986,* it has been agreed that the proposal described and documented in Volume 1 of the proponent's referral supporting document (revision 2) dated 1 June 2021 may be implemented and that the implementation of the proposal is subject to the following implementation conditions and procedures:

1 Limitations and Extent of Proposal

When implementing the proposal, the proponent shall ensure the proposal does not exceed the following extents:

Proposal element	Location	Limitation or maximum extent
Physical elements		
Mine and associated infrastructure	Figures 1 and 2	Development envelope of 20,852 ha
Clearing	Figure 2	No more than 3,830 ha of native vegetation within a development envelope of 20,852 ha
Operational elements		
Mining voids	Figure 2	Nebo pit void to be backfilled above water table post-closure
Mining waste	Figure 2	Placement of up to 1,465 Mt of waste rock into permanent waste rock dumps
Ore processing waste (tailings)	Figure 2	Disposal of up to 315 Mt of tailings into a tailings storage facility and/or Nebo pit void

Power supply	N/A	Up to 60 mega watt (instantaneous load requirement) of fossil fuel electricity generation
Water supply	Figure 2	Abstraction of up to 7.5 gigalitres per annum via borefield and dewatering
Project life	N/A	26 years

2 Cultural Heritage

2-1 The proponent shall implement the proposal to meet the following environmental outcomes:

(1) no direct disturbance of the ethnographic exclusion zones, data of which is held by the EPA and CEO; and

(2) subject to reasonable health and safety requirements, no interruption of ongoing access to land utilised for traditional use or custom by the Ngaanyatjarra People.

2-2 The proponent shall implement the proposal to meet the following environmental objectives:

(1) avoid, where possible, and otherwise minimise indirect impacts to cultural heritage within and surrounding the development envelope; and

(2) avoid, where practicable, and otherwise minimise direct disturbance to archaeological cultural heritage sites.

2-3 The proponent shall implement the *West Musgrave Copper and Nickel Project Cultural Heritage Management Plan* (Revision 3, October 2021) with the objective of ensuring that the outcomes of conditions 2-1(1) and 2-1(2) and the objectives of conditions 2-2(1) and 2-2(2) are achieved.

2-4 The proponent may review and revise the *West Musgrave Copper and Nickel Project Cultural Heritage Management Plan* (Revision 3, October 2021) or any subsequent revisions in consultation with the **NGC** and as approved by the CEO.

2-5 The proponent shall review and revise the *West Musgrave Copper and Nickel Project Cultural Heritage Management Plan* (Revision 3, October 2021) as and when directed by the CEO by notice in writing, and in consultation with the **NGC**, as detailed in condition 2-4.

2-6 The proponent shall continue to implement the approved Cultural Heritage Management Plan, or any subsequently approved revisions, until the CEO has confirmed by notice in writing that the proponent has demonstrated that the

outcomes of condition 2-1 and the objectives of 2-2 are being and will continue to be met.

2-7 In the event of failure to implement management actions detailed in the approved Cultural Heritage Management Plan, the proponent shall notify the CEO in writing within seven (7) days of the non-compliance being identified and shall immediately implement the contingency actions described in the plan.

3 Flora and Vegetation

3-1 The proponent shall implement the proposal to meet the following environmental outcomes:

(1) direct disturbance to be confined to the development footprint identified in Figure 2, limited to 3,380 ha;

(2) the loss of no more than one (1) population of the flora species *Aenictophyton anomalum* within the development envelope;

(3) no direct disturbance in exclusion areas for *Aenictophyton anomalum* identified on Figure 3; and

(4) the loss of no more than 10 per cent of the known population of *Goodenia asteriscus* or *Amaranthus centralis,* or more than 5.2 per cent of any other **priority flora species**.

3-2 The proponent shall implement the proposal to meet the following environmental objective:

(1) avoid, where possible and otherwise minimise impacts to native flora and vegetation, including impacts from clearing, weeds, and fire.

3-3 The proponent shall implement the *West Musgrave Copper and Nickel Project Flora and Vegetation Management Plan* (Revision 1, September 2021), and subsequent approved revisions, with the objective of ensuring the environmental outcomes of condition 3-1 and the objective of condition 3-2 are achieved.

3-4 The proponent shall implement the latest revision of the Flora and Vegetation Management Plan which the CEO has confirmed by notice in writing, addresses the requirements of conditions 3-1 and 3-2.

3-5 The proponent:

(1) may review and revise the Flora and Vegetation Management Plan; or

(2) shall review and revise the Flora and Vegetation Management Plan as and when directed by the CEO, including (if directed) in consultation with the **NGC**.

3-6 The proponent shall continue to implement the Flora and Vegetation Management Plan, or any subsequent revisions as confirmed by the CEO in condition 3-4, until the CEO has confirmed by notice in writing that the proponent has demonstrated that the environmental outcomes detailed in condition 3-1 have been met.

4 Inland Waters

4-1 The proponent shall implement the proposal to meet the following environmental outcomes:

(1) ensure drawdown does not exceed (one) 1 metre at Linton Bore; and

(2) no drawdown related adverse impacts to **culturally important vegetation.**

4-2 The proponent shall revise the *West Musgrave Copper and Nickel Project Groundwater Monitoring and Management Plan* (Revision 2, September 2021) to ensure it is consistent with achievement of the environmental outcomes in condition 4-1. The plan shall:

(1) when implemented, substantiate, and demonstrate that condition 4-1 is being met;

(2) specify trigger criteria that will trigger the implementation of management and/or contingency actions to ensure achievement of the environmental outcomes in condition 4-1;

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

(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 4-2(2) and/or the threshold criteria required by condition 4-2(3) have not been met (including changes to operations, reduction in extraction and consideration of alternative sources (subject to regulatory approval)); and

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

4-3 The proponent shall implement the latest revision of the Groundwater Monitoring and Management Plan which the CEO has confirmed by notice in writing, addresses the requirements of conditions 4-1 and 4-2.

