

Environmental Protection Authority

# Mackay Sulphate of Potash Project

Agrimin Limited

Report 1777 December 2024 This assessment report has been prepared by the Environmental Protection Authority (EPA) under s. 44 of the *Environmental Protection Act 1986* (WA). It describes the outcomes of the EPA's assessment of the Mackay Sulphate of Potash Project proposal by Agrimin Limited.

The Mackay Sulphate of Potash Project was determined under the Commonwealth *Environment Protection and Biodiversity Act 1999* to be a controlled action and to be assessed by the EPA under an accredited process. This document is also the result of the EPA's accredited assessment process.

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

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

**Darren Walsh** Chair Environmental Protection Authority

7 December 2024

ISSN 1836-0491 (Online) Assessment No. 2193

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# Summary

# Proposal

The Mackay Sulphate of Potash Project is a proposal to develop a greenfields sulphate of potash (SOP) fertiliser operation. The proposal is located approximately 490 kilometres (km) from Halls Creek, in the Shire of East Pilbara and the Kimberley region of Western Australia.

The proponent for the proposal is Agrimin Limited. The proposal involves the on-lake development of trenches and solar evaporation ponds for brine extraction and SOP production.

The development envelopes (DE) comprise of four components that make up the proposal (263,675 ha):

- on-lake DE (217,261 ha) includes development of trench network, extraction of up to 100 gigalitres per annum (GL/a) of brine, evaporation and crystalliser ponds
- off-lake DE (688 ha) includes development of access roads, processing plant, accommodation village, airstrip and solar farm
- southern infrastructure DE (borefield DE) (11,799 ha) includes development of bore field water pipeline and access tracks for groundwater abstraction of 3.5 GL/a
- northern infrastructure DE (haul road DE) (33,928 ha) includes a 350 km haul road for trucking SOP product to Wyndham Port.

# Context

The proposal is in a remote and relatively undisturbed area in WA with vegetation in excellent condition which provides critical habitat for several threatened fauna species including the night parrot (*Pezoporus occidentalis*), greater bilby (*Macrotis lagotis*) and the great desert skink (*Liopholis kintorei*).

Lake Mackay is the largest inland salt lake in WA, and the fourth largest in Australia, and extends beyond the state border into the Northern Territory. The lake provides habitat for a high diversity and abundance of listed migratory shorebird species and supports aquatic and subterranean fauna. Flooding leads to rapid growth of aquatic biota that can provide a significant food source for waterbirds.

# **Environmental values**

The key environmental values that may be impacted by the proposal are:

- Terrestrial fauna: critical habitat for several threatened species, including the night parrot, great desert skink, greater bilby, and migratory and threatened waterbirds and shorebirds
- flora and vegetation: riparian vegetation, priority 1 and 3 species, and native vegetation currently in excellent condition

- inland waters, subterranean fauna: potential groundwater dependent ecosystems and aquatic biota, and important foraging and breeding habitat for waterbirds and migratory shorebirds; and,
- social surroundings: Aboriginal cultural heritage sites and areas of cultural significance.

# Consultation

The EPA published the proponent's referral information for the proposal on its website for seven days public comment and received three comments. The EPA also published the proponent's environmental review document on its website for public review for four weeks (from 4 May to 30 May) and received one comment. The EPA considered the 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 considered the mitigation hierarchy in the development and assessment of its proposal, and as a result will:

- 1 avoid direct impacts to significant fauna by implementing buffers around night parrot (*Pezoporus occidentalis*) roosting sites, active great desert skink (*Liopholis kintorei*) burrows, and ephemeral water sources
- 2 avoid direct impacts to lake island habitat where migratory shorebirds and waterbirds breed, and stygofauna habitat have been recorded
- 3 avoid direct impacts to heritage sites by realigning the haul road Development Envelope
- 4 minimise adverse indirect impacts to significant fauna through the implementation of mitigation and monitoring outlined in the Construction Environmental Management Plan, Night Parrot Management Plan and Terrestrial Fauna Environmental Management Plan
- 5 minimise indirect impacts to significant fauna through the implementation of fire and feral animal management programs
- 6 minimise clearing of critical roosting, burrowing and supporting habitats (e.g. foraging) for significant species including the greater bilby (*Macrotis lagotis*), night parrot and great desert skink
- 7 offset significant residual impacts of habitat clearing on significant fauna (greater bilby, night parrot and great desert skink) through the implementation of fire and feral pest management, and research programs to improve the resilience and management of significant fauna species in the region.

# Assessment of key environmental factors

The EPA has identified the key environmental factors (listed below) in the course of the assessment. For each factor, the EPA has assessed the residual impacts of the

proposal on the environmental values and considered whether the environmental outcomes are likely to be consistent with the EPA environmental factor objectives.

# Terrestrial fauna

Residual impact or risk to environmental value		Assessment finding
1.	<ul> <li>Direct impact to the following habitat types that are of importance to threatened fauna:</li> <li>42.22 ha of claypan and claypan mosaic, 3.44 ha of saline flats and depressions, 22.4 ha of lake margin complex habitat that are critical to the night parrot, and 0.55 ha drainage line habitat that is supporting habitat for the night parrot</li> <li>248.12 ha of gravel spinifex plain, 754.20 ha of spinifex sandplain, 42.22 ha of claypans and claypan mosaic, 281.82 ha of dunefield and 19.27 ha of dune habitat that are critical habitat for the greater bilby.</li> <li>754.20 ha of spinifex sandplain habitat that is critical habitat for the great desert skink.</li> </ul>	Significant residual impacts are predicted to occur as a result of the clearing of critical habitat for the night parrot, greater bilby, and great desert skink. The EPA has recommended conditions to limit the extent of clearing, set outcomes and objectives, and require specific avoidance and minimisation measures are implemented to ensure residual impacts are not greater than predicted. The EPA considers that significant residual impacts can be counterbalanced by appropriate offsets (condition B5) so that the environmental outcome is likely to be consistent with the EPA objective for terrestrial fauna.
2.	Impact to threatened fauna from injury and/or mortality during construction and operation, including from vehicle strike, bird strike (wind turbines), artificial light, entrapment in ponds and trenches, noise, vibration and dust.	There is the potential for significant residual impacts to threatened fauna as a result of construction and operation of the proposal. The EPA considers that with appropriate management, the risk of residual impacts can be mitigated, and the environmental outcome will likely be consistent with the EPA's objective for terrestrial fauna. The EPA has recommended outcome-based conditions B1-1, objective-based conditions B1-2, as well as specific management and monitoring actions (condition B1-3 to B1-11) to reduce the risk of injury and mortality to terrestrial fauna.
3.	Indirect impact to threatened fauna through habitat fragmentation, altered fire regimes, altered hydrogeology and introduction of invasive weed species.	The EPA advises there is material scientific uncertainty in relation to potential impacts on the night parrot, greater bilby and great desert skink, and limited confidence in the likelihood of buffer and minimisation measures being able to mitigate those
4.	fauna as a result of increase in feral predator species.	impacts. The EPA considers that tangibly improving the resilience of the species in the region

		through habitat management and threat reduction will be required to reduce the scientific uncertainty, increase confidence in buffer and minimisation measures, and also offset the direct impacts. Sustained net gain in habitat quality prior to and post the proposal is needed to satisfy the EPA that the proposal can be consistent with viability of these threatened species in the region.
		The proponent's revised offset strategy, combined with the EPA's recommended offsets conditions, provide this satisfaction through providing targeted conservation actions, such as fire and feral animal management, to contribute to the overall recovery and protection of populations.
		The EPA has assessed that with proposal specific outcomes-based regulation, monitoring and adaptive management requirements, and offsets (condition B5) to improve resilience in place prior to disturbance, the proposal can be implemented in a way which is likely to be consistent with the EPA's objectives.
5.	Indirect impacts to habitat and availability of foraging resources through changes to lake hydrology including altered ground and surface water regimes.	There is the potential for the proposal to alter lake hydrology which may result in a loss of habitat and foraging resources for threatened fauna species. The EPA advises that the residual impact can be regulated through conditions relating to the monitoring and management of impacts to inland waters to achieve required environmental outcomes. The EPA considers that managing the proposal to prevent residual impacts to inland waters will be effective in preventing secondary impacts to habitat and

# Flora and vegetation

Residual impact or risk to environmental value		Assessment finding
1.	Loss of up to 1,500 ha of native vegetation of which 99% is in excellent condition.	The clearing of excellent condition vegetation, including riparian vegetation, represents a residual impact. The EPA
2.	Loss of up to 33.13 ha of riparian vegetation.	advises that this residual impact can be regulated through conditions including limitations on clearing (condition A1).
3.	Loss of up to 9% <i>Comesperma</i> sabulosum (P3).	conditions with specific environmental outcomes to ensure no adverse impacts to

4.	Indirect impacts to <i>Stackhousia</i> sp. Lake Mackay (P.K. Latz 12870) (P1) and <i>Tecticornia</i> spp.	native vegetation and priority flora (condition B2), monitoring of <i>Tecticornia</i> spp. and <i>Stackhousia</i> sp. Lake Mackay (P.K. Latz 12870) and progressive rehabilitation, through a mining proposal and closure plan under the Mining Act, to meet rehabilitation and closure outcomes (condition B6). The proponent has committed to the implementation of the Flora and Vegetation Environmental Management Plan to ensure that potential impacts are detected early, and adaptive monitoring can be implemented. The residual impact is likely to be able to be regulated through conditions to ensure the environmental outcome is consistent with the EPA's objective for flora and vegetation.
5.	Indirect impacts associated with uncontrolled discharge of saline water, changes to surface hydrology and water flows during inundation regime, sedimentation, and groundwater drawdown.	The proposal may result in disturbance and decline in flora and vegetation. The proponent has committed to the implementation of the Flora and Vegetation Environmental Management Plan to ensure that potential impacts are detected early, and adaptive monitoring can be implemented. <i>Tecticornia spp. and</i> <i>Stackhousia sp.</i> Lake Mackay (P.K. Latz 12870) will be monitored in the Vegetation Health Monitoring Program to measure the effectiveness of the management actions outlined in the Flora and Vegetation Environmental Management Plan. The EPA advises that subject to the implementation of recommended conditions to require monitoring and adaptive management, the residual impact can be managed so that the environmental outcome is likely to be consistent with the EPA objective for flora and vegetation.
6.	Introduction and spread of weeds.	The proposal may result in the introduction and spread of weeds into parts of Western Australia with vegetation currently in excellent condition. The EPA advises that subject to the implementation of recommended condition B2 to require no detectable increase in the baseline extent of weed populations or new populations of weed species within the development envelope, the residual impact can be managed to ensure the environmental outcome is consistent with the EPA objective for flora and vegetation.

Residual impact or risk to environmental value		Assessment finding
1.	Groundwater drawdown from abstraction within the bore field DE and abstraction of brine from the on-lake DE. Potential to change groundwater regimes. Potential impacts to subterranean fauna and aquatic biota.	The proponent's groundwater modelling has demonstrated the predicted maximum drawdown within the bore field DE and on Lake Mackay. Drawdown from bore field abstraction and brine abstraction have the potential to affect the extent of subterranean fauna habitat. Given the extent of predicted impacts and the availability of habitat remaining, the proposal is unlikely to have a significant residual impact on subterranean fauna. The EPA notes there still remains some uncertainty of the potential impacts and has therefore recommended condition B3-4 and B3-5 to ensure the trenches will be developed in five stages, and conditions B3- 3 and C4-5 requiring the Inland Waters Environmental Management Plan to be implemented and resubmitted at the end of each stage. The EPA advises that the residual impact on groundwater drawdown is manageable subject to the implementation of the Inland Waters Environmental Management Plan and the recommended conditions. The EPA has concluded that, subject to the recommended conditions, the environmental outcome is likely to be consistent with the EPA objectives for inland waters and subterranean fauna.
2.	Alteration to surface water flow regimes.	Potential impacts from altered surface water hydrology are unlikely to be significant and can be regulated through reasonable implementation conditions. The EPA considers the proponent's mitigation measures in combination with outcome-based conditions (recommended condition B3-2(4)) requiring no adverse impacts to surface water hydrology, will ensure environmental outcomes consistent with the EPA objectives for inland waters and subterranean fauna.
3.	Potential impacts to groundwater and surface water quality.	The EPA advises there is a residual impact from abstraction of brine and water, and mining operations altering the quality of groundwater and surface water.

The EPA advises that the residual impact on groundwater and surface water quality is unlikely to be significant subject to the implementation of the Inland Waters Environmental Management Plan and the recommended conditions.
The EPA considers that subject to the implementation of the proposed mitigation, monitoring and management measures and implementation of the recommended conditions, the environmental outcome is likely to be consistent with the EPA objectives for inland waters and subterranean fauna.

# Social surroundings

Residual impact or risk to environmental value		Assessment finding	
1.	Potential for direct impacts to Aboriginal heritage sites and areas of cultural significance.	The EPA considers that although the haul road passes through country that is rich wit mythology, the haul road development	
2.	Direct impacts to Indigenous Protection Areas (IPAs) from clearing within the disturbance footprints	sites of significance within the broader mythical landscape through the design of the haul road, utilising historical disturbed areas where possible.	
3.	Potential for indirect impacts to Aboriginal cultural heritage sites and areas of cultural significance from changes in amenity values, increase in dust, noise (aircraft, wind turbines and haulage) emissions and altered fire regimes.	The EPA considers there is a risk of residual indirect impact to Aboriginal cultural heritage associated with disturbance of the broader mythical landscape.	
		The EPA advises that any direct impact to Aboriginal heritage sites or places is likely to be mitigated under the AH Act.	
		The EPA recommends condition A1 that imposes limitations on clearing to ensure the impacts to IPAs are unlikely to be significant.	
		The EPA considers that the residual indirect impacts to Aboriginal cultural heritage can be regulated through recommended conditions and other decision-making processes to ensure the environmental outcomes are consistent with the EPA objective for social surrounds.	

#### Holistic assessment

The EPA considered the connections and interactions between relevant environmental factors and values 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.

# Conclusion and recommendations

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

- environmental values which may 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)
- 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
- 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 Mackay Sulphate of Potash Project is a proposal to develop a greenfields sulphate of potash (SOP) fertiliser operation. The proposal is located approximately 490 kilometres south of Halls Creek, in the Shire of East Pilbara and the Kimberley region of Western Australia (see Figure 1).

The proposal involves the on-lake development of trenches and solar evaporation ponds for brine extraction and SOP production. Brine will be extracted from a network of shallow trenches established on the surface of Lake Mackay. The brine will be transferred into evaporation ponds for the precipitation of salt which will be harvested and then processed to produce a potash fertiliser product.

The proponent has proposed a staged abstraction of brine from brine mining units (BMUs) and designed the trench network to maintain natural hydrological processes and ecological values. Brine abstraction on Lake Mackay occurs over five operational stages (as depicted in Figure 6) and begins in the southern portion of the lake. Within these stages, the trench network is partitioned into 17 smaller areas, representing similar physio-chemical characteristics. The staged abstraction will also enable periodic recovery of groundwater levels across the lake.

The development envelopes (DE) comprise of four components that make up the proposal (263,675 ha):

- on-lake DE (217,261 ha) includes development of trench network, extraction of up to 100 gigalitres per annum (GL/a) of brine, evaporation, and crystalliser ponds
- off-lake DE (688 ha) includes development of access roads, processing plant, accommodation village, airstrip, and solar farm
- southern infrastructure DE (bore field DE) (11,799 ha) includes development of bore field water pipeline and access tracks for groundwater abstraction of 3.5 GL/a
- northern infrastructure DE (haul road DE) (33,928 ha) includes a 350 km haul road for trucking SOP product to Wyndham Port.

The proponent for the proposal is Agrimin Limited. The proponent referred the proposal to the Environmental Protection Authority (EPA) on 21 December 2018. The referral information was published on the EPA website for seven days public comment. On 30 January 2019, the EPA decided to assess the proposal at the level of Public Environmental Review. The EPA also published the environmental review document (ERD) (Stantec 2022) on its website for public review for 4 weeks (from 4 May to 30 May 2022).

The proposal was determined under the *Environment Protection and Biodiversity Conservation Act 1999* to be a controlled action and to be assessed by the EPA under an accredited process.

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

Table	1: Proposa	al content	document	(propone	nt reference)
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Proposal element	Location	Maximum extent or range			
Physical elements					
Proposal area (comprising all four development envelopes).	Figure 2	Disturbance of up to 15,000 ha on the lake surface and no more than 1,500 ha of clearing of native vegetation within the total development of 263,675 ha.			
On-Lake Development Envelope (On-LDE): Brine extraction trenches and evaporation ponds.	Figure 2	Disturbance of no more than 15,000 ha of the lake within the 217,261 ha On-LDE (less than 5 % of the lake's surface).			
Off-Lake Development Envelope (Off-LDE): Processing infrastructure, power supply, access roads, associated infrastructure (camp, airstrip).	Figure 2	Clearing of no more than 200 ha of native vegetation within the 688 ha Off-LDE.			
Southern Infrastructure Development Envelope (SIDE): Bore field, water pipelines and access tracks.	Figure 2	Clearing of no more than 300 ha of native vegetation within the 11,799 ha SIDE.			
Northern Infrastructure Development Envelope (NIDE): Haul Road.	Figure 2	Clearing of no more than 1,000 ha of native vegetation within the 33,928 ha NIDE.			
Construction elements					
Native vegetation clearing.	-	Clearing of up to 1,500 ha of native vegetation within the On-LDE, Off-LDE, SIDE and NIDE.			
Trench and evaporation pond construction.	-	Progressive construction of trenches and evaporation ponds.			
Process plant, non-process infrastructure (including borefield) and haul road construction.	-	Clearing limits within the development envelopes described above.			
Operational elements					
Trench construction	-	Construction of up to 2,000 km of extraction trenches during the first 17 years of operation.			
Brine abstraction	-	Abstraction of up to 100 GL/a of hypersaline brine.			
Water abstraction	-	Abstraction of up to 3.5 GL/a of groundwater for processing via a borefield of approximately 28 operating bores.			
Water treatment	-	Treatment of no more than 0.2 GL/a of water through a reverse osmosis plant.			

Proposal element	Location	Maximum extent or range		
Waste salt	-	Disposal of no more than 18 mtpa of waste salt to be retained on the lake surface.		
Wind turbine	-	Placement of five wind turbines located within the SIDE and NIDE.		
Timing elements				
Life of mine	-	20 years		

#### Units and abbreviations

ha – hectare GL/a – gigalitres per annum mtpa – million tonnes per annum

#### Proposal amendments

The original proposal is set out in section 2 of the proponent's referral supporting report (Stantec 2018), which is available on the EPA website.

During the assessment process, the EPA encouraged the proponent to identify avoidance and mitigation measures for the proposal in addition to those included in the original proposal. The proponent requested changes to the original proposal during the assessment. The changes were assessed to be unlikely to significantly increase any impacts of the proposal and some changes reduced potential impacts on the environment. EPA Chair's notices, of 12 June 2020 and 11 July 2021, consenting to the changes is available on the EPA website. Additional changes were made as part of the proponent's response to submissions and considered by the whole EPA during its meeting in July 2024. the consolidated and updated elements of the proposal which has been subject to the EPA's assessment is included in Table 1.

#### **Proposal alternatives**

Due to the nature of the activity, the location of the proposal was largely constrained by the location of the lake to allow for large scale SOP production. Therefore, the proponent did not consider alternative locations for the proposal. However, alternative designs were considered as detailed in section 2.3 of the ERD (Stantec 2022).

Three potential processing plant locations were investigated. The selected location was based on avoiding impacts to riparian vegetation, peripheral claypans and proximity to evaporation ponds.

The haul road development envelope was revised and re-aligned to reduce the development envelope (DE) width to 1 km and the disturbance footprint width to 24 m, following consultation with Traditional Owner groups. The haul road development envelope was aligned to best meet heritage and environmental constraints, minimise the total area of native vegetation clearing, and provide the most direct route from the SOP project processing plant to the public Tanami Highway and onward to Wyndham Port. Approximately 30% of the haul road is on an existing track that connects the Kiwirrkurra community to the Balgo community. Southern haulage

corridors were considered to have a similar environmental impact; however, were not commercially viable.

#### Proposal context

Lake Mackay is the largest inland salt lake in WA, and the fourth largest in Australia, and extends beyond the state border into the Northern Territory. The lake itself is considered to be ephemeral with inundation occurring after heavy and prolonged rainfall events.

The majority of the Mackay Sulphate of Potash Project is located within the Mackay subregion (GSD2) of the Great Sandy Desert bioregion, within the Eramaean Botanical Province of WA. The northern portion of the proposal extends into the Tanami Desert 1 subregion (TAN1) of the Tanami Desert bioregion.

Lake Mackay supports a diversity of fauna habitats and several key species of terrestrial fauna. The proposal area overlaps critical habitat for the threatened night parrot (*Pezoporus occidentalis*), greater bilby (*Macrotis lagotis*) and the great desert skink (*Liopholis kintorei*). The lake itself provides habitat for a high diversity and abundance of listed migratory shorebird species and supports aquatic and subterranean fauna. The proposal has the potential to result in significant impacts to the night parrot, greater bilby, and great desert skink as a result of the loss of significant habitat and potential for habitat fragmentation.