4-4 The proponent shall not undertake groundwater extraction activities for construction or operation of the proposal until the CEO has confirmed in writing that the revisions to the Groundwater Monitoring and Management Plan required under condition 4-2 meet the requirements of that condition.

4-5 In the event that monitoring or investigations at any time indicate an exceedance of threshold criteria specified in the Groundwater Monitoring and Management Plan which is confirmed under condition 4-3, the proponent shall:

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

(2) implement the contingency actions required by condition 4-2(5) within seven (7) days of the exceedance being reported as required by condition 4-5(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 the threshold contingency actions are 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; and

(5) provide a report to the CEO within twenty-one (21) days of the exceedance being reported as required by condition 4-5(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 4-5(3) and 4-5(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 will continue to be met.

4-6 The proponent:

(1) may review and revise the Groundwater Monitoring and Management Plan; or

(2) shall review and revise the Groundwater Monitoring and Management Plan as and when directed by the CEO, including (if directed) in consultation with the **NGC**.

4-7 The proponent shall continue to implement the Groundwater Monitoring and Management Plan, or any subsequent revisions as confirmed by the CEO in condition 4-3, until the CEO has confirmed by notice in writing that the proponent has demonstrated that the environmental outcomes detailed in condition 4-1 have been met.

5 Greenhouse Gas Management

5-1 The proponent shall take measures to ensure that **net greenhouse gas (GHG) emissions** do not exceed:

(1) 915,000 t CO_2-e for the period between project commencement and 30 June 2028;

(2) 780,000 t CO_2-e for the period between 1 July 2028 and 30 June 2033;

(3) 378,000 t CO_2-e for the period between 1 July 2033 and 30 June 2038;

(4) zero (0) t CO_2-e per annum for every five (5) year period from 1 July 2038 onwards.

5-2 The proponent shall submit a report to the CEO each year by 31 March, commencing on the first 31 March after the date of this Statement specifying for the previous financial year:

(1) the quantity of **proposal GHG emissions** and copper and nickel concentrates produced; and

(2) the **emissions intensity** for the proposal.

5-3 The proponent shall submit to the CEO by 31 March 2029, and every fifth 31 March thereafter:

(1) a report specifying:

(a) for each of the preceding five (5) financial years, the matters referred to in conditions 5-2(1) and (2);

(b) for the period specified in conditions 5-1(1), (2), (3) or (4) that ended on 30 June of the year before the report is due:

(i) the quantity of **proposal GHG emissions**;

(ii) the **net GHG emissions**;

(iii) the type, quantity, identification or serial number, and date of retirement or cancellation of any **authorised offsets** which have been retired or cancelled and which have been used to calculate the **net GHG emissions** referred to in condition 5-3(1)(b)(ii), including written evidence of such retirement or cancellation; and

(iv) any measures that have been implemented to avoid or reduce **proposal GHG emissions**

(2) an audit and peer review of the report required by condition 5-3(1), carried out by an independent person or independent persons with suitable technical experience dealing with the suitability of the methodology used to determine the matters set out in the report, whether the report is accurate and whether the report is supported by credible evidence. This report is to be made publicly available as required by condition 5-8.

5-4 A summary document comprising of a summary plan and progress statement outlining key information from the **greenhouse gas management plan** (and reports to that time) must be provided every five (5) years thereafter as per condition 5-3 and also if the **greenhouse gas management plan** is revised under condition 5-7. The summary, where feasible must include:

(1) a graphical comparison of scope 1 emission reduction commitments in the **greenhouse gas management plan** with 'actual' emissions for compliance periods;

(2) proposal performance against benchmarking for comparable facilities;

(3) **emissions intensity**;

(4) a summary of emission reduction measures undertaken by the proponent; and

(5) a clear statement as to whether interim targets have been achieved.

5-5 Within two (2) months of the date of this Statement, the proponent shall revise the *West Musgrave Copper and Nickel Project Greenhouse Gas Management Plan* (Revision 2, October 2021) to ensure it is consistent with the requirements of this condition 5. The proponent shall implement:

(1) the latest version of the plan that the CEO has confirmed in writing meets the requirements of condition 5-7.

5-6 The proponent:

(1) may revise a **greenhouse gas management plan** at any time;

(2) must revise the **greenhouse gas management plan** if there is a change to the proposal which means there is a material risk that condition 5-1 will not be achieved;

(3) must revise the **greenhouse gas management plan** at least every five (5) years to align with the five (5) yearly reporting requirements specified in condition 5-3; and

(4) must revise a **greenhouse gas management plan** if directed to by the CEO, within the time specified by the CEO.

5-7 The proponent shall ensure any revised **greenhouse gas management plan**:

(1) is consistent with the achievement of the emission limits in condition 5-1 (or achievement of emission reductions beyond those required by the emission limits);

(2) specifies the estimated **proposal GHG emissions**, **net GHG emissions** and total **GHG emissions intensity** for the remainder of the life of the proposal;

(3) includes comparison of each of the estimated emissions and **emissions intensity** figures referred to in condition 5-7(2) for the remainder of the life of the proposal against other comparable projects;

(4) identifies and describes any measures that the proponent will implement to avoid, reduce and/or offset **proposal GHG emissions**, or reduce the total **GHG emissions intensity** of the proposal;

(5) specifies interim and long-term targets for avoiding, reducing and/or offsetting **proposal GHG emissions**; and

(6) provides for a program for the future review of the plan to:

(a) assess the effectiveness of measures referred to in condition 5-7(4); and

(b) identify and describe options for future measures that the proponent may or could implement to avoid, reduce and/or offset **proposal GHG emissions** or reduce the **emissions intensity** of the proposal.

(7) is accompanied by a summary plan.