Figure 1: Project location



Figure 2: Development envelope and disturbance footprint

# 2 Assessment of key environmental factors

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

# 2.1 Terrestrial fauna

# 2.1.1 Environmental objective

The EPA environmental objective for terrestrial fauna is to *protect terrestrial fauna so that biological diversity and ecological integrity are maintained* (EPA 2021b).

#### 2.1.2 Investigations and surveys

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

- Terrestrial Fauna Environmental Management Plan (appendix C.3 of the environmental review document) (Stantec 2023a)
- Lake Mackay Potash Project: Detailed and Targeted Vertebrate Fauna Survey and Consolidation. Unpublished report prepared for Agrimin Ltd (appendix G.1 of the environmental review document) (Stantec 2021a)
- Lake Mackay Night Parrot (*Pezoporus occidentalis*) Baseline Survey Memorandum (Stantec 2021b)
- Lake Mackay Night Parrot (*Pezoporus occidentalis*) Habitat Modelling Memorandum (Stantec 2021c)
- Lake Mackay Night Parrot (*Pezoporus occidentalis*) Targeted Survey Memorandum (Stantec 2021d)
- Short Range Endemic Invertebrate Survey (appendix of the environmental review document) (Stantec 2021e)
- Lake Mackay Potash Project: Level 2 Vertebrate Fauna Survey (Stantec 2020)
- Lake Mackay Sulphate of Potash Project: Level 2 Vertebrate and Targeted Fauna Survey (Strategen 2018)
- Waterbird Survey for the Mackay SOP Project (360 Environmental 2017a)
- Agrimin Mackay Project: Level 1 Fauna and Single Phase Level 2 Flora Assessment (Ecologia Environment 2017)
- Lake Mackay Sulfate of Potash project: Single Phase Level 2 Fauna Survey at Lake Mackay (360 Environmental 2018b)
- Single Phase Level 2 Fauna Survey of the Mackay SOP Project (360 Environmental 2018)
- Night Parrot Monitoring Lake Mackay (Ecologia Environment 2019)
- Kiwirrkura Threatened Species Survey 2012 (Paltridge 2012)
- Looking for animals on Ngururrpa Country (Paltridge 2015)
- Level 1 Terrestrial Fauna Assessment (Outback Ecology 2012a)

The surveys were consistent with the *Technical Guidance – Terrestrial vertebrate surveys for environmental impact assessment* (EPA 2020).

#### 2.1.3 Assessment context – existing environment

#### Fauna habitat

Twelve broad fauna habitat types were recorded during the survey, all of which occur within the development envelope, including salt lake playa, spinifex sandplain, dune-field, claypans and claypan mosaic, lake margin, gravel spinifex plain, saline flats and depressions, dune, outcropping and stony rise, ridge slope, drainage line and rocky ridge and gorge (Stantec 2021a). All habitats aside from drainage line were considered significant having been confirmed to support significant fauna or having the potential to support significant fauna (Stantec 2021a).

The most common fauna habitat type recorded was salt lake playa (216,333 ha), which accounted for approximately 89% of the total development envelope (Stantec 2021a).

Of the 12 broad fauna habitat types, seven (salt lake playa, lake margin, saline flats and depressions, claypan and claypan mosaic, rocky ridge and gorge, outcropping and stony rise, and drainage line) were classified as having potential to support short range endemic (SRE) invertebrates. The remaining five habitats were classified as being of low suitability for SRE taxa, due to the lack of microhabitat opportunities (Stantec 2021a).

In addition to these broad habitat features, fresh water sources are a limiting factor in arid environments and are an important feature of the arid interior, typically during and immediately following significant rainfall events. A total of 13 temporary water sources were identified in the study area. One permanent water source is located approximately 250 m west of the haul road DE.

#### Significant fauna

Six species of conservation significance were recorded, or had a high likelihood of occurring within or immediately adjacent to, the development envelope, as well as ten migratory species (Stantec 2023a):

- greater bilby (*Macrotis lagotis*) listed vulnerable under the *Environment Protection* and *Biodiversity Conservation Act 1999* (EPBC Act) and the *Biodiversity Conservation Act 2016* (BC Act) (confirmed)
- night parrot (*Pezoporus occidentalis*) listed endangered under the EPBC Act and critically endangered under the BC Act (confirmed)
- great desert skink (*Liopholis kintorei*) listed vulnerable under the EPBC Act and BC Act (confirmed)
- brush-tailed mulgara (*Dasycercus blythi*) listed Priority 4 under the BC Act (confirmed)

- spotted *Ctenotus* (*Ctenotus uber. Johnstonei*) listed Priority 2 under the BC Act (confirmed)
- migratory or threatened waterbirds and shorebirds listed as migratory and threatened under the EPBC Act, including
  - red-necked stint (*Calidris ruficollis*) (Mi: migratory shorebird)
  - sharp-tailed sandpiper (*Calidris acuminata*) (Mi: migratory shorebird)
  - o marsh sandpiper (*Tringa nebularia*) (Mi: migratory shorebird)
  - o oriental plover (*Charadrius veredus*) (Mi: migratory shorebird)
  - o common greenshank (*Tringa nebularia*) (Mi: migratory shorebird);
  - o glossy ibis (*Plegadis falcinellus*) (Mi)
  - o gull-billed tern (*Sterna nilotica*) (Mi)
  - o white-winged black tern (Sterna leucopterus) (Mi)
  - o fork-tailed swift (Apus pacificus) (Mi).

#### **Regional threats**

At a regional level, key existing threats for significant fauna include:

- habitat loss resulting in the loss of suitable breeding and foraging habitat, and fragmentation of habitats that may limit dispersal and population viability
- predation by feral animals, with the construction of roads and infrastructure likely to increase the presence of feral animals
- overgrazing by feral herbivores that may reduce the quality and availability of habitat
- introduction of weed species that may affect the availability of suitable habitat
- altered fire regimes with larger, hotter fires more likely to reduce the availability of foraging habitats and increase predation through a reduction in shelter for prey species
- while not an introduced species, silver gulls have also been recorded in the region and are known to predate on the chicks of the banded stilt and have a significant influence on breeding success.

# 2.1.4 Consultation

Matters raised during stakeholder consultation and the proponent's responses are provided in Attachment 2 of the Mackay Sulphate of Potash Project Response to Submissions document (Stantec 2022). No public submissions raised concerns related to terrestrial fauna.

# 2.1.5 Potential impacts from the proposal

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

- loss of critical habitat for threatened fauna species
- potential impacts to fauna from injury and/or mortality during construction and operation, including from vehicle strike, bird strike (wind turbines), artificial light, noise, vibration and dust
- potential entrapment of fauna in ponds and trenches

- potential indirect impacts via the loss or fragmentation of habitat through altered fire regimes, altered hydrogeology, and introduction of invasive weed species
- potential increase in predation of terrestrial fauna as a result of an increase in feral predator species
- potential changes to lake hydrology through altered surface water and groundwater regimes.

The potential impacts to priority fauna species and SRE invertebrates are considered unlikely to be material because of the proponent's minimisation measures described in section 2.1.7. In addition, given the linear nature of the haul road and the relatively small portion of each habitat type that will be impacted by the proposal within the haul road DE (Table 2), habitat suitable for supporting priority fauna species and SRE invertebrates will continue to be present within the development envelope and the wider survey area post-construction. Therefore, these issues were not considered further in the assessment.

### 2.1.6 Avoidance measures

The proponent has designed the proposal to avoid impacts to terrestrial fauna through the implementation of avoidance buffers for significant fauna species and key habitats. No disturbance is permitted within these buffer zones. The following buffers have been implemented to avoid direct impacts to terrestrial fauna and avoid direct impacts to critical habitat:

- 1. Avoidance buffer of 300 m around known roosting sites of the night parrot
- 2. Avoidance buffer of 300 m around prominent ephemeral water sources in proximity to night parrot nest sites
- 3. Avoidance buffer of 300 m around known active burrows of greater desert skink
- 4. Avoidance of lake islands to avoid disturbance to breeding shorebirds on the islands
- 5. Avoidance buffer of 500 m applied to landform islands, 250 m to large and intermediate islands, and 100 m to small islands to avoid adverse impacts to aquatic and subterranean fauna
- 6. Road infrastructure design avoids roadside artificial water sources
- 7. Preclearance surveys will be undertaken two weeks prior to clearing to inform the designation of avoidance buffers.

# 2.1.7 Minimisation measures (including regulation by other DMAs)

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

- 1. Set limits of disturbance for important fauna habitat types so that disturbance does not exceed:
  - o on-lake development will not exceed 15,000 ha
  - clearing not to exceed 1,500 ha (200 ha in the off lake development envelope, 300 ha within the borefield and 1,000 ha within the haul road development envelopes)
- 2. Clearing to be undertaken during daylight hours only

- 3. Pre-clearance surveys to be undertaken prior to clearing and avoidance buffers implemented where significant fauna burrows or roosting sites are located.
- 4. Installation of fauna crossings to reduce impact of habitat fragmentation and facilitate movement and dispersal of significant fauna species
- 5. Implementation of speed limits on the haul road to reduce injury/death to fauna
- 6. No operational use of the haul road at night
- 7. Trenching at night will only occur for the first two years after which point it will be daytime only
- 8. Waste management plan and feral predator deterrence measures in place
- 9. No access to inundated portions of Lake Mackay when more than 20% of the lake is inundated
- 10. Implementation of weed and fire management programs
- 11. Directional lighting measures to minimise light spill into lake margin complex habitat
- 12. Implementation of feral animal management program
- 13. Reduction of haul road development envelope to 1 km in width to minimise impacts to critical fauna habitat
- 14. Expansion of existing haul road to meet new requirements and minimise additional disturbance
- 15. Bunding of approximately 1.5 m will be established along all trenches as a deterrent to fauna
- 16. Staged development of trenches to maintain natural hydrological processes

# 2.1.8 Rehabilitation measures

The proponent has proposed that at closure, strategic breaching of trenches and canals will be undertaken to maintain hydrology, based on hydrological modelling results. This will allow the trenches to infill via natural processes over about ten years. The natural infill of trenches will be aided by flooding events that will increase the deposition of sediment in the trenches.

In accordance with the *Mining Act 1978* (Mining Act), the proponent will be required to prepare a Mine Closure Plan consistent with the Statutory Guidelines for Mine Closure Plans (DMIRS 2023), which includes the requirement for rehabilitation and revegetation of land and closure objectives and criteria. The Mine Closure Plan is subject to approval by the Department of Mines, Energy, Industry Regulation and Safety (DEMIRS).

These measures are expected to indirectly mitigate some terrestrial fauna impacts in the medium to long-term, but will not materially mitigate direct proposal impacts to fauna.

### 2.1.9 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 threatened fauna. The potential impact to terrestrial fauna is likely to be a significant residual impact for the proposal and is assessed further in this section.

In assessing this proposal, the EPA has had regard to the cumulative effects of the proposal in addition to several other existing and foreseeable projects on the key environmental factors in this proposal.

#### Fauna habitat

The study area for terrestrial fauna covered 443,985 ha across all four development envelopes and included areas outside of the proposal footprint. Four vegetation types mapped within the study area were found to support a number of threatened and priority species. Those vegetation types are: spinifex gravel plain, spinifex sandplain, claypans and claypan mosaic (including adjacent areas with old growth *Triodia*) were found to support the greater bilby, great desert skink and night parrot respectively, among other threatened and priority species. The salt lake playa, associated islands and surrounding habitats, including claypans, claypan mosaic and saline flats and depressions provide foraging and breeding habitat for various threatened and migratory shorebirds when Lake Mackay is in flood (Stantec 2021).

Spinifex sandplain habitat is widespread within the development envelope (23.3% of area) and broader region characterised by relatively flat *Triodia* hummock grasslands with sparse shrubs and trees, and a substrate with high burrowing suitability. This habitat provides a range of foraging and shelter opportunities for mammals and reptiles and is a suitable habitat for burrowing species including the mulgara, great desert skink and bilby.

Gravel spinifex plains were typically elevated and widespread in the region though comprised only 2.17% of the study area. The low vegetation and high digging suitability provides suitable habitat for the greater bilby and spotted *Ctenotus* and suitable foraging habitat for the greater bilby. Long un-burnt *Triodia* may also support night parrot roosting.

The dune field habitat is widespread in the region and provides habitat for the marsupial mole (*Notoryctes caurinus / Notoryctes typhlops*), princess parrot (*Polytelis alexandrae*), spectacles hare-wallaby (*Lagorchestes conspicillatus leichardti*) and striated grasswren (*Amytornis striatus striatus*). The habitat typically comprises small closely spaced dunes with sparse vegetation, comprised of isolated shrubs and occasional thickets. The habitat is highly suitable for burrowing species, and when flowering, shrubs provide foraging opportunities for the princess parrot.

While claypans and claypan mosaics provide habitat for significant fauna including the night parrot and migratory shorebirds and waterbirds, they are limited in extent in the study area (i.e., < 4%). The claypans hold less saline water and freshwater when inundated compared to the saline flats and depressions and are often surrounded by isolated trees to low open woodlands. These taller trees are uncommon in the

broader landscape. The mosaic of vegetation interspersed by bare depressions would increase resistance to broadscale fires and support species that are sensitive to disturbance. The habitat contains long unburnt *Triodia* and seeding ephemeral vegetation, which may support night parrot roosting and foraging respectively. Waterbirds foraging and breeding in these areas may include threatened and migratory listed species.

The lake margin habitat fringes the salt lake playa of Lake Mackay which is widespread and considered to provide minimal shelter for terrestrial fauna. It may however be used by salt lake specialists and utilised by waterbirds and shorebirds during flooding events. The habitat may also support foraging habitat for night parrots. The saline flats and depressions are flat low-lying saline areas in the landscape interspersed with depressions that have the potential to hold water after rain. This habitat is unlikely to provide optimal habitat for migratory shorebirds but may support foraging and roosting of the night parrot.

During major flood events, Lake Mackay supports a range of waterbird species including migratory shorebirds, terns and ducks. The larger islands support breeding habitat while the surrounding claypans and saline depressions support foraging. The lake also supports aquatic fauna that are a key source of food for migratory bird species. Based on available satellite imagery, inundation events, classified as being over 20% inundated, have occurred 58 times over the last 33 years. Typically, these events were less than a month in duration. An inundation event of greater than 65 days is required for successful breeding of banded stilts. The proponent has committed to avoidance of all lake islands to avoid disturbance to breeding waterbirds. They have also committed to not accessing inundated portions of the lake during inundation events (> 20% lake inundated) to minimise disturbance to foraging waterbirds. The proponent will also implement buffer zones to lake islands to further minimise the potential for disturbance of breeding and foraging waterbirds.

Thirteen temporary water sources were identified within and adjacent to the haul road development envelope. Most of these pools were located in the rocky ridge and gorge (5), minor drainage line (3) and outcropping and stony rise (2) habitats. Three temporary water sources were identified in the claypans and claypan mosaic habitat. There is one permanent water source approximately 250 m from the haul road development envelopment (Stantec 2024). The proponent has committed to an avoidance buffer of 300 m from all prominent ephemeral water sources in proximity to night parrot nesting sites.

Noting the importance of the above habitat types, the proponent has set limits of disturbance to them. At least 93% of the mapped extents of each habitat type will remain within the development envelopes (Table 2).

Fauna habitat type	Extent mapped within development envelopes (ha)	Limit of disturbance (ha)	Extent remaining within development envelopes post- clearing (ha)
Salt lake playa	216,333 ha (88.93%)	13,363 ha (5.49 %)	202,970 ha (93.8%)
Lake Margin	1,341 ha (9.01%)	22.4 (0.015%)	1,318.60 ha (98%)
Claypan / claypan mosaic	1,547 ha (9.13%)	42.4 ha (0.26%)	1,504.6 ha (97.2%)
Saline flats and depressions	151 ha (1.87%)	3.4 ha (0.04%)	147.6 ha (97.7%)
Dune field	5,431.74 ha (13.11%)	281.82 ha (0.68%)	5,149.92 ha (94.8%)
Dune	1,477 ha (22.65%)	19.27 ha (0.30%)	1,457.73 ha (98.6%)
Spinifex and sandplain	28,189 ha (27.25%)	754 (0.73%)	27,435 ha (97.3%)
Gravel spinifex sandplain	8,614 (89.3%)	248 (2.57%)	8,366 ha (97.1%)

#### Table 2. Limits of disturbance for significant fauna habitat types

The other fauna habitat types recorded in the survey are not considered to be highly valuable for terrestrial fauna, as they do not provide as many microhabitat opportunities. These fauna habitat types are widespread throughout the Great Sandy Desert bioregion, and no threatened fauna species are likely to rely upon them.

The EPA considers that the significant residual impact from habitat loss can be regulated through recommended condition A1-1 (limitations on clearing) and counterbalanced by offsets (section 4) to ensure the environmental outcome is likely to be consistent with the EPA objective for terrestrial fauna.

# Threatened fauna

The proponent undertook extensive survey effort in the form of trapping, spotlighting, avifauna census, systematic searching, echolocation recordings and motion-sensor camera monitoring. Baseline targeted survey effort involved the use of survey methods specific to each species of significance where suitable habitats were encountered within the terrestrial fauna study area, which covered all four development envelopes and surrounding areas (Figure 2) including the deployment of motion cameras at 157 locations primarily to detect the presence/activity of the greater bilby and the great desert skink, as well as species of marsupial mole and the brush-tailed mulgara (*Dasycercus blythi*).

A '2 ha plot' survey method was used primarily to detect the presence/activity of the greater bilby and the great desert skink, but also species of marsupial mole and the brush-tailed mulgara. In total, 142 '2 ha plots' were conducted within the study area. Subsequent targeted surveys for the great desert skink were undertaken to better define the extent of a population of the affected significant species which informed the design of the haul road DE.

Baseline targeted survey efforts for the night parrot was undertaken by deploying autonomous SM4 acoustic bird recorders at 110 locations with a total of 829 recording nights, and by conducting dusk census combined with call playback. Subsequent to the baseline surveys, an additional 89 units (604 recording nights) were deployed to better understand night parrot occurrence at two locations that coincide with the study area.

Targeted waterbird surveys were undertaken of Lake Mackay and peripheral wetlands when the lake was inundated in both 2021 and 2017.



Figure 3. Terrestrial fauna study area covering all four development envelopes and habitats between the on-lake, off-lake, haul road and southern infrastructure development envelope

#### Night parrot

The night parrot is listed as critically endangered under the BC Act, endangered under the EPBC Act, and is listed on the International Union for the Conservation of Nature (IUCN) list as critically endangered. It is considered to be at very high risk of extinction. The Department of Climate Change, Energy, the Environment and Water (DCCEEW) issued a consultation paper on changing the listing for the night parrot from endangered to critically endangered (DCCEEW 2024). The paper discusses the eligibility of the night parrot for inclusion in the critically endangered category, which is based on criteria such as population size, rate of decline and geographic distribution. The EPA notes changing the listing for the night parrot from endangered to critically endangered is consistent with the BC Act and IUCN listings.

The proposal will directly impact 68.02 ha of critical habitat for the night parrot including claypan mosaic, saline flats and depressions, lake margin and complex habitat, representing 2.24% of the mapped habitat extent of critical habitat within the development envelopes. These habitat types are well distributed within the development envelopes and have been well surveyed, with 40% of the known populations of night parrot in Australia being documented within this area. Confirmed calls from roosting night parrots from 58 recording sites including evidence of juvenile birds in the area, are indicative of a breeding population suggesting the area is likely to be highly important for the species in the state and possibly more broadly within Australia. Based on habitat surveys, the haul road development envelope overlaps with significant night parrot nesting and foraging habitat with the greatest overlap being the haul road development envelope with roosting habitat. The proposal has the potential to result in the fragmentation of old-growth spinifex habitat through clearing and indirect impacts such as fire. There is also the potential for direct injury and mortality of individual birds, and the loss of nests and roost sites. The proponent has proposed the implementation of fire and feral pest management procedures to minimise potential impacts to the night parrot within the development area from these pressures.

While the proponent has committed to pre-clearance surveys and avoidance buffers , there is considerable uncertainty regarding the efficacy of avoidance buffers and the potential for nest abandonment, habitat fragmentation, and impacts of noise and light on the survivability and habitat use of the species. To address this uncertainty, the proponent has proposed monitoring of occupied roost sites in proximity to the haul road during clearing and for three days post clearing. While this goes some way to address uncertainty, it is not clear what management would be implemented should impacts be detected despite the implementation of the buffer zone. Noting the lack of understanding of night parrots in the region, the significance of any impact on the regional population remains unclear. Given that the baseline surveys indicate the broader survey area supports the highest number of night parrots recorded in WA, it is likely that any impacts to night parrots within the development envelopes and surrounding areas have the potential to be significant at the population level. The proponent has committed to the implementation of a 300 m avoidance buffer around roost sites and prominent ephemeral water sources as there is an increase in the risk of impact to the night parrot by constructing a haul road immediately adjacent to critical habitat. The EPA notes that little is known about the species, and appropriate buffer distances around night parrot roosts are unclear. However, minimum buffer

distances of 100 m are often recommended for disturbance around bird roosts (e.g., Rodgers and Schwikert 2002). Given the conservation importance of this site to the night parrot, and the uncertainty regarding disturbance ranges for roosting night parrots, the EPA considers that increasing the buffer to 300 m is an appropriately preventative approach that will also help to alleviate indirect clearing impacts.

The EPA acknowledges the proposed mitigation and management of potential impacts to night parrot and has recommended conditions B1-1 through to B1-5 to require these measures be implemented to minimise impacts to the night parrot. The EPA also recommends that a cautious, preventative approach be taken to mitigation and management. As a result, the EPA has recommended condition B1-11 requiring monitoring and adaptive management should the proposed management not achieve the required environmental outcomes.

The EPA does however consider that there remains considerable scientific uncertainty in the efficacy of proposed mitigation measures and the significance of any residual impacts, and there remains a threat of serious or irreversible harm because of the species' listing status, the length of the haul road, the long life of the proposal, and the uncertainty of haul road use controls after the proposal. There is also scientific uncertainty about whether contingency measures will be effective if an adaptive management framework is applied. Therefore, through consideration of the precautionary principle,

- The EPA has carefully evaluated options to avoid serious or irreversible harm, including whether the proposal should be implemented, whether proportionate management and contingency measures are available, and whether an offsets program could provide a net benefit for the species;
- The EPA does not consider there are likely to be additional management or contingency measures which can provide assurance there will not be a serious threat risk; and
- The EPA considers the implementation of a significant offsets proposal in the region that is consistent with the Threatened Species Action Plan 2022-2032 and with managing threats identified in the consultation paper (DCCEEW 2024) will provide a net benefit for the species which is likely to counterbalance potential impacts on a regional scale. The offsets proposal is likely to improve the quality of habitat away from the proposal area in the event that serious harm eventuates from the proposal, as well as improve the habitat in the area of the proposal to increase its resilience and ability to withstand impacts.

Assessment of the offsets is provided in section 4 of this report, and the EPA recommends condition B5 to require this offset be implemented. In summary, the EPA commends the proponent's offsets proposal and considers is it likely to provide a net benefit to the species. However, the EPA considers additional elements are required to ensure species resilience is improved before impacts occur, to avoid the risk the net benefit from the offset is too late to counter-balance the impact. The EPA also considers the offset should be designed so it is likely to endure after the proposal is being actively managed. Therefore the EPA recommends the

proponents' offsets strategy be implemented, provided it also includes the following important elements:

- Staging of offsets implementation to ensure threat abatement is progressively undertaken ahead of haul road construction to increase resilience in critical fauna habitat for the longest time before being disturbed, so the habitat resilience is increased before impacts occurs; (condition B5-2(6))
- threat abatement actions commencing, and adequate baseline monitoring being completed, before construction on the haul road commences; (C1-5)
- contributes to the long-term, post proposal viability of the species in the area (B5-2(8));
- consistency with sustainable, funded habitat conservation and improvement models which are likely to be maintained beyond the life of the proposal (B5-2(9)).

The EPA believes that recommending that the proposal be implemented with conditions which reflect the above measures would be a reasonably proportionate response in order to prevent irreversible or serious damage to the night parrot, greater bilby and the great desert skink and not go beyond what is appropriate and necessary to achieve likely consistency with the EPA's objective. The EPA advises that without these recommended conditions it does not believe the proposal could be implemented in a way which is likely to be consistent with its objectives.

The EPA has also recommended an outcome based condition, B1-1, requiring no disturbance to night parrot roosting sites and no detectable decrease in abundance; condition B1-2 requiring no adverse impacts to the species and to minimise the risk of habitat fragmentation and physical injury; and condition B1-3 and B1-11 requiring the implementation and update of environmental management plans relevant to the monitoring and management of the project to ensure the environmental outcomes and objectives specified in conditions B1-1 and B1-2 are met, and thus consistent with the EPA's objective for terrestrial fauna.

#### Greater bilby

The greater bilby was recorded from 130 locations including over 77 active burrows. Key habitat includes areas of long-unburnt spinifex with habitat meeting the criteria of 'habitat critical to the survival of the species' occurring within and adjacent to the haul road development envelope. All known locations of bilby burrows occurred within the haul road development envelope. The proposal has the potential to result in individual injury or mortality as well as the loss and fragmentation of old-growth spinifex habitat through clearing and indirect impacts that may affect habitat utilisation.

Bilbies are highly mobile and are known to build new burrows every couple of days, consequently avoidance of utilised burrows within the infrastructure footprint was not considered by the proponent to be feasible or present a significant conservation benefit. The Recovery Plan for the greater bilby (DCCEEW 2023) sets out key

management objectives for the recovery of the greater bilby. These include to maximise the retention of bilby habitat, and enhance retained habitat, through the avoidance of habitat alteration, fragmentation, and loss, where possible. Where avoidance is not possible, then priority should be given to the reduction of key threats including feral animals and altered fire regimes. Retaining adequate suitable habitat, pre-clearance surveys and ongoing monitoring for the greater bilby (DCCEEW 2023) to ensure the area occupied by the greater bilby has been maintained or increased and meet Objective 3 of limiting habitat fragmentation and potential fragmentation.

Outside of the direct disturbance footprint, the proponent has committed to ensuring that adequate habitat and foraging resources are maintained within a 1.5 km buffer of active burrows. An active burrow is defined as homing a greater bilby individual any time in the past two years. The foraging and dispersal of the females is 1.5 km and males 2-3 km (average) through the landscape (Southgate et al. 2007). Burrows within the infrastructure footprint will not be avoided; however, relocation of bilbies will be undertaken consistent with Department of Biodiversity, Conservation and Attractions (DBCA) advice.

Where habitat is unavoidably affected, predator, fire, and habitat management should be implemented to increase the chances of long-term persistence at the site, and to expand the occurrence into an adjoining or nearby area (Action 5f). Consistent with the Recovery Plan, the proponent has proposed to implement predator, fire and habitat management programs to increase long-term persistence of bilbies within the area. The proponent has proposed the installation of fauna crossings to reduce the impact of habitat fragmentation and facilitate movement and dispersal. Studies have shown that wildlife corridors, including fauna crossings, help direct animal movements and increase connectivity between habitats. While specific studies on bilbies using fauna crossings are limited, there is evidence that similar structures aid movement and habitat connectivity (Dziminski et al.,2021). The EPA has recommended condition B1-6, requiring the installation of fauna crossings to minimise the potential risk of predation, align with ecological linkages, connect areas of good quality vegetation and/or connect areas with high environmental values.

The EPA considers the implementation of a significant offsets proposal in the region that is consistent with the Recovery Plan will provide a net benefit for the species which is likely to counter-balance potential impacts on a regional scale. The offsets proposal is likely to improve the quality of habitat away from the proposal area in the event that serious harm eventuates there, as well as improve the habitat in the area of the proposal to increase resilience there.

Assessment of the offsets is provided in section 4 of this report, and the EPA recommends condition B5 to require this offset be implemented.

The EPA considers that given the widespread presence of suitable habitat for bilbies within the development envelope, the maintenance of habitat within a home range (1.5 km) of active burrows outside of the infrastructure footprint, installation of fauna crossings and relocation of bilbies in accordance with DBCA guidelines, the proposal

is likely to result in an outcome that is consistent with the EPA's objective for terrestrial fauna.

To address uncertainty in the efficacy of proposed management, the EPA has recommended an outcome-based condition requiring no detectable decrease in the abundance of greater bilbies (B1-1). In addition, the EPA has recommended conditions B1-2, B1- 3, B1-4 and B1-5 to minimise the risk of habitat fragmentation, mortality, injury and disturbance, and ensure the environmental outcome is likely to meet the EPA's objective for terrestrial fauna.

#### Great desert skink

A cluster of over 64 great desert skink burrows were found adjacent to the haul road development envelope which represents an important population for the species. Two other known populations identified within the project area in historical surveys (2000 and 2018) have since been determined to be extinct, most likely as a result of feral cat predation. The development of the haul road will increase access to feral predators, potentially increasing the predation pressure from feral cats. The proponent has proposed feral animal management strategies to minimise potential impacts from feral predators. The proponent has also realigned the haul road to avoid areas of high-density great desert skink burrows and proposes a 300 m avoidance buffer around individual burrows. The 300 m buffer is considered appropriate to account for the foraging behaviours of the great desert skink, which tends to be less than 200 m from an active burrow (Dennison 2015).

The EPA considers that the proposed mitigation measures are appropriate for minimising the potential impacts of feral predators and disturbance and has recommended conditions B1-5 and B1-6 to minimise potential impacts to the great desert skink. The EPA also recommends outcome and objective based conditions B1-1 and B1-2 requiring no detectable decrease in the abundance of great desert skink, and that disturbance to the species be minimised. Recommended conditions B1-3 and B1-11 require the implementation and update of the Construction Environmental Management Plan and Terrestrial Fauna Environmental Management Plan to ensure that an environmental outcome consistent with the EPA's objective for terrestrial fauna is met.

The EPA considers the implementation of a significant offsets proposal in the region that is consistent with the Recovery Plan will provide a net benefit for the species which is likely to counter-balance potential impacts on a regional scale. The offsets proposal is likely to improve the quality of habitat away from the proposal area in the event that serious harm eventuates there, as well as improve the habitat in the area of the proposal to increase resilience there.

Assessment of the offsets is provided in section 4 of this report, and the EPA recommends condition B5 to require this offset be implemented.

#### Migratory shorebirds and waterbirds

Lake Mackay supports a high diversity and abundance of migratory shorebirds and water birds. Surveys conducted after inundation events recorded over 42,000 birds from as many as 27 species (Stantec 2001, and 2021). These aggregations include

nationally significant counts of migratory red necked stint (*Calidris ruficollis*) and sharp tailed sandpiper (*Calidris acuminate*). The banded stilt (*Cladorhynchus lecocephalus*) is also considered significant for this proposal due to records of breeding at Lake Mackay.

Lake Mackay represents important foraging and breeding habitat for migratory shorebirds and waterbirds. The island habitats where waterbirds and shorebirds breed have been avoided with the application of buffers around the islands. However, migratory shorebirds and waterbirds may be indirectly impacted as a result of changes in the hydrology of the lake during inundation events. These changes would be confined to the salt lake playa habitat within the on-lake development envelope. Changes in surface water flows as a result of the project infrastructure, including ponds and bunds, have the potential to change the areas, depths and duration of flood events. Groundwater flows also have the potential to be impacted through groundwater drawdown. These changes to hydrology could in turn effect the productivity of the lake as a whole and may not be limited to the development envelope. Potential impacts to surface water and groundwater flows are discussed in greater detail in Section 2.3 (inland waters).

Given the significance of the area to migratory bird species, the EPA recommends outcome and objective based condition B1-1 and B1-2 requiring there are no disturbance to migratory shorebirds on the Lake Islands, and to minimise the risk of adverse impacts to native fauna from construction and operation.

#### Invertebrates and SRE

Diverse invertebrate fauna including at least 48 taxa, 40 of which are potentially SREs, has been documented within the proposal area. Nine potential SRE species are only known from the salt lake playa, lake edge and claypan habitats and are potentially restricted to Lake Mackay. Two new spider species identified as salt lake specialists have also been identified and may be endemic to Lake Mackay. The proposal has the potential to result in a reduction in the distribution and diversity of invertebrate fauna that are restricted to the on-playa and lake-edge habitats. The proportion of each habitat within the on-lake indicative footprint comprises a minor proportion of the extent within the Proposal area and the Study Area. The proponent has proposed ongoing monitoring and management measures in accordance with the Inland Waters Environmental Management Plan to monitor and manage impacts to SRE salt lake specialist invertebrates to ensure that there is maintenance of ecosystem function of SRE habitats that have potential to be impacted by the Proposal i.e. Lake and salt lake margin habitat. The EPA considers that the proposed mitigation and management measures are appropriate and likely to result in an environmental outcome consistent with the EPA's objective for terrestrial fauna.

#### Other impacts to terrestrial fauna

#### Fauna mortality or injury

The proponent commits to undertaking pre-clearance surveys for the greater bilby, brush tailed mulgara, great desert skink and spotted *Ctenotus* within two weeks of clearing being undertaken. Pre-clearance surveys will inform the implementation of avoidance buffers for the great desert skink and the greater bilby. Where appropriate, spotted *Ctenotus*, brush tailed mulgara and greater bilby will be

relocated in accordance with all relevant DBCA policies and procedures. Initial preclearance acoustic surveys for night parrots will be undertaken a maximum of four weeks prior to clearing. Targeted listening surveys will then be undertaken in the days prior to clearing. Physical inspection of *Triodia* hummocks will be undertaken the day of clearing to ensure that night parrots are not roosting in the area to be cleared. Where roosting night parrots are detected, a 300 m buffer will be implemented, and the roost site monitored for indirect impacts to nest attendance or behaviour. The EPA considers that the risk of fauna mortality or injury from clearing and construction activities can be minimised through recommended conditions B1-2, B1-3 and B1-4. Where bilbies must be relocated, priority will be given to encouraging them to move out of the area as opposed to trapping. Once bilbies have moved on, the burrow will be filled in and monitored for a period of three nights. Qualified fauna handlers will be engaged for the conduct of pre-clearance surveys and fauna relocation. All clearing will be undertaken during daylight only.

During construction and operation of the haul road, there is the risk of threatened fauna being struck by vehicles. To minimise this potential impact, the proponent proposed speed limits for all vehicles within the development envelope on access roads and utilising the haul road of 80 km/h on sealed roads and 60 km/h on unsealed roads. The EPA notes that roadkill rates vary due to factors such as abundance of taxa and increased vehicle traffic. However, road speed limits dominantly influence the rate of mortalities on roads, indicating the benefit in reduction of speed limits (e.g. Rendall et al., 2021). In addition, the EPA has recommended the speed limit of 40 km/hr (during night-time operations) within proximity to night parrot habitat within the off-lake DE, on-lake DE and the bore field DE. The EPA considers these vehicle speed limit conditions are appropriate and consistent with other recent decisions on proposals; for example, the approved Mardie Project (Ministerial Statement 1211; EPBC 2018/8236) conditions speed limits of 40 km/hr within the defined low speed zone, which inhibits known northern quoll foraging habitat. There will be no haul road operations from dusk to dawn to further minimise impacts to night parrots that are active at night and may be attracted to headlights.

The EPA considers that the proponent's mitigation measures of setting speed limits near high-value habitat will minimise the potential impact of vehicle strike and the risk of injury and mortality of individuals. Throughout the operation of the project, there is the potential for bird strike from wind turbines that will be installed as part of the project infrastructure. The five wind turbines will be located within the off-lake development envelope to be away from deeper parts of the lake and to avoid migratory bird pathways. While the wind turbines are unlikely to impact night parrots due to their low flying height, it is possible they may cause injury or mortality to migratory bird species. The proponent has proposed monitoring measures to detect any instances of bird strikes and commits to investigate possible management measures should bird strike eventuate.

The EPA considers that should bird strike occur, the proponent must take immediate and best practice management and contingency actions towards minimising the potential for bird strike consistent with the outcome and objective in condition B1-1(7) and B1-2(4). As a result, the EPA has recommended that the management plan required by recommended condition B1-3 be updated in accordance with recommended condition C4-3 to ensure meaningful management actions are implemented in the event of a threshold exceedance. The EPA considers that, subject to the recommended conditions, the risk can be managed consistent with the EPA's objective for terrestrial fauna.

#### Fauna entrapment

There is the potential for fauna to become entrapped in the trench network on the lake which will be approximately 6 m wide and up to 4.5 m in depth with water levels ranging from between 0.5 to 3 m below ground surface. The trench network will be constructed progressively over the life of the project with the closest being 250 m from the lake margin, and the majority forming a network across the centre of the lake away from terrestrial fauna habitats. The proponent has committed to construct berms approximately 1.5 m high adjacent to the trenches to minimise the risk of fauna becoming entrapped. The proponent has also committed to the implementation of a monitoring program with corrective actions should fauna entrapment be recorded including proposed weekly inspections for the main feed canal and evaporation ponds, and six monthly inspections for the infiltration trenches.

The EPA considers that the risk of entrapment of terrestrial fauna in the trench network is minimised through the location of the trench network away from key terrestrial fauna habitats and the use of berms to minimise fauna entry into the trench network. Further, the EPA has recommended additional conditions B1-8(1) and B1-8(2) requiring regular inspections of the main feed canal and evaporation ponds, with quarterly inspections of the lake infiltration trenches by a qualified fauna handler to ensure the risk of entrapment is managed consistent with the EPA's objective for terrestrial fauna.

#### Indirect impacts

Changes to surface water flows and lake hydrology may indirectly impact migratory shorebirds and water birds through a reduction in the abundance of aquatic invertebrates which support foraging. The potential impacts of changes to surface water flows and groundwater drawdown on lake hydrology are discussed in section 2.3. Changes in lake hydrology and surface water flows also have the potential to impact on flora and vegetation that provides habitat on-lake islands and lake margins. These potential impacts are also discussed further in section 2.3.

The EPA considers that the risks of indirect impacts to migratory shorebirds and water birds as a result of changes to lake hydrology can be managed through recommended conditions B3-1, B3-2 and B3-3 to ensure consistency with the EPA's objective for terrestrial fauna and inland waters.

The introduction and spread of weeds may impact the quality of fauna habitat through vegetation degradation. Potential indirect impacts to vegetation (fauna habitat) are assessed under flora and vegetation (section 2.2.9).

The construction and operation of the haul road has the potential to result in indirect impacts to fauna and critical habitat from dust, noise and vibration. The proponent has committed to fitting all machinery and equipment with noise attenuation measures, and to implement a dust management plan with specific dust suppression
measures. The implementation of a 60 km/h speed limit on unsealed tracks will also limit impacts from both noise and dust. The EPA considers that standard vehicle speed limit conditions are appropriate and consistent with other recent decisions on proposals. The EPA considers that the risks of indirect impacts from noise, dust and vibration can be managed through recommended condition B1-3 (Night Parrot Management Plan, Construction Management Plan and Terrestrial Fauna Management Plan).

The EPA considers that there is a threat of serious or irreversible damage to the night parrot, and there will be significant residual impacts to the greater bilby and great desert skink from the construction of the haul road (350 km) through critical habitat. The EPA considers that there is material scientific uncertainty about whether management and contingency measures will be adequate to prevent material impacts on these species, in particular from feral predators and altered fire regimes. Therefore, after consideration of the precautionary principle, the EPA recommends that a cautious, approach be taken to mitigation and management.

This includes recommended condition B1-11 requiring increased monitoring, stop work provisions and adaptive management to provide confidence that appropriate environmental outcomes will be achieved. If monitoring indicates there has been any instance of proposal related disturbance to either night parrots, greater bilby or great desert skink, all work on the haul road must stop until alternative management measures have been approved by the CEO.

The EPA has also recommended the following additional measures:

- Requiring the proponent to achieve environmental outcomes (B1-1(1)) to ensure no detectable decrease in the abundance of the great desert skink, greater bilby or night parrot at any monitoring site and meet specific objectives (B1-2 (5)) requiring no adverse impacts to these species as a result of project-related increase in feral animal abundance relative to suitable reference sites.
- Requiring the proponent to implement the Night Parrot Management Plan, Terrestrial Fauna Environmental Management Plan and Construction Environmental Management Plan (recommended condition B1-3) to ensure environmental outcomes and objectives are achieved.
- Contingency measures may be required to be developed and implemented to ensure the environmental outcomes are met if the monitoring trigger and threshold criteria are exceeded, indicating that impacts are greater than predicted or management targets are not being met (recommended condition C4-1(7)).
- The EPA notes the proponent has already committed to undertake preclearance surveys to establish avoidance buffers for all active roost sites and burrows and undertake relocation of threatened fauna in accordance with all relevant DBCA policies and procedures (recommended conditions B1-4(1) and B1-4(2)).

The EPA advises that some residual impacts resulting from the clearing of critical habitat will remain even with the additional recommended mitigation and management. However, noting that the key threats to all three of these species are from unmanaged fire and feral animals, the EPA is satisfied that an offset approach of managing fires and feral pests, combined with investment in research to improve

species conservation and management outcomes, will achieve a net benefit for all three species, as well as provide benefits for other terrestrial fauna in the area such as brush tailed mulgara, spotted *Ctenotus*, northern/southern marsupial mole and princess parrot. The EPA's assessment of this approach is included in the night parrot assessment above, and in section 4 Offsets of this report.

The EPA is satisfied that these measures, if implemented with the EPA's recommended conditions, would mean that the proposal is likely to be consistent with the EPA's objectives and the EP Act objectives of inter-generational equity and conservation of biodiversity (see appendix C for consideration of these objectives).