5-8 The proponent shall make all **greenhouse gas management plans** and all reports required under this condition 5 (including audits and peer reviews, summary plans and progress statements) publicly available on the proponent's website within the timeframes specified below for the life of the proposal, or in any other manner or time specified by the CEO:

(1) the **greenhouse gas management plan** (and summary plan) referred to in condition 5-5 within two (2) weeks of receiving notice from the CEO in writing confirming the plan meets the requirements of condition 5-7;

(2) the report referred to in condition 5-2 within two (2) weeks of the report being submitted to the CEO;

(3) the reports, audits and peer reviews, summary plans and progress statements referred to conditions 5-3 and 5-4 within two (2) weeks of the relevant reports, summary statements and progress reports being submitted to the CEO; and

(4) any revised greenhouse gas management plan referred to in condition 5-6 within two (2) weeks of receiving confirmation from the CEO as referred in condition 5-5(1).

6 Terrestrial Fauna

6-1 To prevent impacts to significant fauna species, the proponent shall implement the proposal to meet the following environmental outcome:

(1) loss of no more than 6.7 ha of the spinifex sandplain habitat.

6-2 The proponent shall implement the proposal to meet the following environmental objective:

(1) avoid, where possible and otherwise minimise impacts to native fauna, including impacts from clearing, fragmentation, vehicles and machinery, pipeline construction, feral animals, weeds, and fire.

6-3 The proponent shall implement the *West Musgrave Copper and Nickel Project Terrestrial Fauna Management Plan* (Revision 1, September 2021) with the objective of ensuring the environmental outcome of condition 6-1 and the objective of condition 6-2 are achieved.

6-4 In the compliance assessment report required under condition 10-6, the proponent shall detail the reporting to the **NGC** of any **conservation significant fauna** or **culturally significant fauna** deaths and feral animal monitoring outcomes attributable to the implementation of the proposal.

6-5 The proponent shall implement the latest revision of the Terrestrial Fauna Management Plan which the CEO has confirmed by notice in writing, addresses the requirements of conditions 6-1 and 6-2.

6-6 The proponent:

(1) may review and revise the Terrestrial Fauna Management Plan; or

(2) shall review and revise the Terrestrial Fauna Management Plan as and when directed by the CEO, including (if directed) in consultation with the **NGC**.

6-7 The proponent shall continue to implement the Terrestrial Fauna Management Plan, or any subsequent revisions as confirmed by the CEO in condition 6-4, until the CEO has confirmed by notice in writing that the proponent has demonstrated that the environmental outcome and objective detailed in conditions 6-1 and 6-2 have been met.

7 Environmental Performance Report

7-1 The proponent shall submit an Environmental Performance Report to the Minister every five (5) years.

7-2 The first Environmental Performance Report shall be submitted within three months after five (5) years from substantial commencement, or such other time as may be approved by the CEO.

7-3 Each Environmental Performance Report shall report on proposal impacts on the following environmental values:

(a) state of social surroundings including cultural heritage, landscape, access for traditional use and custom, and amenity;

(b) state of flora and vegetation;

(c) state of groundwater;

(d) state of terrestrial fauna; and

(e) state of the holistic environment.

7-4 The Environmental Performance Report must include:

(a) a comparison of the environmental values identified in condition 7-3 at the end of the five (5) year period; against the state of each environmental value at the beginning of the five (5) year period;

(b) a comparison of the environmental values identified in condition 7-3 at the end of the five (5) year period; against the state of the environmental

values identified in first Environmental Performance Report submitted in accordance with condition 7-2; and

(c) proposed adaptive management and continuous improvement strategies.

7-5 The Environmental Performance Report may be in whole, or part prepared in conjunction with other proponents where there are cumulative impacts from their proposals.

8 Contact Details

8-1 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.

9 Time Limit for Proposal Implementation

9-1 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.

9-2 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.

10 Compliance Reporting

10-1 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 10-6, or prior to implementation of the proposal, whichever is sooner.

10-2 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.

10-3 After receiving notice in writing from the CEO that the Compliance Assessment Plan satisfies the requirements of condition 10-2 the proponent shall assess compliance with conditions in accordance with the Compliance Assessment Plan required by condition 10-1.

10-4 The proponent shall retain reports of all compliance assessments described in the Compliance Assessment Plan required by condition 10-1 and shall make those reports available when requested by the CEO.

10-5 The proponent shall advise the CEO of any potential non-compliance within seven (7) days of that non-compliance being known.

10-6 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;

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

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

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

(8) indicate any proposed changes to the Compliance Assessment Plan required by condition 10-1.

11 Public Availability of Data

11-1 Subject to condition 11-2, 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.

11-2 If any data referred to in condition 11-1 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.

Schedule 1

Table 1: Abbreviations and definitions

Acronym or abbreviation	Definition or term
Authorised Offsets	Units representing GHG emissions issued under one of the following schemes and cancelled or retired in accordance with any rules applicable at the relevant time governing the cancellation or retiring of units of that kind: (a) Australian Carbon Credit Units issued under the *Carbon Credits (Carbon Farming Initiative) Act 2011* (Commonwealth); (b) Verified Emission Reductions issued under the Gold Standard program; (c) Verified Carbon Units issued under the Verified Carbon Standard program; or (d) other offset units that the CEO has notified the proponent in writing meet integrity principles and are based on clear, enforceable and accountable methods
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/her delegate
Conservation significant fauna	Threatened fauna species listed under the *Environment Protection and Biodiversity Conservation Act 1999* and *Biodiversity Conservation Act 2016*
Culturally important vegetation	Specific stand of desert oaks and Mulga identified through consultation with the Ngaanyatjarra People as being of cultural significance, as detailed in the as detailed in the *West Musgrave Copper and Nickel Project Groundwater Monitoring and Management Plan* as amended from time to time.
Culturally significant fauna	Fauna species of cultural importance identified through consultation with the Ngaanyatjarra People, as detailed in the *Terrestrial Fauna Management Plan* as amended from time to time.
Emissions intensity	Proposal GHG emissions per tonne of copper concentrate and nickel concentrate produced.
EPA	Environmental Protection Authority
ha	Hectare
Minister	West Australian Minister for Environment

Net Greenhouse Gas (GHG) Emissions	Proposal scope 1 GHG emissions for a period less any reduction in GHG emissions represented by the cancellation or retirement of authorised offsets which: (a) were cancelled or retired between the first day of the period until 1 March in the year after the period has ended; (b) have been identified in the report for that period as required by condition 5-3(1)(b)(iii); (c) have not been identified as cancelled or retired in the report for that period as required by condition 5-3(1)(b)(iii); (d) have not been used to offset GHG emissions other than proposal GHG emissions; and (e) were not generated by avoiding proposal GHG emissions.
NGC	Ngaanyatjarra Council (Aboriginal Corporation) ICN 101
Priority flora species	As defined in the Conservation Codes for Western Australian Flora and fauna
Proposal GHG emissions	GHG emissions released to the atmosphere as a direct result of an activity or series of activities that comprise/s or form/s part of the proposal
t CO_2-e	Tonnes of carbon dioxide equivalent. A metric used to compare emissions from various greenhouse gases by converting amounts of other gases to the equivalent amount of CO_2 based on their Global Warming Potential.

Figures (attached)

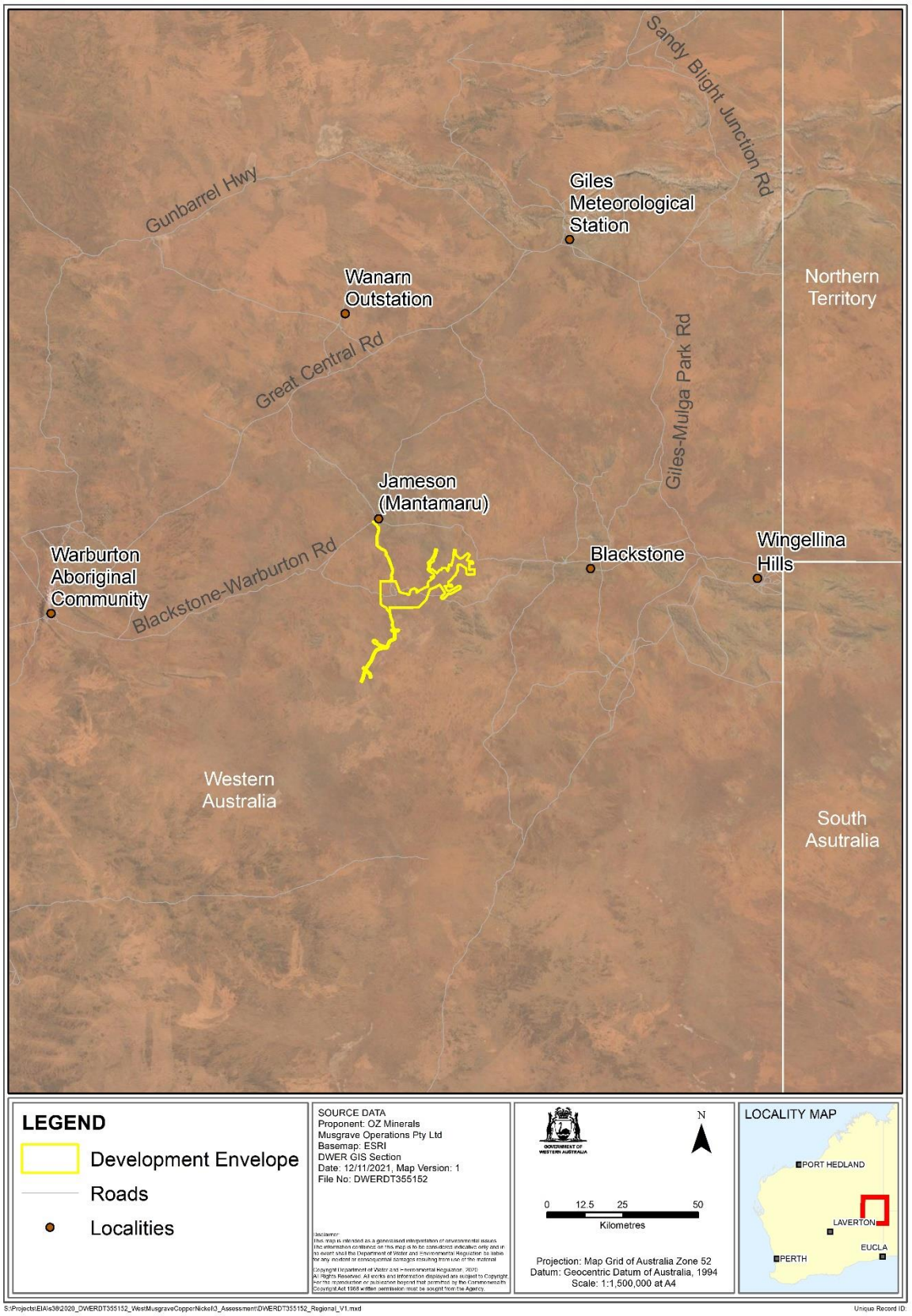

Figure 1. Regional location of the proposal

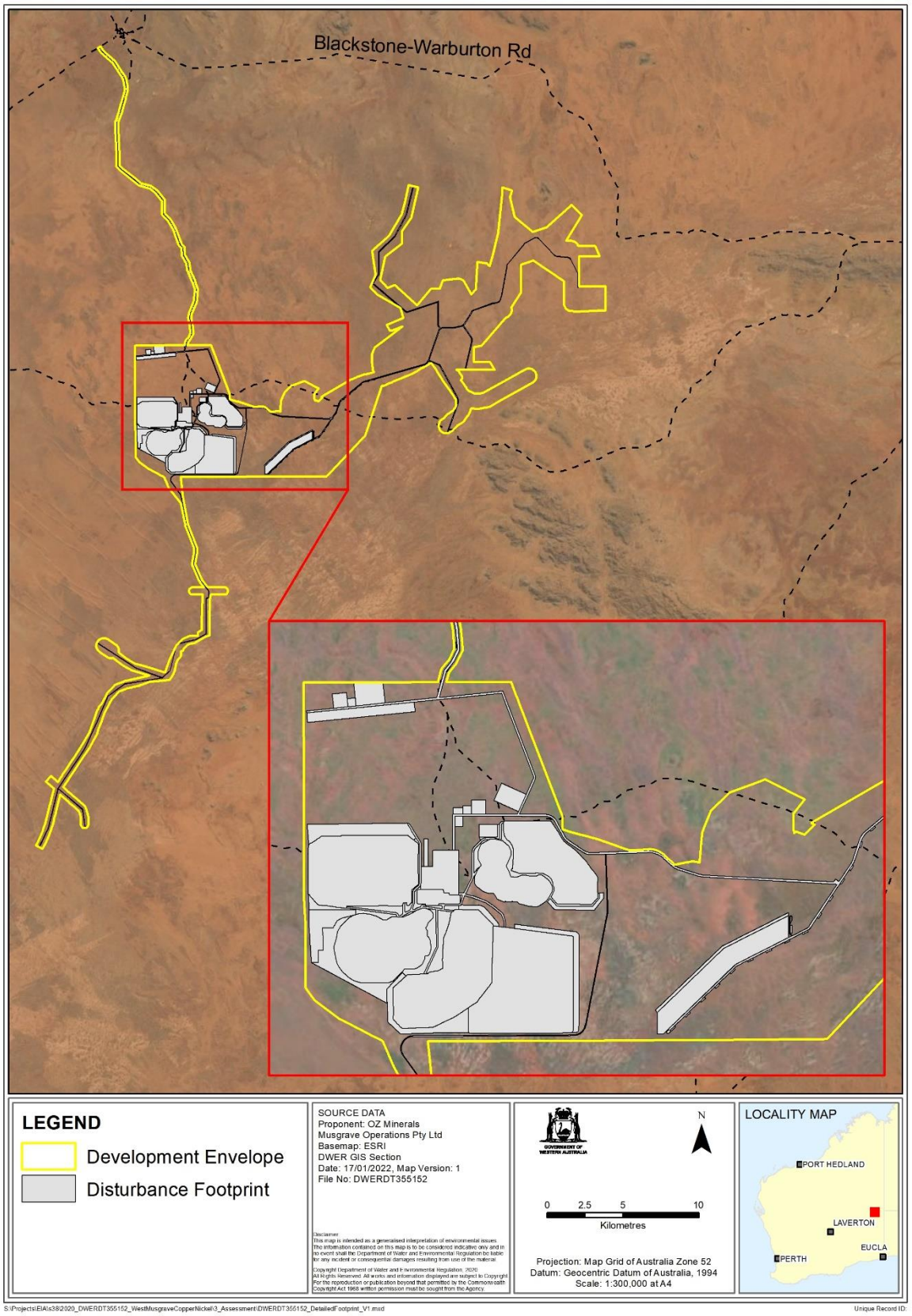

Figure 2. Development envelope for the proposal

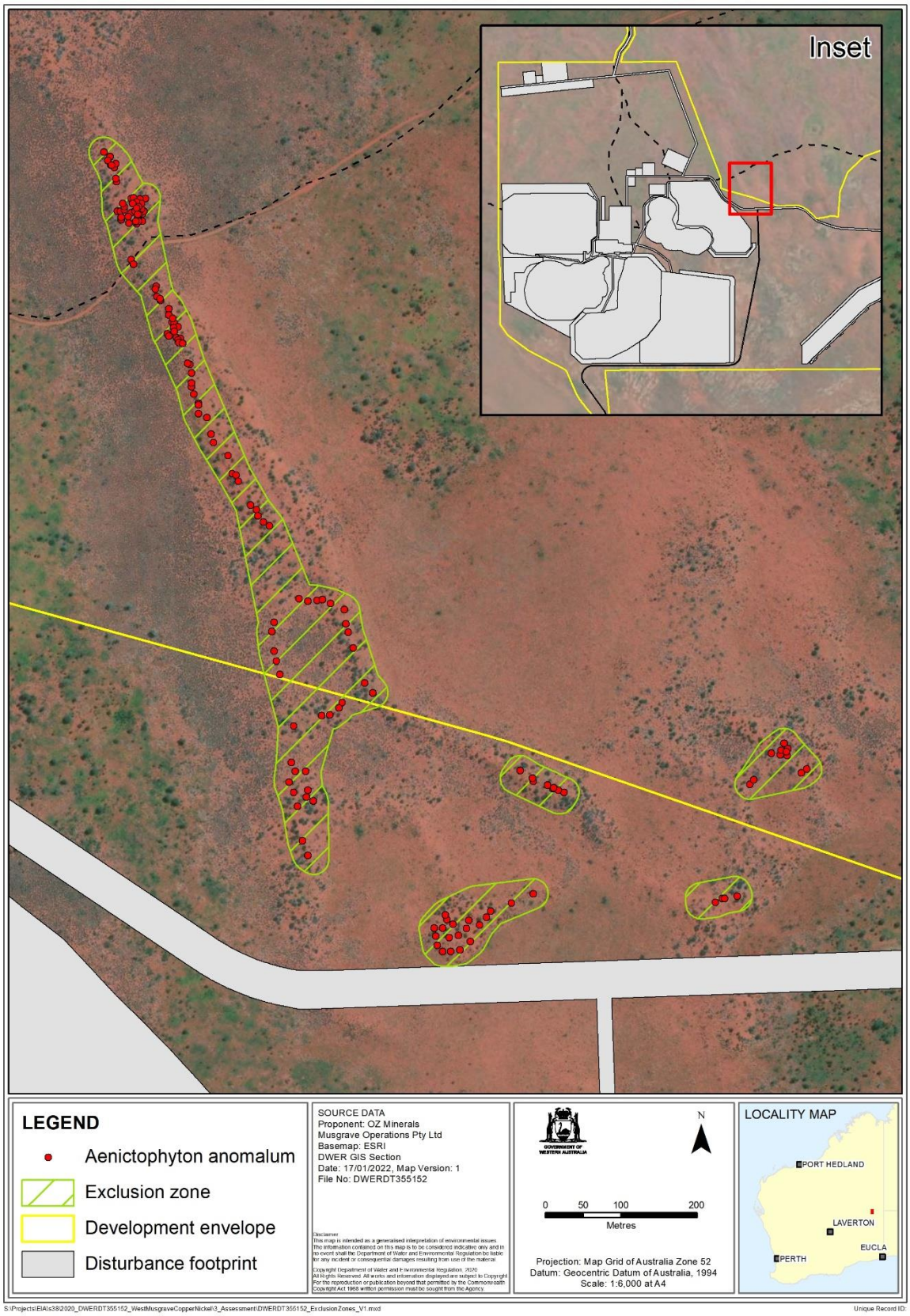

Figure 3: Exclusion zones for *Aenictophyton anomalum*

All co-ordinates are in metres, listed in Map Grid of Australia Zone 52 (MGA Zone 52), datum of Geocentric Datum of Australia 1994 (GDA94).
Spatial data depicting the figures in this schedule are held by the Department of Water and Environmental Regulation as follows:

- Figure 1: Regional location of the proposal – DWERDT551755
- Figure 2: Development envelope for the proposal – DWERDT551749
- Figure 3: Exclusion zones for *Aenictophyton anomalum* – DWERDT550560

Appendix B: Decision-making authorities

Table B1: Identified relevant decision-making authorities

Decision-Making Authority	Legislation (and approval)
1. Minister for Aboriginal Affairs	*Aboriginal Heritage Act 1972* - section 18 consent to impact a registered Aboriginal heritage site
2. Minister for Environment	*Biodiversity Conservation Act 2016* - section 40 authority to take or disturb threatened species
3. Minister for Mines and Petroleum	*Mining Act 1978* - granting of a new mining lease
4. Minister for Water	*Rights in Water and Irrigation Act 1914* - s. 5C licence to take water - s. 26D licence to construct or alter a well - dewatering licence
5. Chief Executive Officer, Department of Biodiversity, Conservation and Attractions	*Biodiversity Conservation Act 2016* - authority to take flora and fauna (other than threatened species)
6. Chief Dangerous Goods Officer Department of Mines, Industry Regulation and Safety	*Dangerous Goods Safety Act 2004* • storage and handling of dangerous goods