#### **Cumulative Impacts**

The proponent has assessed the cumulative effects of the proposal by considering this proposal in addition to several other existing and reasonably foreseeable projects including Beyondie Sulphate of Potash Project, Lake Disappointment Potash Project, Lake Wells Potash Project and Lake Way Sulphate of Potash Project.

The proposed disturbance from this proposal comprises 0.5% of the extent of salt lakes within WA. Cumulatively, impacts from approved potash projects and this proposal will result in a disturbance of less than 1% of salt lake habitat within WA (Stantec 2022).

The EPA considered the cumulative impacts from the range of threats and pressures in the area of the proposal; and whether the environment affected by the proposal has significant value. The EPA notes there are no other proposed developments of salt lakes in the Great Sandy Desert or Tanami bioregions.

The EPA notes that on a bioregional scale, implementation of this proposal would contribute to cumulative impacts to threatened fauna species, including the greater bilby, night parrot and great desert skink through habitat loss, and through the exacerbation of existing pressures such as feral predators and altered fire regimes. As assessed in this section, the proposal is likely to constitute significant residual impacts to fauna habitats.

Cumulatively the impacts are not to a level that would alter the likely environmental outcomes of this proposal. Should this proposal be approved with EPA's recommendation for offsets (section 4), it will deliver offset projects for populations of greater bilby, great desert skink and night parrot in the region to provide environmental benefits, including improved population resilience throughout the region.

## 2.1.10 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, or other decision-making processes can ensure consistency with the EPA factor objective.

The EPA has also considered the principles of the *Environmental Protection Act 1986* (see Appendix C) in assessing whether the residual impacts will be consistent with its environmental factor objectives and whether reasonable conditions can be imposed (see Appendix A).

The EPA has also had regard to its conclusions in other recent assessments, including EPA Report 1606 - Thunderbird Mineral Sands Project.

Residual impact or risk to environmental value		Assessment finding or Environmental outcome	Recommended conditions and DMA regulation
1.	<ul> <li>Direct impact to the following habitat types that are of importance to threatened fauna:</li> <li>42.22 ha of claypan and claypan mosaic, 3.44 ha of saline flats and depressions, 22.4 ha of lake margin complex habitat that are critical to the night parrot, and 0.55 ha drainage line habitat that is supporting habitat for the night parrot</li> <li>248.12 ha of gravel spinifex plain, 754.20 ha of spinifex sandplain, 42.22 ha of claypans and claypan mosaic, 281.82 ha of dune field and 19.27 ha of dune habitat that are critical habitat for the greater bilby.</li> <li>754.20 ha of spinifex sandplain habitat for the great desert skink.</li> </ul>	The EPA advises that these impacts are likely to result in residual and significant residual impacts. Residual impacts are likely to be regulated through conditions including limitations on clearing, limits on disturbance habitat types and progressive rehabilitation and closure outcomes. Offset conditions are recommended to require the proponent to counterbalance the significant residual impacts to night parrot, greater bilby and great desert skink. Taking into account the mitigation of the residual impacts through conditions, and the counterbalancing of significant residual impacts through offsets, the EPA has concluded that the environmental outcome is likely to be consistent with the EPA objective for terrestrial fauna.	Condition A1 (Limitations and extent of proposal) Condition B1 (Terrestrial fauna) Sets outcomes and objectives for management and specific avoidance and minimisation measures. Condition B5 (Offsets) Sets requirements for environmental impact offset plans for the greater bilby, great desert skink and night parrot.
2.	Impact to threatened fauna from injury and/or mortality during construction and operation, including from vehicle strike, bird strike (wind turbines), artificial	Residual impacts can be regulated through recommended conditions to ensure the environmental outcome is likely to be consistent with the EPA objective for terrestrial fauna.	Condition B1 (Terrestrial fauna) Sets outcomes and objectives for management and specific avoidance and minimisation measures.

Table 3: Summary	of	assessment	t for	terrestrial	fauna
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Residual impact or risk to environmental value		Assessment finding or Environmental outcome	Recommended conditions and DMA regulation
	light, noise, vibration and dust.		Pre-clearance surveys to inform the implementation of avoidance buffers, and where required to relocate greater bilby in accordance with DBCA guidelines.
			Minimisation measures.
			Terrestrial Fauna Environmental Management Plan
			Construction Environmental Management Plan
			Night Parrot Environmental Management Plan.
3.	Potential fauna entrapment in ponds and trenches.	Residual impacts can be regulated through recommended conditions to ensure the environmental outcome is likely to be consistent with the EPA objective for terrestrial fauna.	Condition B1 (Terrestrial fauna) Inspection of trenches and ponds Installation of fauna refuges in trenches 1.5 m high bunding around all trenches.
4.	Indirect impact to threatened fauna through habitat fragmentation, altered fire regimes, altered hydrogeology and introduction of invasive weed species.	The EPA advises there is a threat of serious or irreversible harm on the night parrot, there will be significant residual impacts to the greater bilby and great desert skink, and	Condition B1 (Terrestrial fauna) Monitoring and adaptive management of avoidance buffers
5.	Increase in predation of terrestrial fauna as a result of increase in feral predator species.	there is material scientific uncertainty relating to whether potential residual impacts can be mitigated. As a result, the EPA has applied the precautionary principle to consideration of these matters when assessing consistency of the proposal with its objectives. The EPA considers that tangibly improving the resilience of the species in the region through habitat management and threat	and objectives Terrestrial fauna Environmental Management Plan, Construction Environmental Management Plan and the Night Parrot Management plan Implementation of feral predator management program <b>Condition B2 (Flora and Veg)</b>

Residual impact or risk to environmental value		Assessment finding or Environmental outcome	Recommended conditions and DMA regulation
		reduction will be required to reduce the scientific uncertainty, increase confidence in buffer and minimisation measures, and also offset the direct impacts. Sustained net gain in habitat quality is needed to satisfy the EPA the proposal can be consistent with viability of these threatened species in the region.	Invasive weed management measures <b>Condition B3 (Inland Waters)</b> Inland waters monitoring and management plan. <b>Condition B5 (Offsets)</b> Sets requirements for environmental impact offset plans for the greater bilby, great desert skink and night parrot.
6.	Indirect impacts to habitat and availability of foraging resources through changes to lake hydrology including altered ground and surface water regimes.	Residual impacts can be regulated through recommended conditions to ensure the environmental outcome is likely to be consistent with the EPA objective for terrestrial fauna.	Condition B1 (Terrestrial fauna) Environmental outcomes and objectives Condition B3 (Inland Waters) Inland waters monitoring and management plan.

# 2.2 Flora and Vegetation

# 2.2.1 Environmental objective

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

## 2.2.2 Investigations and surveys

The EPA advises the following investigations and surveys were used to inform the assessment of the potential impacts to flora and vegetation:

- Baseline Aquatic Ecology Study of Lake Mackay and Peripheral Wetlands (Stantec 2021a)
- Lake Mackay Potash Project, Detailed Flora and Vegetation Survey and Consolidation (appendix F of the environmental review document) (Stantec 2021b)
- Lake Mackay Potash Project, Environmental Review Document (Stantec 2022)
- Lake Mackay Construction Environmental Management Plan (CEMP) (Stantec 2024a)

- Lake Mackay Flora and Vegetation Environmental Management Plan Rev V2 (Stantec 2024b)
- Lake Mackay Potash Project, Response to Submissions (Stantec 2024c)
- Lake Mackay Potash Project, Response to submissions (Stantec 2023a)
- Lake Mackay Potash Project, Mine Closure Plan (Stantec 2023b)
- Detailed Flora and Vegetation Assessment of the Mackay SOP Project (Stantec 2018).

The surveys undertaken were broadly consistent with the *Technical Guidance* – *Flora and vegetation surveys for environmental impact assessment* (EPA 2016). The EPA considers that the proponent has completed the relevant studies to appropriately inform the assessment as required by the ESD.

## 2.2.3 Assessment context – existing environment

#### Vegetation

As defined in the Interim Biogeographic Regionalisation of Australia (IBRA), the proposal occurs mostly within the Mackay subregion (GSD2) (98.1 %) of the Great Sandy Desert bioregion and extends northward into the Tanami Desert 1 subregion (TAN1) (1.9 %) of the Tanami Desert bioregion.

The proposal includes four discrete development envelopes that collectively cover 263,675 ha. They include the on-lake DE (ponds and trenches), off-lake DE (infrastructure), bore field DE and the haul road DE. Unless otherwise specified, development envelope refers to the collective of all four areas. The proposal includes disturbance of up to 15,000 hectares of the lake's surface and clearing of approximately 1,500 ha of native vegetation, 99% of which is in excellent condition (Stantec 2021b).

50 vegetation types have been identified and recorded within the development envelope. Of the 50 vegetation types, 39 occur in the haul road DE, 15 occur in the bore field DE, 11 occur within the on-lake DE and five occur within the off-lake DE. No Threatened Ecological Communities (TEC), Priority Ecological Communities (PEC), or threatened flora are likely to occur within the development envelopes (Stantec 2021b).

The proposal does not intersect any Environmentally Sensitive Areas (ESA) that have been declared under Section 51B of the EP act. The closest ESA is the Lake Gregory system (WA096) which is a nationally important wetland and is located approximately 50 km west of the northern end of the haul road DE. No conservation reserves occur within or in close proximity to the proposal. The nearest conservation reserve is the Wolfe Creek Meteorite Crater National Park located approximately 70 kms north of the haul road development envelope (Stantec 2023b).

## Flora

Fourteen priority flora species were recorded in the study area, of which seven occur within the development envelopes.

• Stackhousia sp. Lake Mackay (P.K. Latz 12870) (P1)

- Goodenia virgata (P2)
- Comesperma sabulosum (P3)
- Eragrostis lanicaulis (P3)
- Goodenia modesta (P3)
- Indigofera ammobia (P3)
- Stackhousia clementii (P3)

*Stackhousia sp. Lake Mackay (P.K. Latz 12870)* (P1) was recorded in the borefield DE and the off-lake DE; however, was not recorded in the disturbance footprint. Only one species of priority flora, *Comesperma sabulosum* (P3), was recorded in the disturbance footprint.

Flora surveys recorded range extensions for 135 species. The GSD2 subregion is relatively poorly surveyed compared to other areas in WA and as such, it was expected that a high proportion of the species recorded would represent range extensions. The range extensions recorded during surveys for the proposal are unlikely to represent species of conservation concern. Vegetation types from the range extensions recorded are well represented outside the development envelopes and are likely to be well represented in the surrounding region (Stantec 2023a). Given the impacts are not likely to be significant, with no expected change or elevation in conservation status as a result of direct or indirect impacts associated with the implementation of the proposal, no further assessment has been undertaken.

Ten flora species of 'other significance' were recorded within the study area, all of which occur within the development envelopes. Of these, two species (*Goodenia aff. armitiana* and *Triodia c.f. epactia*) were recorded in the indicative footprint. These species have been recorded extensively outside of the development envelopes (Stantec 2021b). Given the impacts are not likely to be significant, with no expected change or elevation in conservation status as a result of direct or indirect impacts associated with the implementation of the proposal, no further assessment has been undertaken.

## Introduced flora

Six introduced taxa were identified within the haul road DE, none of which represent Weeds of National Significance or are listed under the *Biosecurity and Agriculture Management Act 2007* as declared pests (Stantec 2022).

## 2.2.4 Consultation

Matters raised during stakeholder consultation and the proponent's responses are provided in the response to submissions document (Stantec 2024c). Public consultation on the proposal raised concerns about island vegetation susceptibility to groundwater extraction. The issues raised during the public consultation on the proposal and how they have been considered in the assessment are described in

sections 2.2.6 and 2.2.9 and under the key environmental factor inland waters (section 2.3).

## 2.2.5 Potential impacts from the proposal

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

- loss of native vegetation of up to 1,500 ha, including up to 33.13 ha of riparian vegetation from the direct impact of clearing.
- loss of or reduction in health of significant vegetation and flora from saline water discharge, changes to surface hydrology and water flows during inundation, sedimentation, and groundwater drawdown
- fragmentation of vegetation
- introduction of weed species to areas which are currently in excellent condition.

The surface of Lake Mackay, defined as lake playa habitat (15,000 ha), is unvegetated but when inundated provides important foraging habitat for migratory shorebirds and water bird species. The potential impacts to migratory shorebirds and waterbirds from the disturbance of lake playa habitat are discussed in section 2.1

## 2.2.6 Avoidance measures

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

- designing the on-lake DE (evaporation and crystalliser ponds) to exclude islands to avoid direct and potential indirect impacts (total of 20,119 ha of islands excluded from on - lake DE):
  - a) landform islands (3 islands in total) exclusion zone of 500 m
  - b) intermediate and large islands (52 islands in total) exclusion zone of 250 m
  - c) small islands (216 islands in total) exclusion zone of 100 m
- designing the off-lake DE (processing plant and associated infrastructure) outside of the riparian vegetation.

## 2.2.7 Minimisation measures (including regulation by other DMAs)

The proponent has proposed measures to minimise impacts to flora and vegetation:

- Implement the Flora and Vegetation Environmental Management Plan which includes monitoring, management, contingency actions (temporarily ceasing clearing activities and undertaking field inspections), weed management and monitoring programs
- 2. Reducing the extent of native vegetation clearing by constructing 30% of the haul road on an existing cleared track and limiting the haul road to a 24 m wide footprint

- 3. Minimising dust emissions by sealing the haul road in the early stages of the proposal, utilising dust suppression (water carts) during clearing activities and operations and reducing vehicle speeds on construction roads
- 4. Implementing a cohesive salt crust to assist in retention of sediment and soil moisture limiting sediment soil mobilisation
- 5. Ensure all vehicles stay on approved access ways
- 6. Implement vehicle hygiene, weed and seed hygiene practices for all personnel entering the site
- 7. Fire response equipment maintained at site, in vehicles, machinery, and haul trucks
- 8. Design pipelines in earthen bunded culverts to prevent spills from discharging into the surrounding environment
- Design the Wastewater Treatment Plant and irrigation infrastructure to be operated and maintained in accordance with design specifications and adhere to wastewater best practice health and environmental legislation and guidelines for irrigation of treated wastewater (Part V of the EP Act, Department of Health and shire of east Pilbara)

10. Clearing will only occur in approved ground disturbance areas.

#### 2.2.8 Rehabilitation measures

The proponent prepared a Mine Closure Plan in accordance with the requirements of the Statutory Guidelines for Mine Closure Plans (DMIRS, 2023) issued under the Mining Act.

As per the Mine Closure Plan, rehabilitation actions outlined by the proponent include:

- waste salt stockpiles at closure will be left in-situ, unrehabilitated in order for passive assimilation to occur into the surrounding lake and landscape over the long term
- supporting infrastructure including pumps and pipelines to be dismantled and removed and either disposed of at a licensed landfill or reused/recycled
- land based disturbances remaining after removal of infrastructure will be backfilled to the natural surface level and re-contoured, covered with topsoil if and where available and ripped and seeded with local provenance species
- revegetate where appropriate with a suitable mix of native species of local provenance compatible with the proposed post-mining land use.

The proponent has proposed the following key rehabilitation measures which are outlined in the Flora and Vegetation Environmental Management Plan (Stantec 2024b):

- undertake rehabilitation of temporarily cleared areas in accordance with rehabilitation procedures
- progressively rehabilitate areas as soon as possible to prevent weed proliferation

- ensure appropriate collection of topsoil and outline techniques for topsoil stripping and storage for rehabilitation
- annual inspection of rehabilitated areas for weeds.

## 2.2.9 Assessment of impacts to environmental values

The EPA considers that the key environmental values for flora and vegetation likely to be impacted by the proposal are vegetation in 'Excellent' condition, riparian vegetation and conservation significant flora and their associated values of habitat for conservation significant fauna.

## Significant flora and vegetation

The EPA has assessed the likely residual impacts of the proposal on vegetation to be the clearing of up to 1,500 ha of native vegetation of which 99% is in excellent condition.

The construction of the haul road (350 km) will directly impact 1,000 ha of vegetation within the 33,928 ha haul road DE. The proponent has committed to constructing 30% of the haul road on an existing cleared track. A total of 39 vegetation types are mapped within the haul road DE, the most dominant being *AstipGwaAancTbTe*. The study area for flora and vegetation covered 443,985 ha across all four development envelopes and included areas outside of the proposal footprint. The proposal will clear approximately 132 ha within the indicative footprint which represents less than 3% of the study area. This vegetation type is considered to occur extensively across the Great Sandy Desert (Stantec 2022).

The processing infrastructure, access roads, air strip and solar farm will directly impact up to 200 ha of vegetation within the 688 off-lake DE. Five vegetation types are mapped within the off-lake DE, the most dominant being *AdAlALMTs*. The proposal will clear up to 70 ha within the indicative footprint which represents less than 8% of the study area. The majority of the dominant species comprising this vegetation type have a widespread distribution across arid and semi-arid regions of WA (Stantec 2021b).

Clearing of vegetation for the borefield, water pipelines and access tracks will directly disturb 300 ha within the 11,799 ha bore field DE. Sixteen vegetation types are mapped within the bore field DE, with vegetation type *EgEp (Co)AsppTb* comprising 70%. The proposal will clear approximately 144 ha within the indicative footprint which represents less than 1% of the study area. This vegetation type is considered to occur extensively across the Great Sandy Desert (Stantec 2022).

The vegetation types recorded generally represent comparable landforms in the Mackay subregion of the Great Sandy Desert and Tanami bioregions (Stantec 2021b).

Nineteen vegetation types recorded in the development envelopes support priority flora and are considered to be locally significant. Of these vegetation types, two support the Priority 1 species *Stackhousia sp.* Lake Mackay (P.K. Latz 12870) and 12 vegetation types support the priority 3 species *Comesperma sabulosum* (Stantec 2024b). Impacts to these vegetation types represent less than 4% of the extent

within the study area and are thus considered unlikely to be significant. The EPA considers that the limitation on the clearing extent (recommended condition A1) will appropriately minimise impacts to vegetation.

Seven priority flora species were recorded in the development envelopes. One species, *Comesperma sabulosum* (P3) was recorded at 106 locations within the study area, with ten locations (9%) occurring within the haul road indicative footprint. No other priority flora was recorded within the indicative footprint (Stantec 2022).

One species of priority flora, Stackhousia sp. Lake Mackay (P.K. Latz 12870) (P1) was recorded at 16 locations within the development envelopes, however, was not recorded within the indicative footprint. This species occurs within the riparian zone. To minimise indirect impacts the proponent proposes to monitor Tecticornia spp. and Stackhousia sp. Lake Mackay (P.K. Latz 12870). Monitoring for indirect impacts (changes in inundation regime, groundwater abstraction, sedimentation or uncontrolled discharge of saline water) has been incorporated into the vegetation health monitoring program of the Flora and Vegetation Environmental Management Plan. The EPA considers that impacts to flora species are likely to be consistent with the EPA's objectives for flora and vegetation subject to recommended condition B2-1(5) to ensure no detectable decrease in the health of native vegetation supporting priority flora species, and condition B2-3 requiring the implementation of the Flora and Vegetation Environmental Management Plan to ensure that potential impacts are detected early, and adaptive monitoring can be implemented. Further, the EPA advises that the residual impact to excellent condition vegetation should be subject to implementation conditions (recommended condition A1 limitations on extent of clearing and B2-1) to ensure that the environmental outcome is likely to be consistent with EPA objective for flora and vegetation.

## Riparian vegetation

The riparian zone vegetation is dominated by *Tecticornia* species and is considered locally significant. The proposal will reduce groundwater levels in the vicinity of trenches on the lake surface. The proponent has committed to avoiding lake islands (total of 20,119 ha of islands excluded) within the on-lake DE to avoid direct and potential indirect impacts.

The Mackay Sulphate of Potash Project allows for the direct disturbance of 33.13 ha of riparian vegetation. No additional direct impacts are predicted for riparian vegetation. Table 4 summarizes impacts from clearing to riparian vegetation from the proposal.

Vegetation type	Extent in st area	udy	Extent within the development envelopes (ha)		Direct impacts (loss) – in disturbance footprint (ha)	
	(ha)	(%)	(ha)	(%)	(ha)	(%)
TsppEf	7,871.48	1.77	698.04	8.87	0.25	0.01
MIGcSdFcTs pp(TsaTp)	7,673.33	1.73	678.34	8.84	21.68	0.28
FcTsppEf(Ts aTs)	6,090.96	1.37	146.99	2.41	11.2	0.18
Total	21,635.77	4.87	1523.37	7.04	33.13	0.15

#### Table 4: Summary of predicted impacts on riparian vegetation

Eight sterile *Tecticornia* taxa were recorded from the DE, none of which are recorded within the indicative disturbance footprint (RTS 2023). The EPA considers the potential for direct impacts to these taxa is low. *Tecticornia globulifera* (P1), which is regionally significant, has been recorded at two locations during surveys for the proposal. It is likely that *Tecticornia globulifera* occurs elsewhere at Lake Mackay in suitable habitat within the riparian zone in association with vegetation type *TsppEf*. The proposal will directly impact 0.25 ha (less than 0.01%) of vegetation type *TsppEf*. Given that no individuals are known to occur within the disturbance footprint and that direct impacts to this vegetation type are less than 0.01%, direct impacts to this species are likely to be low (Stantec 2023a).

Noting that the distribution of *Tecticornia globulifera* within the area is poorly understood, the Flora and Vegetation Environmental Management Plan allows for adaptive management should additional species be found elsewhere within the development envelopes. It is likely that additional information may become available throughout the vegetation health monitoring program. The EPA has therefore recommended condition B2-1(1) to limit clearing of riparian vegetation and condition B2-3 to implement the Flora and Vegetation Environmental Management Plan to ensure that the EPA's objective for flora and vegetation can be met. The residual impact is likely to be able to be regulated through the recommended conditions above.

No known groundwater dependent vegetation was recorded within the development envelope. Four species were identified as having the potential to use groundwater, three of which (*Eucalyptus victrix*, *Melaleuca glomerata* and *Corymbia candida*), are considered vadophytes and are not considered groundwater dependent. *Allocasuarina decaisneana* has the potential to utilise groundwater, however its reliance on groundwater is unknown (Stantec 2024b). Thus, the EPA assessed *Allocasuarina decaisneana* as having the potential to be affected by groundwater drawdown. This species occurs on the lake islands which have been excluded from the disturbance footprint with buffers ranging from 100 m to 500 m from the trench network. The buffers are based on the proximity of the predicted extent of groundwater drawdown and potential sensitive receptors on the islands. Considering this and the proponent's commitment to avoid direct impacts on the islands, the buffers are considered appropriate. The EPA has therefore recommended condition B2-1(2) and (4) to avoid lake islands and ensures no detectable decrease in the health of riparian vegetation or trees (*Allocasuarina decaisneana*) that may be utilising groundwater.

#### Indirect impacts to flora and vegetation

The EPA has assessed likely residual impacts to flora and vegetation from indirect impacts to be:

- uncontrolled discharge of saline water, changes to surface hydrology and water flows during inundation regimes, sedimentation and groundwater drawdown
- increase in abundance and diversity of introduced flora
- fragmentation of native vegetation
- unintentional spillage or seepage of untreated wastewater
- increased dust deposition, altered fire regimes, increased soil salinity and disturbance of acid sulphate soils.

There is potential for indirect impacts from saline water discharge, changes to surface hydrology and water flows during inundation regimes (frequency, extent, depth and duration), sedimentation and groundwater drawdown resulting in disturbance and decline in flora and vegetation, including riparian vegetation and potential groundwater dependent vegetation. Groundwater drawdown is likely to be confined within the vicinity of the trench network. The trench network has been designed to avoid lake islands (recommended condition B2-1(2)) and to include sufficient distance between the areas of potential drawdown between the margins of the lake and the islands, to minimise the loss of critical habitat and disturbance. Some areas of the lake are predicted to be inundated temporarily. As the trench network has been designed to allow water to flow around on-lake infrastructure and naturally inundate the deeper portions of the lake that are the most biologically productive, it is unlikely that these rare flooding events would negatively impact riparian vegetation, including *tecticornia* taxa, within these areas (Stantec 2022).

The EPA notes the Flora and Vegetation Environmental Management Plan includes outcome and objective based provisions, triggers and thresholds and management actions particularly for riparian vegetation to reduce the risk of decline in flora and vegetation from direct and indirect impacts. *Tecticornia spp.* and *Stackhousia sp.* Lake Mackay (P.K. Latz 12870) will be monitored in the Vegetation Health Monitoring Program to measure the effectiveness of the management Plan. Monitoring against triggers and thresholds will provide an early warning to detect a reduction in groundwater levels outside of predicted modelled drawdown on the lake and islands. Therefore, the EPA has recommended conditions B2-3 and B3-3 to implement the Flora and Vegetation Environmental Management Plan and Inland Waters Environmental Management Plan.

The EPA advises that the residual impact should be subject to implementation conditions (recommended conditions B2-1(4), B2-1(5), B2-3 and B3-3)) to protect riparian vegetation and potential groundwater dependent vegetation from impacts and ensure that the environmental outcome is consistent with the EPA objective for flora and vegetation.

There is potential for the development of the haul road to introduce and increase the spread of weeds throughout the development envelope and adjacent vegetation. The EPA advises the development of the haul road is likely to introduce weeds into parts of WA which are currently in excellent condition.

Six introduced flora species were recorded within the haul road development envelope. Two recorded species, *Cenchrus ciliaris* (Buffel Grass), *Cenchrus setiger* (Birdwood Grass) and *Aerva javanica* (Kapok Bush) are considered to be serious environmental weeds with the potential to proliferate and become dominant in their preferred habitats. The record of *Flaveria trinervia* within the DE also represented a bioregional range extension (Stantec 2024b).

The introduction and proliferation of weeds is likely to require ongoing management over the life of the proposal given the extensive weed populations to the south (Kiwirrkurra) and north (Tanami Road) of the proposal (Stantec 2023a). The proponent has committed to managing introduced flora during construction, operation, and decommissioning stages. To monitor introduction and proliferation of weeds from the proposal the proponent has prepared a Flora and Vegetation Environmental Management Plan (recommended condition B2-3). The Flora and Vegetation Environmental Management Plan proposes a weed management plan and weed monitoring program which focuses on weeds which are rated as high or very high (by DBCA) and preventing their spread into night parrot, great desert skink and greater bilby habitat along the entirety of the haul road, as well as managing the abundance of weeds throughout the development envelopes.

The EPA considers preventing the spread of weeds should not be limited to night parrot habitat and should extend into a larger surrounding area to prevent large, uncontrolled hot fires. Consequently, the EPA recommends condition B2-1(7) to ensure there is no increase in the baseline extent of weed populations within the development envelope as a result of the proposal.

The EPA considers that with appropriate management and implementation of recommended outcomes-based conditions B2-1 and B2-3, these indirect impacts can be managed such that the proposal can be implemented to be consistent with the EPA objective for flora and vegetation.

The proponent has committed to implementing a range of management actions to ensure indirect impacts to flora and vegetation are minimised such as implementing the dust suppression measures, dust management plan, spill response training and developing and implementing a Hazardous Substances Management Plan and Procedure. The EPA assessed the proponent's proposed mitigation measures for dust suppression, altered fire regimes, increased soil salinity and disturbance of acid sulphate soils during construction and operations and determined they are likely to be sufficient to ensure the EPA objective for flora and vegetation is met.

#### Cumulative impacts

The proponent has considered the cumulative effects of the proposal by considering the proposed impacts to flora and vegetation from this proposal and several other existing and reasonably foreseeable projects including Beyondie Sulphate of Potash Project, Lake Disappointment Potash Project, Lake Wells Potash Project and Lake Way Sulphate of Potash Project.

As defined in the IBRA, the proposal occurs mostly within the Mackay subregion GSD2 (98.1 %) of the Great Sandy Desert bioregion and extends northward into the TAN1 (1.9 %) of the Tanami Desert bioregion. The majority of the Great Sandy Desert bioregion is unallocated crown land, with areas of conservation, mining leases, and Aboriginal lands and reserves, and several small areas of urban development. Approximately 7% of the Great Sandy Desert bioregion is used for grazing. The Tanami bioregion is dominated by unallocated crown land and crown reserves. Within the vicinity of the proposal, existing impacts in the region are largely confined to development associated with the remote Indigenous communities, historical resource exploration and access roads (Stantec 2022).

The proposed disturbance from this proposal comprises 0.5 % of the extent of salt lakes within WA. Cumulatively, impacts from approved potash projects and this proposal will result in a disturbance of less than 1% of salt lake habitat within WA (Stantec 2022).

The EPA considered the cumulative impacts from the range of threats and pressures in the area of the proposal; and whether the environment affected by the proposal has significant value. The EPA notes there are no other proposed developments of salt lakes in the Great Sandy Desert or the Tanami bioregions. Riparian vegetation associated with the salt lake playa of Lake Mackay is the only vegetation which is not considered widely distributed. Thus, EPA recommend condition B2-1(1) to limit disturbance on riparian vegetation.

Vegetation types do not represent TECs or PECs, vegetation types and priority flora are not restricted locally, and the majority of the vegetation is considered to be distributed widely in the regional context with no expected change or elevation in conservation status as a result of direct or indirect impacts associated with the implementation of the proposal. Thus, the cumulative impacts from this proposal within the Great Sandy Desert and Tanami bioregions are likely to meet the environmental outcomes and be consistent with the EPA objective for flora and vegetation.

## 2.1.10 Summary of key factor assessment and recommended regulation

The EPA has considered the likely residual impacts of the proposal on flora and vegetation environmental values. In doing so, the EPA has considered whether reasonable conditions could be imposed, or other decision-making processes can mitigate potential impacts on the environment, to ensure consistency with the EPA factor objective. The EPA assessment findings are presented in Table 5.

The EPA has also considered the principles of the *Environmental Protection Act 1986* (see Appendix D) in assessing whether the residual impacts will be consistent with its environmental factor objective and whether reasonable conditions can be imposed (see Appendix A).

Residual impact or risk to environmental value		Assessment finding or Environmental outcome	Recommended conditions and DMA regulation	
1.	Loss of up to 1,500 ha of native vegetation of which 99% is in Excellent condition.	The clearing of Excellent condition vegetation, including riparian vegetation, represents a residual impact. The EPA advises that this residual impact can be regulated through conditions including limitations on clearing, environmental outcomes to	Regulated through recommended conditions: <b>Condition A1 (Limitations and extent of proposal)</b> Limit extent of loss of vegetation.	
2	Loss of up to 33.13 ha of riparian vegetation.	ensure no adverse impacts to native vegetation and priority flora and monitoring of	Condition B2 (Flora and vegetation)	
3.	Loss of up to 9% Comesperma sabulosum (P3).	<i>Tecticornia</i> spp. and <i>Stackhousia</i> sp. Lake Mackay (P.K. Latz 12870). The proponent has committed to the implementation of the Flora and Vegetation Environmental Management Plan to ensure that potential impacts are detected early, and adaptive monitoring can be implemented. The residual impact is likely to be able to be regulated through conditions to ensure the environmental outcome is consistent with the EPA's objective for flora and vegetation.	<ul> <li>limitations on extent for riparian vegetation.</li> <li>no disturbance of flora</li> </ul>	
4.	Indirect impacts to Stackhousia sp.		and vegetation within landform island exclusion zones.	
	Lake Mackay (P.K. Latz 12870) (P1) and <i>Tecticornia</i> spp.		<ul> <li>no detected early, and adaptive monitoring can be implemented.</li> <li>The residual impact is likely to be able to be regulated through conditions to ensure the environmental outcome is consistent with the EPA's objective for flora and vegetation.</li> <li>no detected in the here vegetation.</li> <li>no detection in the here vegetation.</li> </ul>	<ul> <li>no detectable decrease in the health of riparian vegetation or trees.</li> </ul>
				<ul> <li>ensure no adverse impacts to native vegetation including significant flora.</li> </ul>
				consistent with the EPA's objective for flora and vegetation.
			<ul> <li>implementation of the Flora and Vegetation Environmental Management Plan.</li> </ul>	
				Condition B6 (Rehabilitation and Closure)
			Meet progressive closure environmental outcomes through the implementation of a Mine Closure Plan.	
			DMA legislation	
			(Appendix B)	
			DEMIRS can regulate rehabilitation and closure outcomes, including	

# Table 5: Summary of assessment for flora and vegetation

Residual impact or risk to environmental value		Assessment finding or Environmental outcome	Recommended conditions and DMA regulation
			progressive rehabilitation, through the requirements of a mining proposal and mine closure plan under the Mining Act.
5.	Indirect impacts associated with uncontrolled discharge of saline water, changes to surface hydrology and water flows during inundation regimes, sedimentation, and groundwater drawdown.	The proposal may result in disturbance and decline in flora and vegetation. The proponent has committed to the implementation of the Flora and Vegetation Environmental Management Plan to ensure that potential impacts are detected early, and adaptive monitoring can be implemented. <i>Tecticornia</i> <i>spp. and Stackhousia sp.</i> Lake Mackay (P.K. Latz 12870) will be monitored in the Vegetation Health Monitoring Program to measure the effectiveness of the management actions outlined in the Flora and Vegetation Environmental Management Plan. The EPA advises that subject to the implementation of recommended conditions to require monitoring and adaptive management, the residual impact can be managed so that the environmental outcome is likely to be consistent with the EPA objective for flora and vegetation.	<ul> <li>Regulated through recommended conditions:</li> <li>Condition B2 (Flora and vegetation)</li> <li>no detectable decrease in the health or riparian vegetation or trees</li> <li>no adverse impacts to native vegetation including significant flora and riparian vegetation.</li> <li>implementation of the Flora and Vegetation Environmental Management Plan.</li> <li>implementation of the Inland Waters Environmental Management Plan.</li> </ul>

Residual impact or risk to environmental value		Assessment finding or Environmental outcome	Recommended conditions and DMA regulation
6.	vironmental value Introduction and spread of weeds.	Environmental outcome The proposal may result in the introduction and spread of weeds into parts of WA with vegetation currently in Excellent condition. The EPA advises that subject to the implementation of recommended conditions to require no proliferation of introduction of weed species and to undertake weed control and management, the residual impact can be managed to ensure the environmental outcome is consistent with the EPA objective for flora and vegetation.	<ul> <li>and DMA regulation</li> <li>Regulated through recommended conditions:</li> <li>Condition B2 (Flora and vegetation)</li> <li>no detectable increase in the baseline extent of weed populations or new populations of weed species within development envelopes.</li> <li>implementation of the Flora and Vegetation Environmental Management Plan.</li> <li>Condition B6 (rehabilitation and closure)</li> <li>ensuring rehabilitated vegetation is self- sustaining, including not adversely impacted by environmental weeds.</li> </ul>
			DMA regulation
			(Appendix B)
			The DEMIRS can regulate weed management under the requirements of mining proposal under the Mining Act.

# 2.3 Inland waters and Subterranean fauna

## 2.3.1 Environmental objective

The EPA 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).

The EPA objective for subterranean fauna is to protect subterranean fauna so that biological diversity and ecological integrity are maintained (EPA 2016).

## 2.3.2 Investigations and surveys

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

- Mackay Potash Project Detailed Hydrogeological Assessment (H3 Level): On-Lake Brine (Stantec 2024a)
- Mackay Potash Project Detailed Hydrogeological Assessment (H3 Level): Borefield DE (Stantec 2024b)
- Inland Waters Environmental Management Plan (Stantec 2024c)
- Construction Environmental Management Plan (Stantec 2024d)
- Lake Mackay Potash Project, Environmental Review Document (Stantec 2022)
- Chapter 6. Hydrological and Hydrogeological Modelling for the Mackay SOP Project Prefeasibility Study. Report prepared for Agrimin, Western Australia (Advisian 2018)
- Hydrology and hydrogeology of the Lake Mackay Sulphate of Potash (SOP) Project, Western Australia (Agrimin Ltd 2018)
- Southern Borefield Process Water Supply Investigation 2019 Drilling Bore Completion Report. Report prepared for Agrimin, Western Australia (Agrimin and CSIRO. 2020)
- Lake Mackay SOP Project Preliminary Acid Sulfate Soils Investigation. Prepared for Agrimin Limited. (360 Environmental 2018)
- Lake Mackay Potash Project, Response to submissions (Stantec 2023a)

The EPA considered these investigations were adequate to assess impacts from the proposal. The EPA's confidence in the predictions from the investigations was strengthened due to the fact that hydrogeological and hydrological understanding are fundamental to defining the proposal resource, as well as to assessing potential environmental impacts, and so was a priority area for the proponent in developing the proposal.

The EPA advises the following investigations and surveys were used to inform the assessment of the potential impacts to subterranean fauna:

- Survey for Aquatic Macroinvertebrates for the Lake Mackay SOP Project, Western Australia (Invertebrate Solutions 2017)
- Survey for Aquatic Macroinvertebrates for the Lake Mackay SOP Project, Western Australia (Invertebrate Solutions 2018)
- Subterranean Fauna Risk Assessment for the Lake Mackay SOP Project (ecologica Environment 2017)
- Pilot Survey for Subterranean Fauna for the Lake Mackay SOP Project, Western Australia (Invertebrate Solutions 2017)
- Phase 1 Survey for Subterranean Fauna for the Lake Mackay SOP Project, Western Australia (Invertebrate Solutions 2018).

The surveys were consistent with the *Technical Guidance – Subterranean fauna* surveys for environmental impact assessment (EPA 2021).

## 2.3.3 Assessment context – existing environment

Lake Mackay is located within the groundwater and surface water catchment area of the Mackay basin. The proponent has undertaken a considerable number of studies on groundwater and surface water regimes for the Lake Mackay project as well as detailed hydrological assessments (H3 level) for both the on-lake brine operations and the bore field. The hydrogeological investigations performed to date provides a comprehensive basis to approximate the hydrological impacts of the brine extraction.

Lake Mackay spans across the Northern Territory/Western Australia border. While the portion of the lake that falls within the Northern Territory is recognised as a RAMSAR wetland, the portion of Lake Mackay situated within Western Australia is not recognised as a wetland of international importance and is not listed in the Directory of Important Wetlands in Australia. There are no surface water areas proclaimed under the RiWI Act within the proposal development areas.

Further information on the development areas of the proposal is described below.

#### Groundwater regimes and quality

The H3 Level hydrogeological assessments provide characterisation of the groundwater regime within the proposal area. The proposed borefield will intercept an extensive sedimentary aquifer consisting of the Neogene alluvial deposit and Angus Hills Formation.

Groundwater in the vicinity of the proposal is inferred to flow in a general northwest to southwest direction with a hydraulic gradient extending from the shoreline of the lake to approximately 20 km south (Stantec 2024a). The Mackay basin is recharged from surface water runoff and the groundwater paleochannel system. Groundwater infiltration varies across the lake due to differing composition of lakebed sediments. Following major rainfall events, surface water rapidly and easily infiltrates the lakebed sediments on the eastern portion of the lake. The low infiltration rate on the western portion of the lake results in water remaining on the surface for days to weeks.

Brackish to saline water quality exists within the aquifer targeted for abstraction in the borefield DE. Salinity concentration increases as sampling reaches closer to the lake and at depth. Results from monitoring bores show the pH is relatively consistent and is close to neutral. Island groundwater salinity levels and water quality are variable in relation to the bore depths, locality of the islands, and due to seasonal characteristics. Beneath the islands, lower salinity shallow groundwater bodies exist. These areas measured with lower salinity increase in concentration, returning to hypersaline brine with depth (Stantec 2024b).

The proposal will require up to 3.5 GL per annum from the borefield DE and up to 100 GL per annum of hypersaline brine abstraction from the on-lake DE. Initial concerns were raised over the availability of groundwater for the successful implementation of the proposal. Environmental values that are likely to be sensitive to changes in groundwater regimes, availability, and quality include potential groundwater dependent ecosystems and aquatic biota. The H3 assessment includes an analysis of the aquifer sustainable yield over an abstraction period of 20 years from the proposed borefield. The assessment shows that yield of 4 litres per second (L/s) per abstraction bore can meet the mine water demand while minimising groundwater extent (Stantec 2024a). There are no registered groundwater users within the borefield DE. The closest confirmed significant groundwater user is the community of Kiwirrkurra.

#### Surface water regimes and quality

Lake Mackay is situated within the Mackay basin surface water catchment area. The lake is predominantly dry; however, is subject to isolated or widespread inundation depending on rainfall events. Surface water typically pools within the southern half of the lake following rainfall events and reaching a depth of approximately 30 mm. The pooled water rarely resides on the lake due to the influence of winds, infiltration, and evaporation. During large magnitude rainfall events, surface water flow concentrates between islands and in areas where external inflow enters the lake. On average, the lake fills once every 10 years, based on available long-term satellite imagery (Stantec 2024a).

The movement of surface water is influenced by wind conditions and the bathymetry of the lake surface. The wind tends to originate from the east and southeast, while the topography of the lake generally slopes from northwest towards the southeast. Baseline surface flow velocities are negligible, with up to 0.5 m/s occurring under peak rainfall conditions (Stantec 2022). The baseline surface water quality sampling undertaken by the proponent indicated that surface water quality within the proposal development envelope is highly variable.

Numerous claypans and smaller waterbodies surround the proposal area. Small ephemeral creeks and watercourses exist along the margins of the lake that drain the surrounding landscape. The proponent has noted that no major stream channels appear to reach the lake. Peripheral claypans are likely perched with no expected hydraulic connection to the regional groundwater table. Infill is driven by rainfall and localised surface runoff and discharge is primarily by evaporation (Stantec 2024a).

A desktop review of the Australian National Acid Sulfate Soil Risk Map (ASRIS 2020) indicates that there is a high probability of ASS being present in some parts of the proposal area, although considering the lack of on ground verification, there is a low level of confidence in these predictions.