7. Executive Director, Resource and Environmental Compliance, Department of Mines, Industry Regulation and Safety	*Mining Act 1978* - mining proposal
8. State Mining Engineer, Department of Mines, Industry Regulation and Safety	*Mines Safety and Inspection Act 1994* - mine safety - approval to commence mining operations
9. Chief Executive Officer, Department of Water and Environmental Regulation	*Environmental Protection Act 1986* - part V works approval and licence
10. Chief Executive Officer, Shire of Ngaanyatjarraku	*Health Act 1911* and *Health (Treatment of Sewage and Disposal of Effluent and Liquid Waste) Regulation 1974* – treatment of sewage intended to serve a single dwelling or any other building that produces less than 540 litres of sewage per day *Building Act 2011* • permit for worker accommodation

	Planning and Development Act 2005 - development approval

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

Appendix C: Consideration of Environmental Protection Act principles

Table C1: Consideration of principles of the *Environmental Protection Act 1986*

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.*	The EPA has considered the precautionary principle in its assessment and has had particular regard to this principle in its assessment of inland waters and greenhouse gas emissions. The EPA notes in particular that a significant study area was investigated as part of the proposal's environmental baseline program to allow for design flexibility where constraints were identified. Following this, the development envelope and proposed project layout were adjusted to avoid potential environmental values. Additional precautionary avoidance and mitigation measures to avoid potential serious or irreversible damage to the environment included: • Relocation of the airstrip to avoid disruption to surface water flow paths under high AEP scenarios • Adjustment of the development envelope to exclude heritage sites • While traditional owners did not communicate the significance of potential impacts to holistic cultural amenity as a result of the proposed project directly, precautionarily OZ Minerals, in consultation with the Ngaanyatjarra Council (the agent for the Ngaanyatjarra People), have agreed that both direct and indirect biophysical impacts to ethnographic sites have been assessed as satisfactorily mitigated. This is partly due to all ethnographic sites, which were identified by traditional owners and the Ngaanyatjarra Council, being excluded from the development envelope. • Backfilling of Nebo pit to avoid post-closure effects to groundwater systems and allow the water table to recover more rapidly following completion of mining • Development of a bypass which is offset 1.5 km from the Jameson (Mantamaru) community to avoid potential community safety and amenity impacts (such as noise, dust, and light) • Use of 70–80% renewables to supply project electricity would avoid the generation of up to 135% more greenhouse gas compared with a diesel-electricity solution and 75% compared to a conventional gas-fired electricity generation • Ongoing consultation with Traditional Owners about the design and layout of the proposal to ensure that it is culturally appropriate and acceptable. <u>Inland waters</u>