Sampling of the lakebed sediments and soils was undertaken in 2018 to assess the presence of acid sulphate soils within the proposal area. Based on the samples collected, results found no occurrence of actual acid sulphate soil (AASS). No occurrence of potential acid sulphate soil (PASS) was found within the majority of the proposal area, with the exception of two samples located along the southern edge of the lake.

#### Aquatic biota and subterranean fauna

The surficial calcrete aquifer in the Southern Regional Area (outside of the borefield DE) recorded the majority of stygofauna species. One potential stygofauna taxon, *Enchytraeidae sp.*, was recorded within the borefield DE from the Neogene alluvial aquifer. Within the on-lake DE, stygofauna taxa were recorded on the landform islands.

When inundated, the lake provides important foraging and breeding habitat for waterbirds and migratory shorebirds. Flooding leads to rapid growth of aquatic biota that can provide a significant food source for waterbirds.

Temporary and fresh water sources are within the proposal area and provide habitat for SRE taxa. The impacts to waterbirds and SRE taxa are discussed in section 2.1.

## Local groundwater use

There are no known existing groundwater users on or near Lake Mackay. The closest confirmed groundwater users are the community of Kiwirrkurra with six bores located approximately 40 to 80 km south and southwest of Lake Mackay and 10 Gibson Desert North bores (82Lh) located approximately 60 to 100 km northwest. An unregistered hand pump is located approximately 20 km southwest of Lake Mackay (Southern Regional Area, near monitoring bore MWP09). The hand pump is used infrequently during times of hunting or camping by Traditional Owners and is situated within a heritage exclusion zone (Stantec 2024a). There are no other registered groundwater users in the vicinity of the lake and the proposed trench network and brine abstraction from the on-lake DE is not anticipated to impact groundwater users. Considering this, EPA advises that no further assessment or consideration of mitigation measures on the potential impact to local groundwater use, is required.

## 2.3.4 Consultation

Matters raised during stakeholder consultation and the proponent's responses to those matters are provided in the response to submissions document (Agrimin 2023a).

The key issues relevant to inland waters raised during stakeholder consultation on the Mackay Sulphate of Potash Project are as follows:

- island vegetation susceptibility to groundwater extraction
- impacts to the hydrogeology and ecology of the playa ecosystems.

The key issues raised during the public consultation on the proposal and how they have been considered in the assessment are described in section 2.3.9.

The potential impacts to island vegetation and its susceptibility to groundwater abstraction is discussed in section 2.2.

## 2.3.5 Potential impacts from the proposal

Potential impacts to inland waters, subterranean fauna and aquatic biota associated with the proposal include:

- changes to groundwater and surface water regimes due to abstraction of water from the borefield DE and the abstraction of brine from the on-lake DE
- alteration of surface hydrology and topography associated with the clearance and development of evaporation ponds and trench network (landforms altering and disturbing the hydrological processes)
- impacts to groundwater and surface water quality
- loss of subterranean fauna and/or prospective habitat due to trench brine abstraction from the on-lake DE and groundwater abstraction from the bore field as a result of groundwater drawdown
- aquatic and riparian habitat loss, increased habitat fragmentation or modification, and loss of species of scientific interest or other significance, due to clearing, disturbance and construction infrastructure such as access roads, trench network, bunding and evaporation ponds
- groundwater contamination due to hydrocarbon spills from operations
- altered surface hydrology and topography from clearing and disturbance

Potential impacts from predicted drawdown on terrestrial fauna and flora and vegetation are discussed in sections 2.1 and 2.2.

## 2.3.6 Avoidance measures

The proponent has designed the proposal to avoid impacts to inland waters and subterranean fauna:

- avoid impacts to the Northern Territory section of the lake
- avoid stygofauna habitat by implementing buffer zones around the islands, comprising 500 m for landform islands, 250 m for large and intermediate islands and 100 m for small islands
- deviate the haul road to avoid low lying and drainage areas subject to flooding

• avoid use of diesel for power generation by using Liquid Natural Gas (LNG), solar and wind operation alternatives for the proposal.

## 2.3.7 Minimisation measures (including regulation by other DMAs)

The proponent has proposed the following measures to minimise impacts to inland waters and subterranean fauna:

- no access to the inundated portions of Lake Mackay when more than 20% of the lake is inundated
- implement a 1 km distance between trenches and installation of crossovers to limit drawdown and maintain hydrological processes
- staged development of trenches via implementation of brine mining units (BMUs) to maintain natural hydrological processes
- staged development of evaporation ponds and salt piles
- monitoring the drawdown to ensure it shall not exceed 3 GL/annum
- design of evaporation ponds to withstand a 1% Annual Exceedance Probability (AEP) flood event, with minimum embankment height of 1.5m, providing sufficient freeboard to limit saline runoff into the lake during major rainfall events
- haul road constructed to ensure no significant changes to surface water flow regimes, including lowering it as much as practicable to avoid banking of water against the road and creating washouts, and designing to facilitate sheet flow crossing the road during flood events
- appropriate disposal of potentially acid forming material within waste rock
- control measures to prevent movement of salts from evaporation ponds and salt piles
- implementation of the Inland Waters Environmental Management Plan which includes monitoring, management and contingency actions (cease land disturbing activities and initiate field investigations), as well as the requirement to evaluate the effectiveness of the management measures
- spill response training to be provided to all personnel and contractors
- spill response equipment provided in all site vehicles, and bunking and leaking mechanisms in place
- drawdown within the bore field area at a maximum will be <7% of total aquifer thickness, with limited habitat prospectivity for subterranean fauna
- progressive implementation of brine mining units to limit the rate and magnitude of drawdown
- groundwater investigations and modelling will be used to investigate drawdown extent and change in surface flows to validate predicted impacts and proposed monitoring and management approaches.

## 2.3.8 Rehabilitation measures

The proponent has prepared a Mine Closure Plan in accordance with the requirements of the Statutory Guidelines for Mine Closure Plans (DMIRS, 2023) issued under the Mining Act. As per the Mine Closure Plan, rehabilitation actions outlined by the proponent include:

- trench network and associated bunding will be breached as brine mining units are progressively closed over the life of mine to allow natural flow paths to return to the lake
- strategic breaching of the southern feeder canal at closure, allowing trenches to infill naturally within ~10 years with aid of flooding
- evaporation ponds will be breached at closure, with salts gradually dissipating and returning to the playa over time
- following closure of each BMU, recovery of groundwater levels to within 95% of baseline conditions is expected within two to five years.

## 2.3.9 Assessment of impacts to environmental values

The EPA considered that the key environmental values of inland waters and subterranean fauna are likely to be impacted by groundwater drawdown and alterations to groundwater and surface water regimes and quality resulting from brine and groundwater abstraction.

#### Groundwater drawdown - bore field DE

To predict the impacts from groundwater abstraction of up to 3.5 GL/annum and brine abstraction of up to 100 GL/annum, the proponent has undertaken groundwater modelling, simulating the water supply and production scenarios respectively. Several scenarios of production bore configurations were simulated and reviewed. To minimise impacts from groundwater abstraction, the proponent has committed to designing 28 abstraction bores to be configured 1 km apart, following the southern boundary of the borefield DE. The extent of groundwater drawdown from abstraction with this borefield configuration is shown in Figure 4 demonstrating that for a 20-year pumping period, drawdown is predicted to be a maximum of 6 m immediately adjacent to the borefield. Pumping for operations over 20 years is predicted to be equivalent to 7% of the total aquifer thickness (Stantec 2024b).

Predicted recovery analysis of the borefield groundwater deposits was provided based on the assumptions that the borefield abstraction was to cease at 20 years, no other abstraction occurred within the modelled area, and rainfall recharge was simulated at 1.2 mm/annum. Following cessation of abstraction, results show a 90% recovery for the Angas Hills aquifer to between 60 and 100 years. A longer recovery is predicted for the Neogene aquifer. Groundwater recovery for the shallow Neogene aquifer is predicted to reach 90% between 60 and 170 years (Stantec 2024b).

The proponent has also committed to monitor abstraction to ensure it shall not exceed 3.5 GL per annum. The EPA has recommended condition B3-1(5) to ensure the extent of groundwater drawdown from the proposal does not exceed what was

modelled by the proponent. This requires the proponent to ensure that groundwater drawdown immediately adjacent to the monitoring bores should be no more than 6 m for the bore field (within the bore field DE) and maximum drawdown of no more than 2 m at groundwater monitoring bores for environmental receptors as demonstrated in the Inland Water Environmental Management Plan.

The ecosystem health values related to inland waters include the ability to sustain vegetation and terrestrial fauna habitat and the ecological processes that support them, including the strong cultural links for the Traditional Owners. There are limited environmental values like these associated with the groundwater, and the modelled drawdown and recovery times are not expected to have a significant impact on those values. If there are future proposals in the area which have material groundwater impacts or needs, cumulative impacts will need to be assessed to protect environmental values.

The EPA has assessed the proponent's mitigation measures, in combination with recommended conditions B3-1 and limits on groundwater abstraction (recommended condition A1-1) and considers groundwater drawdown from the borefield is unlikely to have significant impacts to inland waters. It is therefore concluded that the EPA objective for this factor is likely to be met.



Figure 4: Predicted groundwater drawdown at the borefield DE

#### Groundwater drawdown - trenches in the playa sediments

Brine abstraction from trenches in the playa surface will cause drawdown of the shallow groundwater in the lakebed sediments (Figure 5). Brine abstraction begins in the south of the lake, progressing north-east over the life of mine. Modelling predicts that the drawdown from brine abstraction varies spatially and temporally on the lake. The eastern portion of the lake within the lakebed sediments and areas directly adjacent to the trenches is predicted to experience the greatest drawdown. Predicted drawdown across Lake Mackay at operational years 5, 10 and 20 is summarised in Table 6-1 of the H3 Brine assessment (Stantec 2024a). The predicted decrease in groundwater levels across the lake is an average of 0.7 m by year 10 of operations. Drawdown extent is dependent on seasonal variation, location of trenches, and differing permeability across the lake.

To predict the impacts from groundwater abstraction and brine abstraction, the proponent has undertaken H3 assessments to improve understanding of the hydrological conditions. The average predicted drawdown is 0.35 m on the islands, with most of the islands subject to a drawdown of less than 0.25 m (at year 20). The landform islands are areas of high recharge, limiting impacts to the low salinity and freshwater transitions zones that overlies the brine. Recovery of groundwater levels following the closure of each BMU is predicted to occur over a period of two to five years once pumping ceases, to within 95% of baseline conditions, aided by large rainfall events that recharge the system (Stantec 2024a). The largest landform islands on the lake support groundwater dependent vegetation (Allocasuarina decaisneana) and stygofauna (copepods), the records of which are typically located more than 1 km from the island margins. These potentially sensitive receptors are associated within the low salinity or fresh groundwater conditions overlying the brine in the lakebed sediments. Various degrees of uncertainty exist associated with the hydrogeological conditions associated with the islands. Due to this uncertainty, the proponent has committed to implement buffer zones around lake islands and claypans to mitigate impacts to stygofauna and potential sensitive receptors. The buffer zones range from 100 m (for 216 small islands) to 500 m (for the 3 largest islands), based on the proximity of the predicted extent of groundwater drawdown and the identification of stygofauna and potential sensitive receptors on the islands. The buffers aim to maintain habitat and reduce drawdown after consideration of ecological, hydrological and hydrogeological studies. Combined with outcomes-based conditions, the buffers are considered suitable to prevent significant impacts to stygofauna and the potential sensitive receptors from groundwater drawdown.

The EPA advises that the residual impacts associated with drawdown of the on-lake brine to sensitive receptors on the landform islands should be subject to recommended condition B3 (Inland waters and Subterranean fauna) to ensure the environmental outcome is likely to be consistent with the EPA objective for inland waters.



Figure 5: Predicted groundwater drawdown within the on-lake DE

The potential impacts of groundwater drawdown from brine abstraction include:

- reduction in groundwater yields
- changes in groundwater flow regimes
- changes to groundwater chemistry, particularly an increase in salinity
- decrease in the quality and available surface water and groundwater habitat, resulting in decline in aquatic biota communities of Lake Mackay, loss of subterranean fauna and/or prospective habitat.

The proponent has proposed a staged abstraction of brine from BMUs and designed the trench network to minimise impacts to hydrological processes and ecological values. Brine abstraction on Lake Mackay occurs over 5 operational stages, as shown in Figure 6. The first stage is planned for implementation at the southern portion of the lake. Within these stages, the trench network is partitioned into 17 smaller areas, representing similar physio-chemical characteristics. BMUs will facilitate abstraction of brine within these areas at each stage. The design confines drawdown within the vicinity of the trench network and is limited to lakebed sediments, enabling periodic recovery of groundwater levels across the lake over the life of mine. The brine within the lakebed sediments is considered too saline to support Groundwater Dependent Vegetation (GDVs) (Stantec 2024a).

The EPA notes the residual impacts of development of construction of trenches on inland waters and subterranean fauna and has therefore recommended condition B3-5 to ensure the trenches will be developed in 5 stages. Conditions B3-4 and C4-5 are recommended which requires the Inland Waters Environmental Management Plan to be updated at the end of each stage to ensure EPA's objective for these environmental factors can be met. Condition B3-4 also requires that the proponent demonstrate the environmental outcomes and objectives for inland waters and the environmental values that rely on them are reasonably likely to be met for each stage before the next stage can commence.



# Figure 6: Proposal layout showing the trench network and indicative schedule of BMU implementation on Lake Mackay

Potential GDVs and prospective habitat for stygofauna exist on several larger lake islands. Brine abstraction from BMUs in the vicinity of landform islands does not begin until year 10 of operations. The islands have been excluded from the disturbance footprint and exclusion buffer zones have been defined to ensure the islands will not be impacted by drawdown. The EPA considers the potential impacts to GDVs and prospective habitat for stygofauna from low salinity or fresh groundwater from abstraction of the brine can be regulated through recommended outcome-based conditions B3-1 and objective based conditions B3-2 to avoid significant impacts to GDVs and stygofauna on landform islands and ensure there are no project related adverse impacts.

Claypans are not anticipated to be influenced by abstraction of the brine. The claypans are likely to be supported by surface water, driven by rainfall and evaporation, and considered disconnected from the groundwater regime. The EPA has recommended condition B3-2(5), in combination with monitoring and management under the provisions of the Inland Waters Environmental Management Plan , to avoid significant impacts to peripheral wetlands (claypans) from activities relating to the proposal.

The EPA notes there is the potential for groundwater drawdown causing changes in hydraulic connectivity and/or reduction in moisture content of sediment to impact aquatic biota. The EPA has therefore recommended condition B3-2(2) to minimise adverse impacts to aquatic biota from changes in hydraulic connectivity or moisture content in sediment from groundwater drawdown.

To monitor impacts from groundwater drawdown, the proponent has prepared an Inland Waters Environmental Management Plan. The Inland Waters Environmental Management Plan proposes specific triggers, thresholds and contingency actions regarding groundwater drawdown to ensure groundwater abstraction does not have a significant impact on inland waters or subterranean fauna. Consistent with the requirements of condition B3-3, the Inland Waters Environmental Management Plan will be implemented in conjunction with the Flora and Vegetation Environmental Management Plan (condition B2-3) to allow for adaptive management.

The EPA notes that the Inland Waters Environmental Management Plan demonstrates that an adequate program of work has been designed to characterise the groundwater regime in the project area and predict and detect impacts in a timely manner. The Inland Waters Environmental Management Plan has committed to collecting a minimum of two years baseline monitoring data prior to construction of the trench network. This data may be used to revise modelling and trigger and threshold criteria. This increases confidence that effective mitigation actions can be implemented to prevent significant impacts associated with drawdown from groundwater and brine abstraction. The EPA recommended conditions B3-1 (1), B3-1(2), B3-2(1) and B3-2(2) to minimise the risk of adverse impacts to stygofauna and aquatic biota from groundwater drawdown and lakebed sediment abstraction.

The EPA has confidence that the recommended outcome-based conditions specified in condition B3-1 and condition B3-4 to stage the development of trenches as well as the requirement for trenches to be 1 km apart will achieve an environmental outcome consistent with the EPA objectives for inland waters and subterranean fauna.

#### Subterranean Fauna and Aquatic Biota

No stygofauna have been recorded in the hypersaline groundwater associated with the lakebed sediments, and this habitat is not considered likely to support stygofauna due to hypersaline groundwater and limited interconnected voids. Studies undertaken by the proponent have however identified one potential stygofauna taxon (*Enchytraeidae sp.*) within the extent of groundwater drawdown. Given this species is widely dispersed in the region, the extent of predicted impacts, and the availability of habitat remaining, it is considered unlikely that it will be impacted by groundwater drawdown of the Neogene alluvial deposit.

The islands of the lake potentially support significant subterranean fauna. Two taxa were recorded from the islands (copepods), one of which was was identified as a new species. A single individual of the potential troglofauna *Projapygidae-OES3* was recorded at one landform island and may represent an endemic species. The proponent has committed to avoid stygofauna habitat by implementing buffer zones around the landform islands.

The EPA has recommended condition B2-1(2) to implement avoidance buffers around lake Islands to minimise the risk of impacts to subterranean fauna and aquatic biota.

The EPA notes that implementation of this proposal is likely to result in local reduction of stygofauna habitat within the vicinity of the project due to groundwater drawdown. However, environmental values, such as GDVs and stygofauna habitat, that are reliant on the Neogene alluvial deposit are not expected to be significantly impacted by abstraction of groundwater from the proposal (Stantec 2024c). The EPA has assessed the impacts to the Neogene deposit and recommends outcome-based condition B3-1 (2) to ensure there are no significant impacts to the shallow aquifer (Neogene alluvial deposit) from the bore field.

#### Surface water network

Infrastructure on the playa surface and the proposed linear trench network has the potential to alter topography and therefore the surface hydrology within the proposal and local area.

The proponent has minimised interruptions to surface water flows by application of suitable engineering and design features. Drainage control features for the trench network includes 1 km spacing between each trench and initial crossovers. Modelled surface water flows convey flow past the on-lake DE infrastructure and returns flow to its natural path and area of inundation when these designs are implemented. The design will allow inundation of the deeper portions of the lake that are most biologically productive (Stantec 2024a). The EPA has recommended condition B3-4 to ensure the staged development of trenches via the BMUs which include 1 km spacing between trenches and installation of crossovers to maintain natural hydrological processes.

The Inland Waters Environmental Management Plan has been developed to align with an adaptive management framework, allowing environmental criteria (including triggers and thresholds) to be revised as additional information is collected from monitoring over time. Opportunistic flooding during wet conditions and rewetting trials during dry conditions are proposed to further understand the surface water regime.

The EPA has recommended condition C4-5(5) which requires the proponent to undertake a verification study of the detailed hydrological modelling of surface water flows, including the simulation of a 1:100-year rainfall event. The study aims to provide further evaluation of impacts to the hydrogeology and ecology of the playa systems. Consistent with the requirements of this condition, outcomes of this study should be submitted to the DWER at the completion of stage 1.

The proponent has committed to construct the haul road in accordance with design considerations that avoid drainage features and follow natural contours to maintain natural hydrology downstream of the crossing. The haul road will be lowered as much as practicable to avoid banking of water against the road and creating washouts and designed to facilitate sheet flow crossing the road during flood events.

The EPA is satisfied that the proposal is unlikely to have a significant residual impact on the surface water hydrology of Lake Mackay with the implementation of outcomebased conditions (recommended condition B3-1(4)) combined with the proponent's mitigation measures. The proponent's modelling of surface water regimes predicts major flooding of Lake Mackay is unlikely to change as a result of the proposal. During larger inundation events, which occur every five to ten years, hydrological modelling has shown the trench network and infrastructure will not prevent complete flooding of the lake. Habitat for aquatic biota is predicted to remain and provide a food source to waterbirds (including migratory species) (Stantec 2024a). The proponent has committed to not access the inundated portions of Lake Mackay when more than 20% of the lake is inundated. The EPA has recommended condition A1-1 based on this commitment.

Surface water modelling and aquatic ecology survey work have demonstrated that the deepest part of the basin corresponds with the highest areas of biological productivity. This occurs in the central-southern area of the lake. During major inundation events, Lake Mackay supports high ecological values. While these types of events are rare, changes to surface water flows and lake hydrology may indirectly impact migratory shorebirds and water birds through a reduction in the abundance of aquatic invertebrates which support foraging. Water balance modelling indicates minimal change to the duration, maximum extent, depth and frequency of surface water during these major flood events (Stantec 2024a). The proponent has committed to implement mitigation measures such as installing breaches in the trench network to allow water to reach these areas and designing the trench network to maintain the surface hydrology of the lake.

The EPA considers that mitigation of potential impacts to aquatic vertebrate and microbial benthic communities can be achieved through implementation of a stringent monitoring program, outlined in the Inland Waters Environmental Management Plan (condition B3-3), where potential impacts are detected early, and adaptive management can be implemented. The EPA has also recommended condition B3-1(4) which ensures no detectable decrease in the extent and duration of surface waters in the deepest parts of the Lake Mackay basin and condition B3-2(2) and B3-2(3) to ensure there are no adverse impacts to aquatic biota.