EP Act principle	Consideration
	The EPA notes that the proponent has taken a precautionary approach when setting drawdown triggers and thresholds for the proposal, to prevent impacts to both community water supplies, and impacts on species of potential groundwater dependence –in the absence of verified GDE status. This will prevent serious or irreversible damage to vegetation while further studies are conducted to clarify the uncertainties and avoid interruption to water supply for traditional owner use and customs. <u>Greenhouse gas emissions</u> The EPA notes that climate change as a result of cumulative GHG emissions has the potential to cause serious damage to WA's environment. The specific impacts of any single proposal's GHG emissions are not able to be known with certainty at this time. However, the EPA has not used this as a reason for postponing assessment of the proposal's contribution to the State's GHG emissions or recommending practicable conditions to reduce emissions in order to minimise the risk of environmental harm associated with climate change. The EPA notes the proposal will result in 4.06 Mt of CO_2-e over 26 years. The proponent has committed to following a trajectory to net zero emissions by 2040, and to use offsets should these targets not be met. The EPA has recommended conditions to ensure these limits are met. The EPA has also recommended conditions to ensure other measures related to key environmental factors are implemented. These include condition 5-5 which requires the implementation of the GHGMP to ensure the proponent continues to review emissions and implement continuous improvement to reduce emissions The EPA has compared the proposal's predicted GHG intensity and energy efficiency against applicable best practice criteria and other existing and proposed base metal mining operations and has determined that the proposed technology that will be used by the project (including processing and energy) and its greenhouse gas intensity and energy efficiency is aligned with best practice.
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.*	The EPA has considered the principle of intergenerational equity in its assessment and has had particular regard to this principle in its assessment of social surroundings, inland waters and greenhouse gas emissions. The EPA considers consistency with this principle could be achieved with the implementation of its recommended conditions, in addition to the proposal's adoption of commitments in their environmental management plans. <u>Social surroundings</u>

EP Act principle	Consideration
	The EPA notes the strong connection to land, and that the Ngaanyatjarra traditional owners and traditional knowledge holders maintain deep and serious obligations to care for country and protect cultural heritage sites. The remote nature of the proposal, and the high value connection of the Ngaanyatjarra People to the West Musgrave region makes it relevant that the connection is not lost for future generations. The EPA has considered that the connection to land should be maintained for future generations. The EPA has recommended implementation of the Cultural Heritage Management Plan (CHMP), and a separate condition requiring that any updates to the CHMP must be done in consultation with the NGC or representative body and agreement must be provided in writing. Inland waters The EPA notes the proponents commitment to monitor the progression of drawdown, and that if the project was to impact on Linton Bore (e.g drawdown) an alternative would be drilled to ensure continued access for the community. Approval for this alternative well would be required and this process would assess impacts at that time. Greenhouse gas emissions The EPA has noted that GHG emissions pose a risk to future generations, however, also notes that the proponent has committed to following a trajectory to net zero emissions by 2040. Offsets are to be used should these targets not be met by continuous improvement. The EPA has recommended conditions to ensure this.
3. The principles of the conservation of biological diversity and ecological integrity *Conservation of biological diversity and ecological integrity should be a fundamental consideration.*	The EPA has considered the principle of conservation of biological diversity and ecological integrity in its assessment and has had particular regard to this principle in its assessment of the impact of groundwater drawdown on flora and vegetation. The proponent has undertaken baseline studies and committed to further studies (e.g. GDEs assessment) 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 in accordance with the mitigation hierarchy. The EPA has considered these measures during its assessment (provided in this report). Flora and vegetation and Terrestrial fauna The EPA has considered to what extent the potential impacts from the proposal to flora and vegetation and terrestrial fauna can be ameliorated to ensure consistency with the principle of conservation of biological diversity and ecological integrity. The EPA has concluded that given the nature of the impacts (large areas of vegetation and habitat for significant fauna species

EP Act principle	Consideration
	that will not be disturbed) that the proposed mitigation and management are likely to ameliorate the impacts of the loss of biological diversity and ecological integrity. The EPA notes that the proponent has excluded critical habitat for the Great desert skink from its development envelope, significantly reducing the potential impact on this vulnerable listed species.
4. Principles relating to improved valuation, pricing and incentive mechanisms *(3) Environmental factors should be included in the valuation of assets and services.* *(4) The polluter pays principle — those who generate pollution and waste should bear the cost of containment, avoidance or abatement.* *(5) 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 wastes.* *(6) Environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, which enable those best placed to maximise benefits and/or minimise costs to develop their own solutions and responses to environmental problems.*	In considering this principle, the EPA notes that the proponent will bear the costs relating to implementing the proposal to achieve environmental outcomes, and management and monitoring of environmental impacts during construction, operation and decommissioning of the proposal. The EPA has had particular regard to this principle in considering greenhouse gas emissions. The proponent has noted that it has and would continue to evaluate opportunities to reduce impacts to land, reduce waste and improve efficiencies in water and energy. <u>Greenhouse gas emissions</u> The proponent will be responsible for bearing the costs of implementing measures to reduce and offset GHG emissions, including the costs of adopting advances in process management and other measures in the future to further reduce and offset GHG emissions to achieve net zero along a trajectory to net-zero by 2040 (proponent's target).
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.*	The EPA has considered the principle of waste minimisation in its assessment and has had particular regard to this principle in its assessment of inlands waters. The EPA notes that proponent proposes to implement an 'avoid, reduce, re-use, reprocess, recycle, recovery and dispose' hierarchy of waste management approach across all components and phases of the project, in accordance with the objectives of the *Waste Avoidance and Resource Recovery Act, 2007.* The EPA notes the proponent has undertaken studies into the geochemical and physical characterisation of waste rock and tailings to gain an understanding of problematic waste and the best mechanisms to manage this waste. These studies have informed the design of waste facilities including waste rock dumps and the TSF.

Appendix D: Other environmental factors

Table D1: 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
Land			
Landforms	A small number of potentially significant Landforms occur near to, but outside of the proposed Development Envelope.	Public comments • Concerns regarding the clearing occurring over an extensive area associated with an extensive landscape feature (West Musgrave Ranges)	A small number of potentially significant Landforms occur near to, but outside of the proposed development envelope. Due to restricted access to many of these landforms due to heritage matters, the proponent precautionarily assigned these Landforms as landforms that may be potentially ecologically, socially or of integrity importance. A regional scale landform assessment was undertaken that covered the development envelope and all areas that may be indirectly impacted by the project proposal. This information was done using regionally available data sets, topographic maps, digital elevation models, heritage reports and site-based knowledge. Significant study effort has occurred to confirm the location of potentially significant Landforms, as such their locations are understood with certainty. The development envelope has been designed to exclude all Landforms and thereby eliminate the potential for direct impacts (OZ Minerals 2021a). Accordingly, the EPA did not consider the factor landforms to be a key environmental factor at the conclusion of its assessment.
Terrestrial environmental quality	Potential impacts to soil resulting from leachate and seepage from waste rock dumps and tailings storage facility.	Public comments • Concern over the long term geochemical risks and their management	The key pathway for surface contaminants to the receiving environment are through surface water. Surface water studies have demonstrated that runoff only occurs as a result of high intensity, low frequency rainfall events and that any runoff that does occur is