The EPA considers potential impacts from altered surface water hydrology are unlikely to be significant and can be regulated through reasonable implementation conditions (recommended conditions B3-1, B3-2, B3-3 and B3-4) to ensure the environmental outcome is likely to be consistent with the EPA objective for inland waters.

#### Groundwater and surface water quality

The proposal has the potential to cause changes in salinity and ionic composition of groundwater and surface water due to abstraction of brine and runoff from evaporation ponds and salt piles. Increased salinity in surface water and groundwater can potentially impact aquatic biota and riparian vegetation. The Inland Waters Environmental Management Plan implements monitoring and management measures associated with increased salinity in comparison to baseline conditions. Routine monitoring is outlined within Appendix A of the Inland Waters Environmental Management Plan, which includes monitoring of water quality, sediment quality, salt crust on the surface of the lakebed, and monitoring of biota. Trigger and threshold

limits, and the associated corrective actions, ensure early detection and address any salinity exceedances. Changes in water quality as a result of sediment runoff from the bunds is anticipated to be minimal. Within weeks of construction, the bunds and their embankments form a very hard crust, effectively preventing erosion. It is also expected that during inundation, only the base (10-20 cm) of the bund may be exposed, minimising the potential for erosion (Stantec 2022). The proponent has committed to utilise cohesive properties on salts to prevent movement of salts from evaporation ponds and salt piles.

The EPA has recommended condition B3-2(4) to ensure there are no adverse impacts to aquatic biota from changes in surface water flows, salinity, or quality from runoff from evaporation ponds and salt piles. The EPA considers that, with the mitigation and monitoring measures proposed and recommended condition B3-3 requiring implementation of the Inland Waters Environmental Management Plan, the environmental outcome is likely to be consistent with the EPA objectives for subterranean fauna and inland waters.

The proposal has the potential to impact groundwater and surface water quality from uncontrolled spills and discharges. The proponent has committed to implementing a range of industry-standard mitigation measures to ensure that potential impacts on water quality from sediment runoff from the bund, spills or leaks of hydrocarbons or chemicals, and leachate from the landfill and wastewater treatment plant operations are minimised. The proponent has proposed spill response training, spill response equipment to be provided and to incorporate bunking and leaking mechanisms to mitigate impacts from uncontrolled spills and discharges. The EPA is satisfied that the risks of uncontrolled spills and discharges to surface water and groundwater quality is unlikely to have a significant impact on inland waters and subterranean fauna and can be regulated through recommended conditions B3-1, B3-2 and B3-3.

The proposal has the potential to disturb and expose ASS during trench excavation and adversely impact aquatic and riparian habitat. Assessment of the lakebed sediments to depths up to 10 m did not detect ASS. Two samples potentially comprised ASS; however, were considered to have a low risk of acid generation. The proponent has proposed to appropriately dispose of potentially acid forming material within waste rock. Condition B3-3 has been recommended which requires the proponent to implement the Inland Waters Environmental Management Plan which includes an ASS assessment that demonstrates how the inland waters and subterranean fauna environmental objectives will be achieved.

The EPA advises that the recommended outcome-based conditions, in combination with the proposed minimisation measures, will achieve environmental outcomes that are consistent with the EPA objectives for inland waters and subterranean fauna.

# 2.3.10 Summary of key factor assessment and recommended regulation

# Table 6: Summary of assessment for inland waters and subterranean fauna

Residual impact or risk to environmental value		Assessment finding or Environmental outcome	Recommended conditions and DMA regulation		
1.	Groundwater drawdown from abstraction within the borefield DE and abstraction of brine from the on-lake DE.	The proponent's groundwater modelling has demonstrated the predicted maximum drawdown within the borefield DE and on Lake Mackay.	Regulated through recommended conditions. Condition A1 (Limitations and extent		
	Potential to change groundwater regimes. Potential impacts to subterranean fauna and	Drawdown from borefield abstraction and brine abstraction have the potential to affect the extent of subterranean fauna habitat. Given the extent of predicted impacts and the availability of habitat remaining, the proposal is unlikely to have a significant residual impact on subterranean fauna. The EPA advises that the residual impacts on inland	Drawdown from borefield abstraction and brine abstraction have the potential to affect the extent of subterranean fauna habitat.	brawdown from borefield abstraction and brine abstraction have the potential to affect the extent of subterranean fauna habitat.	of proposal) Abstraction limits for brine abstraction within the on- lake DE and groundwater abstraction for the entire proposal.
	aquatic biota.		Condition B3 (Inland waters and subterranean fauna)		
			Achieve outcomes and objectives to avoid impacts related to groundwater drawdown.		
		waters, subterranean fauna and aquatic biota is unlikely to be significant subject to implementation of	Limits on groundwater drawdown extent for the life of the proposal.		
		to ensure the trenches will be developed in 5 stages, and conditions B3 and C4-5 requiring the Inland Waters Environmental Management Plan to be implemented and resubmitted at the end of each	Implementation of the Inland Waters Environmental Management Plan including management measures relating to groundwater abstraction.		
		stage. The EPA has concluded that, subject to the recommended conditions, the environmental outcome is likely to be consistent with the EPA	Minimise the risk of adverse impacts to stygofauna and aquatic biota from groundwater drawdown and lakebed sediment abstraction.		
		objectives for inland waters and subterranean fauna.	DMA legislation (Appendix B)		
			DWER will regulate groundwater abstraction through the RiWI Act. The proponent's Groundwater Operating Strategy will		
Residual impact or risk to environmental value		Assessment finding or Environmental outcome	Recommended conditions and DMA regulation		
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			include the achievement of outcomes in condition B3 for groundwater abstraction and be implemented under the DWER decision-making process.		
2.	Alteration to surface water flow regimes.	Potential impacts from altered surface water hydrology are unlikely to be significant and can be regulated through reasonable implementation conditions. The EPA considers the proponent's mitigation measures in combination with outcome-based conditions (recommended condition B3- 1(6)) requiring no adverse impacts to surface water hydrology, will ensure environmental outcomes consistent with the EPA objectives for inland waters and subterranean fauna.	Condition A1 (Limitations and extent of proposal) Abstraction limits for brine abstraction within the on- lake DE and groundwater abstraction for the entire proposal to limit changes to surface water flows. No access to the inundated portions of Lake Mackay when more than 20% of the lake is inundated. Condition B3 (Inland waters and subterranean fauna) Achieve outcomes and objectives to avoid and minimise impacts from changes to surface water regimes. Staged development of trenches via BMU's. Implementation of the Inland Waters Environmental Management Plan including monitoring and adaptive management requirements		
3.	Potential impacts to groundwater and surface water quality.	The EPA advises there is a residual impact from abstraction of brine and water, and mining operations altering the quality of groundwater and surface water.	Condition A1 (Limitations and extent of proposal) Achieve outcomes and objectives to avoid impacts related to		

Residual impact or risk to environmental value	Assessment finding or Environmental outcome	Recommended conditions and DMA regulation
	The EPA advises that the residual impact on groundwater and surface water quality is unlikely to be significant subject to the implementation of the Inland Waters Environmental Management Plan and the recommended conditions. The EPA considers that subject to the implementation of the proposed mitigation, monitoring and management measures and implementation of the recommended conditions, the environmental outcome is likely to be consistent with the EPA objectives for inland waters and subterranean fauna.	groundwater and surface water quality. Condition B3 (Inland Waters and subterranean fauna) No adverse impacts to aquatic biota from changes in surface water flows, salinity or quality from runoff from evaporation ponds and salt piles. No detectable increase in contaminants in the quality waters of Lake Mackay during large inundation events, relative to baseline conditions. Implementation of the Inland Waters Environmental Management Plan. Condition B6 (Rehabilitation and Closure) Meet water quality closure environmental outcomes through the implementation of a Mine Closure Plan. DMA legislation (Appendix B) DWER will regulate emissions and discharges under Part V of the EP Act at the mine. DEMIRS can regulate rehabilitation, including progressive rehabilitation, through the requirements of a mining proposal and mine closure plan under the Mining Act.

## 2.4 Social Surroundings

#### 2.4.1 Environmental objective

The EPA environmental objective for social surroundings is *to protect social surroundings from significant harm*.

#### 2.4.2 Investigations and surveys

The EPA advises the following investigations and surveys were used to inform the assessment of the potential impacts to social surroundings:

- Aboriginal archaeological and ethnographic surveys within the development envelope from 2009 through to 2021 (see Table 10-2 of Stantec 2022)
- A Cultural Heritage Assessment of a proposed Development Corridor through the Ngururrpa Native Title Determination Area (Cane and Wohlan 2019)
- Lake Mackay Construction Environmental Management Plan (Stantec 2024a)
- Lake Mackay Potash Project, Response to Submissions (Stantec 2024b)

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

#### 2.4.3 Assessment context: existing environment

#### Aboriginal Heritage

The proposal is located within three native title determination areas, the Kiwirrkurra Determination Area (WCD2001/002), Ngururrpa Determination Area (WCD2007/004) and Tjurabalan Determination Area (WCD2001/00). The proponent has Native Title Agreements in place with the Parna Ngururrpa, Tjamu Tjamu and Tjurabalan Peoples. Letters of support for ongoing engagement from the Native Title holders is provided in the response to submissions documentation (Stantec 2024b).

The haul road development envelope traverses two Indigenous Protected Areas (IPAs), the Ngururrpa IPA (2,963,799 ha), the Kiwirrkurra IPA (4,276,341 ha), and the Tjurabalan Native Title Determination Area (2,584,199 ha). Indigenous Protected Areas are recognised as an important part of the National Reserve System and are voluntarily dedicated by Traditional Owner groups (Stantec 2024a).

The Ngururrpa IPA comprises of sandplains and dunefields and is known to contain a number of BC Act and EPBC Act listed threatened species including the night parrot, great desert skink and greater bilby. The Kiwirrkurra IPA covers the whole of the Kiwirrkurra Native Title determination and sets out management actions to protect natural and cultural values and provide a range of economic, educational, health and wellbeing benefits for the community (Stantec 2022).

An ethnographic and archaeological assessment was conducted within the haul road DE in 2019 with the Parma Ngururrpa Aboriginal Corporation (PNAC). The assessment acknowledged there may be sites of Aboriginal significance within the Ngururrpa Native Title Determination Area and the haul road DE. It was noted that

Lake Mackay and its surrounds have 'immense significance' to the Ngururrpa native title holders and other traditional owners. Parts of the haul road DE are situated within culturally sensitive terrain with religious narratives and places, and Archaeological sites (Cane and Wohlan 2019).

The Aboriginal Heritage Inquiry System review identified 13 Aboriginal heritage sites that directly intersected with the haul road DE, four sites that were within a 500 m buffer area, and 11 sites that were located within a 1 km buffer area. Table 10-6 of proponent's ERD outlines the registered and lodged Aboriginal Places within the vicinity of the haul road DE which are depicted in Figure 7 (Stantec 2022). The Department of Planning, Lands and Heritage (DPLH) Aboriginal Heritage database search identified the haul road DE intersects 25 Aboriginal heritage places of which five are lodged and 20 are registered. The proponent has designed the proposal to avoid registered Aboriginal heritage sites or mythological sites, listed heritage places and areas of significant cultural values.

The on-lake DE, off-lake DE and the borefield DE are located within Ngaanyatjarra Central Australia Aboriginal Reserve 24923. The desktop review of the Aboriginal Heritage Inquiry System for the proposal area recorded one registered Aboriginal heritage site (Site ID 2033) which was located 6.8 km south-west of the borefield DE. No sites were found to intersect with the on-lake DE or off-lake DE (Stantec 2022).

Based on the information above, and as no Aboriginal heritage sites were recorded within or near the on-lake DE or off-lake DE, no further assessment of impacts of the proposal on these sites has been undertaken.

#### Amenity/Land Use

A number of Aboriginal Communities and pastoral stations are located within or adjacent to the haul road DE. The nearest communities to the proposal are the Balgo community, approximately 2.6 km west of the haul road DE, and the Kiwirrkurra community, located approximately 60 km to the southwest of the bore field DE. The nearest public road is the Tanami Road to the north, which is currently an unsealed road that intersects the haul road DE. Noting the current lack of access roads in the region, the proposed haul road may encourage interest from external parties for tourism or recreational purposes.

Lake Gregory Pastoral Station and Bililuna Pastoral Station are located approximately 6.3 km west of the haul road DE. Considering these pastoral stations are more than 6 km from the haul road DE, impacts are unlikely to be material and no further assessment has been undertaken.

#### Non-indigenous heritage

No State Registered Places or Heritage Places were identified within the development envelopes.

#### 2.4.4 Consultation

Matters raised during stakeholder consultation and the proponent's responses to these matters are provided in the response to submissions document (Stantec 2024b). Public consultation on the proposal did not raise any specific concerns relating to social surroundings.

The proponent has undertaken extensive consultation with Parna Ngururrpa, Tjamu Tjamu and Tjurabalan Peoples regarding cultural heritage preservation, cultural awareness training for personnel, minimising environmental impacts and social and economic benefits. The proponent has developed a Cultural Heritage Management Plan with the Tjamu Tjamu and the Kiwirrkurra People. Letters of support for ongoing engagement from the Native Title holders is provided in the response to submissions documentation. The letters outline the benefit from improved infrastructure, increased connectiveness of communities and the generation of valuable long-term opportunities, including employment, for the Native Title groups and Indigenous communities throughout the Central Desert and the broader Kimberley region via employment and regional supply chain.

#### 2.4.5 Potential impacts from the proposal

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

- direct impacts to two IPA's Kiwirrkurra and Parna Ngururrpa, and the Tjurabalan Native Title Determination Area from clearing native vegetation
- direct disturbance to Aboriginal heritage sites
- indirect impacts to Aboriginal heritage sites through increase in dust, noise (aircraft, wind turbines and haulage) emissions, altered fire regimes, changes in aesthetic values and amenity values
- increased interest from external parties for tourism or recreational purposes
- alteration of the landscape through construction of permanent and temporary infrastructure.

#### 2.4.6 Avoidance measures

The proponent has designed the proposal to avoid registered Aboriginal heritage sites or mythological sites, listed heritage places and areas of significant cultural values.

#### 2.4.7 Minimisation measures (including regulation by other DMAs)

The proponent outlined the following minimisation measures to reduce both direct and indirect impacts to social surroundings:

- Where possible, use already disturbed areas, including tracks and drill lines, for the haul road
- implement the Cultural Heritage Management Plan in consultation with Traditional Owners, which outlines an adaptive management approach to manage potential impacts and risks to Aboriginal heritage sites and values

- implement the Construction Environmental Management Plan which outlines management requirements and consultation with Traditional Owners
- if Aboriginal heritage artefacts or unregistered sites are identified during postclearance surveys, the proponent will consult with relevant Traditional Owners, and where necessary seek relevant approvals under *Aboriginal Heritage Act* 1972
- installation of signage and fencing in areas within close proximity to Aboriginal heritage areas
- cultural awareness and Aboriginal heritage training for on-site personnel
- demarcation of heritage sites and exclusion zones to avoid impacts to heritage values and clearing will only occur in approved ground disturbance areas
- delineate clearing boundary areas, and confirm cleared areas via survey after clearing
- avoid clearing within drainage features and drainage lines where possible
- establish and maintain a geospatial Aboriginal Heritage Management Database to ensure any areas of concern, exclusion areas, sensitive areas and cleared areas in the development envelopes are readily identified, and effectively managed with fencing and/or signage of exclusions areas
- ongoing engagement and consultation with Traditional Owners
- dust controls during clearing and operation, vehicle speed limits and salt stockpile maximum height limits (maximum height of 7 m for excess salt stockpiles and 20 m for process salt stockpile) and location in areas considered to have low visual impact.

#### Aboriginal Heritage Act 1972

Consent is required from the Minister of Aboriginal Affairs to alter Aboriginal sites under the *Aboriginal Heritage Act 1972* (AH Act) within areas of the development envelope likely to be directly affected. The EPA notes that the AH Act does not apply to sites outside direct disturbance areas, or to indirect impacts within the development envelope.

#### 2.4.8 Rehabilitation measures

In accordance with the *Mining Act 1978*, the proponent has prepared a Mine Closure Plan which is consistent with the Statutory Guidelines for Mine Closure Plans (DMIRS, 2023).

As per the Mine Closure Plan, rehabilitation actions outlined by the proponent include:

 waste salt stockpiles at closure will be left in-situ, unrehabilitated in order for passive assimilation to occur into the surrounding lake and landscape over the long term

- supporting infrastructure including pumps and pipelines to be dismantled and removed and either disposed of at a licensed landfill or reused/recycled
- land based disturbances remaining after removal of infrastructure will be backfilled to the natural surface level and re-contoured, covered with topsoil if and where available and ripped and seeded with local provenance species
- revegetate where appropriate with a suitable mix of native species of local provenance compatible with the proposed post-mining land use.

These measures are expected to indirectly mitigate some social surroundings impacts in the long-term, but will not materially mitigate short/medium term or direct proposal impacts.

#### 2.4.9 Assessment of impacts to environmental values

The EPA considered that the key social surroundings values likely to be impacted by the proposal are direct impacts to Aboriginal heritage and cultural values through unauthorised disturbance to Aboriginal heritage places and indirect impacts on ethnographic values.

#### Aboriginal heritage

Implementation of the proposal has the potential to impact on Aboriginal heritage values of registered Aboriginal heritage sites and local indigenous communities within proximity of the proposal. Assessment of the potential impacts has been undertaken in accordance with the *Technical Guidance – Environmental impact assessment of Social Surroundings – Aboriginal cultural heritage* (EPA 2023b).

The cultural heritage assessment concluded the proposed haul road passes through country that has elevated significance for mythological (focal locations) and ethnographic values. Sites of significance within the haul road DE includes archaeological sites such as creeks, swamps and claypans, historical sites, religious narratives and places. The sensitivity of the mythological landscape varied along the length of the haul road with three areas of notable sensitivity identified:

- Northern section ridge and mesa country between the Stansmore (Mangkayi) and Stretch (Kilikinti) Ranges
- Central northern section the plains and breakaways surrounding Point Moody (Parakurra and Kantjimarra)
- Central southern section hill and plain country located between and including Carnegie Bluff (Pawapungu) and the Waterlander Breakaway (Piparr).

The exact locations of sacred sites are considered confidential (Cane and Wohlan 2019). The proponent has designed the proposal to avoid registered Aboriginal heritage sites or mythological sites, listed heritage places and areas of significant cultural values.

The proposal will directly intersect 179.66 ha (0.007%) of the Tjurabalan Native Title Determination Area, 653.13 ha (0.022%) of Parna Ngururrpa IPA and 13,926.24 ha (0.326%) of the Kiwirrkurra IPA. The EPA considered direct impacts to IPAs and

Native Title Determination Areas are less than 0.5% of the regional extent. The EPA recommended condition A1 that imposes limitations on clearing to ensure the impacts are managed consistent with EPA objectives for social surroundings.

Lake Mackay is an integral part of the landscape and the way of life of Traditional Owners. The proposal has the potential to alter the landscape through construction of permanent and temporary infrastructure. To minimise impacts, the proponent has committed to use previously disturbed areas including designing the haul road so they can utilise existing access roads where possible and traversing sand plains and dunes, largely avoiding outcrops and other features associated with the core mythology of the area (Cane and Wohlan 2019). At closure, supporting infrastructure will be dismantled and removed, land-based disturbances remaining after removal of infrastructure will be backfilled to the natural surface level and revegetation of native species will be undertaken. The EPA considers the proponent's mitigation measures are appropriate for minimising impacts to the landscape.

A single lane unsealed track traverses the haul road DE along the western edge of Lake Mackay, joining the Kiwirrkurra community in the south to the Balgo community in the north. This existing track consists of 30% of the haul road. The track is currently used to service a number of gold mines and cattle stations. It is likely that the connection of the haul road to Tanami Road may increase interest from external parties to visit the area for tourism or recreational purposes, including post closure (Stantec 2022). However, the proposal location is extremely remote and there is limited public access roads to the proposal area, therefore, the risk of external parties visiting the area is low. To minimise impacts, the proponent has committed to use previously disturbed areas including existing tracks, drill lines and seismic lines.

The proposed haul road will be sealed in the early stages of the proposal, which will reduce travel time and safer travel for these communities. The Construction Environmental Management Plan has been developed based on considerable consultation and is intended to build capacity of Indigenous ranger groups to undertake monitoring, management and conservation activities on their prescribed lands (Stantec 2024a). This allows Indigenous ranger groups to be involved in the monitoring and management of significant flora, vegetation and fauna.