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
		Agency comments DWER • It is considered that additional geochemical testing would be required during the life of the mining project. This would be necessary to develop management strategies for all mine wastes from the West Musgrave project area on closure, not just for those that are considered to be potentially acid forming (PAF) materials. • It is important that this risk is assessed during the life of the mining operation to ensure this issue can be managed on mine closure. • It is important that the risks of environmental impacts of metals in the pit lake are assessed during the life of the mining project. This would require geochemical modelling to be undertaken to indicate how metal concentrations in the pit lake are likely to change over time. This modelling should be progressively refined as more information becomes available about the geochemistry of waste rock materials from the site. • A works approval and subsequent licence for the WMP may contain conditions in relation to impacts to groundwater at the processing and	likely to be as sheet flow. Velocities are relatively slow, and erosion potential is also therefore low. Impacts of any contamination as a result of surface flow are therefore expected to be short in duration and highly localised. The hydrochemistry modelling has conservatively shown that any generation of solutes can be attenuated within a short distance from solute generating structures by the receiving environment and any potential impacts would be highly localised, in most cases to within metres of the waste structures (TSF and WRDs) themselves. The proponent has confirmed that further refinement of the pit lake model is currently being scoped based on additional hydrogeology work and the final results of kinetic testing. This will include assessment of the filling phase of the pit lake and modelling of concentrations over this time as well as into the long term. These matters will be further addressed as part of the Mining Proposal. DWER have confirmed that emissions and discharges from tailings storage facility would be assessed, managed and regulated under Part V of the EP Act. DMIRS have confirmed that the design of the waste rock facilities and TSF would be assessed, managed and regulated under the Mining Act.

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
		waste disposal facilities associated with prescribed activities.	Accordingly, the EPA did not consider the factor terrestrial environmental quality to be a key environmental factor at the conclusion of its assessment.
Air			
Air quality	Sensitive receptors to dust and emissions related potential impacts include the Jameson (Mantamaru) community 26 km from the development envelope. Potential for particulate and gaseous emissions from the proposed project to result in change in local air quality.	No agency or public comments were received	An assessment of air quality impacts was summarised in Section 6.1.4 of the referral supporting document and presented in detail in Appendix H1. The extent of changes to baseline air quality is predicted to be approximately 20 km based on the monitoring and modelling undertaken at the similar OZ Minerals Prominent Hill operation. The nearest residences are located at Jameson (Mantamaru), 26 km from the proposed project. As a result, there are predicted to be no changes to baseline air quality at Jameson (Mantamaru), and therefore no direct dust and odour amenity impacts. Emissions and discharges from the proposal (e.g. those related to processing, TSF and ancillary infrastructure) can be assessed, managed and regulated under Part V licence to meet he EPAs objective for Air Quality. Accordingly, the EPA did not consider the factor air quality to be a key environmental factor at the conclusion of its assessment.

Appendix E: Relevant policy, guidance and procedures

The EPA had particular regard to the policies, guidelines and procedures listed below in the assessment of the proposal.

- *Environmental Factor Guideline – Social Surroundings (EPA 2016)*
- *Environmental Factor Guideline – Air Quality (EPA 2020)*
- *Environmental Factor Guideline – Flora and Vegetation (EPA 2016)*
- *Environmental Factor Guideline – Greenhouse Gas Emissions (EPA 2020)*
- *Environmental Factor Guideline – Inland Waters (EPA 2018)*
- *Environmental Factor Guideline – Terrestrial Environmental Quality (EPA 2016)*
- *Environmental Factor Guideline – Terrestrial Fauna (EPA 2016)*
- *Environmental Impact Assessment (Part IV Divisions 1 and 2) Procedures Manual* (EPA 2020)
- *Statement of environmental principles, factors, objectives and aims of EIA* (EPA 2021)
- *Assessment (Part IV Divisions 1 and 2) Administrative Procedures* (State of Western Australia 2021)
- *Technical Guidance – Flora and vegetation surveys for environmental impact assessment* (EPA 2016)
- *Technical Guidance – Sampling of short-range endemic invertebrate fauna* (EPA 2016)
- *Technical Guidance – Terrestrial vertebrate fauna surveys for environmental impact assessment* (EPA 2020).

Appendix F: List of submitters

7-day comment on referral

Public submission 1
Public submission 2
Public submission 3

Public review of proponent information

Organisations and public

Ngaanyatjarra Council

Government agencies

Department of Biodiversity, Conservation and Attractions
Department of Planning, Lands and Heritage
Department of Water and Environmental Regulation
Department of Mines, Industry Regulation and Safety

Appendix G: Assessment timeline

Date	Progress stages	Time (weeks)
23 March 2021	EPA decided to assess – level of assessment set	
14 April 2021	EPA requested additional information	3
2 June 2021	EPA received additional information	7
21 June 2021	EPA accepted additional information	2
28 June 2021	EPA released additional information for public review	1
19 July 2021	Public review period for additional information closed	3
28 October 2021	EPA received final information for assessment	14
16 December 2021	EPA completed its assessment (s. 44(2b))	7
27 January 2022	EPA provided report to the Minister for Environment	7
4 February 2022	EPA report published	3 days
25 February 2022	Appeals period closed	3

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

The EPA must give the Assessment report to the Minister so far as is practicable, no later than six weeks after the EPA completes its assessment or reassessment (s. 44(2b)). In this case, the EPA provided its assessment report to the Minister 7 weeks after completing its assessment as it was not practicable to provide it within 6 weeks, due to finalisation of the report coinciding with the Christmas/New Year holiday period.

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EPA References

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EPA 2016d, *Environmental Factor Guideline – Terrestrial Fauna*, Environmental Protection Authority, Perth, WA.

EPA 2016e, *Technical Guidance – Sampling of short-range endemic invertebrate fauna*, Environmental Protection Authority, Perth, WA.

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