Fifty sites of cultural significance are located within the haul road DE. The cultural heritage assessment determined that the haul road does not physically impact any discrete sites of significance (Cane and Wohlan 2019). The final alignment of the haul road will be informed through further consultation with relevant Traditional Owners, as well as post-clearance Aboriginal heritage survey work to ensure unregistered sites are identified, avoided and monitored appropriately (Stantec 2024a). The Construction Environmental Management Plan outlines management requirements and consultation with traditional owners for post-clearance surveys in the event Aboriginal heritage artefacts or unregistered sites are identified. The Cultural Heritage Management Plan has been developed to form part of the agreement between Parna Ngururpa and the proponent to mitigate impacts on cultural heritage.

The EPA has recommended condition B1-3 for the implementation of the Construction Environmental Management Plan to ensure that these values are

protected, and relevant environmental outcomes are achieved. It is considered that the protection of these environmental values will ensure that the associated social, cultural and spiritual values are protected.

The EPA considers that whilst the haul road passes through country that is rich with mythology, the haul road DE avoids and mitigates impacts to sites of significance within the broader mythical landscape through the design of the haul road alignment, and utilising historical disturbed areas where possible. The EPA advises that any direct impact to Aboriginal heritage sites or places can be mitigated under the *Aboriginal Heritage Act 1972.* 

The EPA advises that the proponent has taken reasonable steps to consult with relevant traditional owners and considers its factor objective is likely to be met in respect to Aboriginal cultural heritage, subject to recommended condition B4 which requires:

- no direct disturbance unless consent has been granted under the AH Act after reasonable consultation steps
- no interruption of ongoing access to land utilised for traditional use or custom by relevant Traditional Owners
- avoidance and minimisation of other adverse impacts to Aboriginal cultural heritage.

#### Indirect impacts

Implementation of the proposal has the potential to indirectly impact Aboriginal cultural heritage sites through changes in amenity values, increase in dust, noise (aircraft, wind turbines and haulage) emissions and altered fire regimes.

The nearest sensitive receptors within the vicinity of the development envelopes are the Balgo Aboriginal Community, which is located 2.6 km west of the haul road and the Kiwirrkurra Community, located 60 km south-west of the off-lake DE. The nearest public road is the Tanami Road which is currently unsealed and intersects the northern tip of the haul road.

The proposal has the potential to impact amenity values from wind turbines and salt stockpiles, fugitive dust and noise emissions from construction, operations and product haulage. The proponent has committed to a maximum height of 7 m for excess salt stockpiles and 20 m for process salt stockpiles, which will be located in areas with low visual impact. The proponent has proposed the implementation of fire and dust procedures and vehicle speed limits on roads to reduce dust, noise and vibration to minimise potential indirect impacts to Aboriginal cultural heritage. The EPA considers the proposed mitigation measures are appropriate for minimising visual amenity, dust, noise and altered fire regime impacts.

The EPA considers the proponent's proposed management and mitigation measures will mean the potential indirect impacts are unlikely to be significant and the proposal can be implemented to be consistent with the EPA objective for social surroundings, subject to recommended outcome-based conditions B1-3 and B4-2.

#### Cumulative impacts

The social surroundings values located within the Mackay Sulphate of Potash Project area are unlikely to be impacted by other developments in the region, and therefore, no cumulative impact to social surroundings is expected.



Figure 7 – Lodged and registered Aboriginal sites within 1km of the Project

## 2.4.10 Summary of key factor assessment and recommended regulation

### Table 7: Summary of assessment for social surroundings

Residual impact		Assessment finding	Recommended conditions and DMA regulation
1.	Potential for direct impacts to Aboriginal heritage sites and areas of cultural significance.	The EPA advises that any direct impact to Aboriginal heritage sites or places can be managed under the AH Act. The EPA recommends condition A1 that imposes limitations on clearing to ensure the impacts to IPAs are unlikely to be significant and the proposal can be	Condition A1 (Limitations and extent of proposal) Condition B1 Implement Construction Environmental Management Plan Condition B4 (Aboriginal
2.	Direct impacts to IPAs from clearing within the disturbance footprints	implemented to be consistent with EPA's objectives for social surroundings. The EPA has concluded that there is a risk of residual	<ul> <li>no disturbance to Aboriginal cultural heritage unless consent is granted under AH Act</li> </ul>
3.	Potential for indirect impacts to Aboriginal cultural heritage sites and areas of cultural significance from changes in amenity values, increase in dust, noise (aircraft, wind turbines and haulage) emissions and altered fire regimes.	indirect impact to Aboriginal cultural heritage sites and areas of cultural significance. The EPA considers that the residual indirect impacts to Aboriginal cultural heritage can be regulated through recommended conditions and other decision-making processes to ensure the environmental outcomes are consistent with the EPA objective for social surrounds.	<ul> <li>meet the environmental objective to minimise adverse direct impacts and indirect impacts to Aboriginal cultural heritage</li> <li>DMA legislation (Appendix B)</li> <li>Consent is required to alter Aboriginal heritage sites under section 18 of the AH Act.</li> </ul>

## 3 Holistic assessment

The EPA has assessed the impacts of the proposal against the key environmental factors and environmental values individually in the key factor assessments above. Given the link between flora and vegetation, terrestrial fauna, inland waters, and social surroundings, the EPA has also considered connections and interactions between them to inform a holistic view of impacts to the whole environment.

#### Terrestrial Fauna – Flora and Vegetation – Inland Waters – Subterranean Fauna

The EPA advises there is a threat of serious or irreversible damage to the night parrot, and significant residual impacts to the greater bilby and great desert skink from the construction of the haul road. The EPA considers that there is material scientific uncertainty about potential residual impacts on these species, in particular from feral predators and altered fire regimes. Therefore, after consideration of the precautionary principle, the EPA recommends that a cautious approach be taken to increase the resilience of critical habitat through land management and threat abatement activities before the haul road construction commences in any area. These land management activities are also expected to contribute to minimising impacts on flora and vegetation.

The conservation significant flora and vegetation provides habitat and foraging resources for conservation significant fauna occurring within the proposal area. Impacts to flora and vegetation also have the potential to impact surface water quality. Minimising the direct and indirect impacts to flora and vegetation will also minimise impacts to conservation significant fauna habitat and inland waters.

The unique lake hydrology of Lake Mackay, surface water catchments and groundwater aquifers of the proposal area support vegetation and fauna habitat, which hold environmental and cultural value. The EPA recognises that there are inherent links between the inland waters factor and other environmental factors. For example, changes to the quality or quantity of inland waters can impact on flora and vegetation, and social surroundings. Changes in surface water flows and lake hydrology as a result of groundwater drawdown may negatively impact subterranean fauna and aquatic invertebrates that are a critical food resource for migratory shorebirds and waterbirds that utilise Lake Mackay for critical foraging and breeding behaviours. Changes to lake hydrology may also impact the availability of suitable breeding habitat and subsequent reproductive success for migratory shorebirds and waterbirds.

Water is inherently limited in arid inland environments and surface water flow after heavy rainfall events support ephemeral water sources that are of critical importance for supporting terrestrial fauna species, as well as flora and vegetation. Changes to surface water flows, or the quality of surface water, has the potential to impact negatively on the values of flora and vegetation and terrestrial fauna.

The EPA has recommended the inclusion of outcome and objective based conditions that are focused on the maintenance of ecological integrity and population health by ensuring there are no adverse impacts to key species of terrestrial fauna, flora and vegetation or inland waters that would compromise ecological function. The EPA considers that the proposed mitigation and management measures and recommended conditions for impacts to inland waters will also mean the inter-related impacts to the health of other factors of the environment, including the values associated with terrestrial fauna, subterranean fauna and flora and vegetation, are likely to be consistent with the EPA environmental factor objectives.

#### Social Surroundings – Flora and Vegetation – Terrestrial Fauna – Inland Waters

There is a direct link between Aboriginal culture and the physical and biological aspects of the environment. The ecosystem health values related to inland waters generally include the ability to sustain vegetation and terrestrial fauna habitat and the ecological processes that support them, including the strong cultural links for the Traditional Owners. This may include hunting and collecting traditional bush foods which may be disrupted due to impacts to flora and vegetation, and terrestrial fauna. Water resources are of great importance to the Traditional Owners. The impact assessment has considered the strong connections of the relevant Traditional Owners to the land, and the potential impacts that restricted access to country, disturbance from the proposal and changes to ground and surface water, flora and vegetation, and terrestrial fauna 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 interrelated impacts to the health of other factors of the environment including the values of flora and vegetation, terrestrial fauna and inland waters are likely to be consistent with the EPA environmental factor objectives.

#### Landforms, social surroundings, terrestrial fauna, flora and vegetation, inland

#### waters and subterranean fauna

Although Landforms is not one of the key environmental factors of the proposal, the EPA recognises that there are inherent links between the factor Landforms and other environmental factors as landforms may support numerous and varied environmental values. Lake Mackay is a very large inland salt lake that supports unique and diverse habitats including critical habitat for terrestrial fauna species and subterranean fauna. The values of the lake system are largely driven by hydrological processes that are considered under the inland waters environmental factor. The lake islands themselves provide critical habitat and are considered to be a key value of the landform of the Lake Mackay region. The proponent has committed to avoiding impacts to lake islands and the habitats and terrestrial fauna they support through the implementation of avoidance buffers.

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

#### Summary of holistic assessment

The EPA considered the connections and interactions between relevant environmental factors and values 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 factor objectives.

The EPA has recommended condition B7 to require environmental performance reporting of holistic and connected environmental values through the life of the proposal. These include terrestrial fauna outcomes, environmental outcomes and delivery of key aspects of the offsets strategy, use of native fauna crossings, and inland waters and subterranean fauna outcomes. The EPA considers this is a reasonable condition consistent with the time and spatial scale of the proposal, the uncertainties with assessing some impacts, and adaptive management.

## 4 Offsets

Environmental offsets are actions that provide environmental benefits which counterbalance the significant residual impacts of a proposal.

Consistent with the *WA Environmental Offsets Guidelines* (Government of Western Australia 2014), the EPA may consider the application of environmental offsets to a proposal where it determines that the residual impacts of a proposal are significant, after avoidance, minimisation and rehabilitation have been pursued.

In the case of this proposal, likely (and potential) significant residual impacts are to three Matters of National Environmental Significance (MNES) listed threatened species under the EPBC Act and BC Act:

- night parrot (Endangered, Critically Endangered) direct loss of:
  - 68.02 ha of critical habitat including claypan mosaic habitat, saline flats and depressions, lake margin and complex habitat
  - $\circ$  0.55 ha of supporting habitat.
- greater bilby (Vulnerable) direct loss of:
  - 1345.63 ha of critical habitat including gravel spinifex plain, spinifex sandplain, claypan and claypan mosaics, dunefield and dune habitats.
- great desert skink (Vulnerable) direct loss of:
  - o 754.20 ha of critical habitat including spinifex sandplain habitat.

Indirect impacts on these species through habitat fragmentation, increased competition and predation from feral animals, changes to fire regimes, injury, and disturbance are also likely from the proposal and will add to the significant residual impacts.

Environmental offsets are not appropriate in all cases. In this case the EPA considers offsets are appropriate given:

- the proponent's application of the mitigation hierarchy to reduce potential impacts to environmental values (principle 1 of the WA Environmental Offsets Policy)
- the scale of the environmental impacts (principle 2 of the WA Environmental Offsets Policy)
- EPA public advice (EPA 2024) (considering environmental offsets at a regional scale) principle 2 regional scale management consistent with:
  - Recovery Plan for the Greater Bilby (*Macrotis lagotis*) (Department of Climate Change, Energy, the Environment and Water 2023)
  - National Recovery Plan for the Great Desert Skink (Liopholis kintorei) (Department of Climate Change, Energy, the Environment and Water 2023)
  - o threat abatement plan for predation by feral cats

- the Threatened Species Action Plan 2022-2032 (Department of Climate Change, Energy, the Environment and Water 2022)
- The residual impacts can be counterbalanced by the provision of substantial offsets that are likely to have a long-term strategic benefit and demonstrated environmental benefit (principle 6 of the WA Environmental Offsets Policy).

For this proposal, the EPA advises the approach combines on-ground threat abatement actions, such as feral animal control and fire management, and research offsets. This strategy aims to deliver a net environmental benefit for the night parrot, greater bilby and great desert skink over short-, medium-, and long-term time scales.

#### Proposed offset

The proponent's offset strategy dated March 2022 was advertised during the public review period. A revision to the offset strategy dated April 2024 was submitted with the RTS in response to matters raised during the assessment.

The EPA requested the proponent revise the spatial area for which offsets will be delivered, specify the environmental outcomes likely to be achieved by the proposal, and provide further information on the management of offset funds and consider how the proposed offsets will apply the EPA's public advice. The proponent submitted a revised offset strategy dated August 2024 (Stantec 2024e). The EPA sought advice from DBCA and DCCEEW in relation to the night parrot, greater bilby and great desert skink and, in response to matters raised, the proponent submitted its final revised offset strategy dated October 2024 (Stantec 2024f).

The EPA considers that tangibly improving the resilience of the species in the region through habitat management and threat reduction will be required to reduce the scientific uncertainty and satisfy the EPA the proposal can be consistent with viability of these threatened species in the region.

The option for a direct land offset through land acquisition was investigated by the proponent and DCCEEW, however it was concluded that a direct land offset was unsuitable, with no nearby comparable land acquisition available for the proposal due to the following:

- the land outside of the indicative footprint is held across two IPAs
- the nearest available land to purchase is not comparable habitat and is unsuitable for use as an offset
- the nearest available land (with comparable or suitable habitat) to purchase is located hundreds of kilometres from the proposal (Stantec 2024f).

The EPA considers that given that land acquisition is not an option, the implementation of feral predator and fire management programs in the broader region is important to counterbalance the permanent loss of habitat for the threatened night parrot, great desert skink and greater bilby. The EPA also recognises the value of investment in research programs to inform a better understanding of these species in the region and inform conservation and management measures that provide support for species resilience and recovery.

The proponent's revised offset strategy provided this satisfaction through committing to targeted conservation actions, such as fire and feral animal management, to contribute to the overall recovery and protection of populations and net environmental benefit.

A total offset area of 5,750 ha mitigates over 90% of the direct impacts on the three MNES species (based on State and Commonwealth calculators). This area is proportionate to the proposal's significant residual impacts on critical and supporting habitats, including specific allocations for the night parrot (200 ha), greater bilby (4,350 ha), and great desert skink (1,200 ha). Offset activities across the whole offset area will have benefits for all species, meaning there are multiplier benefits in a landscape scale offset package.

The EPA commends the proponent's offsets proposal and considers is it likely to provide a net benefit to the species for the duration of the proposal, and considers it is likely to provide a net benefit to the species. However, the EPA considers additional elements are required to ensure species resilience is improved before impacts occur, to avoid the risk the net benefit from the offset is too late to counterbalance the impact. The EPA also considers the offset should be designed so it is likely to endure after the proposal is being actively managed. Therefore the EPA recommends the proponents' offsets strategy be implemented, provided it also includes the following important elements:

- staging of offsets implementation to ensure threat abatement is progressively undertaken ahead of haul road construction to increase resilience in critical fauna habitat for the longest time before being disturbed, so the habitat resilience is increased before impacts occurs; (condition B5-2(6))
- threat abatement actions commencing, and adequate baseline monitoring being completed, before construction on the haul road commences; (C1-5)
- contribution to the long term, post proposal viability of the species in the area (B5-2(8));
- consistency with sustainable, funded habitat conservation and improvement models which are likely to be maintained beyond the life of the proposal (B5-2(9)).

The EPA believes that recommending that the proposal be implemented with conditions which reflect the above measures would be a reasonably proportionate response in order to prevent irreversible or serious damage to the night parrot, greater bilby and the great desert skink and not go beyond what is appropriate and necessary to achieve likely consistency with the EPA's objective. The EPA advises that without these recommended conditions it does not believe the proposal could be implemented in a way which is likely to be consistent with its objectives.

The offsets proposed for each species are assessed below.

#### Night parrot

The night parrot is listed as critically endangered at the state level, endangered at the Commonwealth level, and is listed on the IUCN list as critically endangered. It is considered to be at very high risk of extinction. Key threats to the night parrot include; loss of habitat as a result of altered fire regimes, with larger and hotter fires resulting in a loss of critical habitat; predation by feral animals; competition for water and food; and habitat destruction from feral herbivores.

DCCEEWs consultation paper on changing the listing for the night parrot from endangered to critically endangered (DCCEEW 2024) discusses the eligibility of the night parrot for inclusion in the critically endangered category, which is based on criteria such as population size, rate of decline and geographic distribution. The paper outlines conservation actions to protect and recover the night parrot population. These included fire management to avoid large fires, targeted feral animal control and managing grazing to prevent habitat degradation. Consistent with DCCEEW's consultation paper, the offset strategy's emphasis on targeted conservation actions, such as fire and feral animal management, thereby contribute to the overall recovery and protection of the night parrot population and likely net environmental benefit for the night parrot.

Offset projects for the night parrot include:

- feral animal control at the regional, habitat or targeted population scale, to manage existing key threats to the species
- implement traditional burning techniques and fire management practices to reduce fuel loads and prevent hot fires within critical night parrot habitat.

It is noted that there is a paucity of information on night parrots and research gaps contributing to significant uncertainties in the evaluation and management of environmental impacts. Consistent with the Offset Guidelines (Government of Western Australia 2014) the EPA advises that the research offsets are a valuable component of the offset strategy that will inform conservation efforts for the species and contribute to long-term strategic outcomes in terms of understanding threats, pressures and habitat requirements.

Research offsets for the night parrot include:

- implementation of a long-term monitoring program
- identification of key food plants and habitat requirements
- understand nesting requirements and habits
- investigate fire ecology including long term impacts resulting from climate induced changes to fire regimes.

The EPA also notes regional surveys which contribute to understanding of distribution and population structure and patterns of habitat usage would be valuable, and has recommended consideration of these (B5-2(3)).

#### Greater bilby

The greater bilby is listed as vulnerable at both the state and federal level. Key threats to the species include altered fire regimes and feral predators, and the management of fire and feral animals are identified as key priorities in the specie's recovery plan.

Offset projects for the greater bilby include:

- feral animal control at the regional, habitat or targeted population scale, to manage existing key threats to the species
- implement traditional burning techniques and fire management practices to reduce fuel loads and achieve conservation outcomes.

Offset projects that target feral predators will be:

- strategic (i.e., landscape scale, collaborative planning and implementation)
- implemented long term
- implemented at a scale that demonstrates a conservation gain for the greater bilby (landscape-based level).

Research projects for the greater bilby include:

- studies of greater bilby biology, ecology, population dynamics and genetic diversity
- studies of predator biology, ecology, interdependencies, control methods and effects
- quantifying habitat quality, extent, processes and threats, such as fire and grazing
- understanding factors that influence the spread of fire, and its effects on habitat and food availability
- understanding the effects of, and opportunities associated with, a changing climate
- identifying interdependencies between predators (including the dingo), fire, water availability and introduced species.

#### Great desert skink

The great desert skink is listed as vulnerable at the state and federal level. Key threatening processes for the great desert skink include predation by feral predators and altered fire regimes.

Offset projects for the great desert skink include:

- implementation of on-ground recovery actions via Offset Projects to manage existing key threats to the great desert skink comprising feral predator control and fire management; and
- undertaking regional monitoring programs (Offset Projects).

Research offsets for the great desert skink include:

- addressing knowledge gaps for the great desert skink populations and habitat preferences within a regional context
- understanding the species population genetics of the Yagga Yagga great desert skink population.

#### EPA public advice: Considering environmental offsets at a regional scale

During the assessment of the proposal, the EPA published advice on considering environmental offsets at a regional scale (March 2024). The public advice aims to assist proponents and others to identify the guiding values and priorities which should be considered to enable environmental offsets to contribute to environmental protection and enhancement outcomes at regional scales.

The EPA acknowledges that the public advice was published late in the assessment of the proposal; nevertheless, the EPA requested the proponent to update the offset strategy to be consistent with the guiding values described in the public advice given the important role of offsets in the EPA's consideration of the threat of serious and irreversible harm to night parrots and other threatened species. The EPA recognises the effort the proponent undertook during this time to work with DCCEEW, DBCA and DWER to revise its offsets strategy. The EPA considered the proposed offsets are consistent with the guiding values described in the public advice.

The option for a direct land offset through land acquisition was investigated by the proponent and DCCEEW, however it was concluded that a direct land offset was unsuitable, with no nearby comparable land acquisition available for the proposal.

The proponent has proposed offsets that are consistent with the values set out in the EPA's public advice. In particular, the proponent has had regard for recovery plans and proposes a self-managed offset fund to pay for on-ground threat abatement management actions. This aims to manage threatening processes and complements management of lands outside of the boundary of the environmental offset, thereby providing a degree of regional scale management. The regional scale feral predator control and fire management aims to provide medium to long-term benefits, enhancing the resilience and persistence of the night parrot, greater bilby and great desert skink.

Additionally, the proponent has proposed 'other compensatory measures' - indirect offsets in the form of research projects (Stantec 2024f). The proposed indirect research offsets are designed to achieve objectives consistent with the guiding values of expanding scientific knowledge and resilient systems. The intent of these projects is to address key threatening processes in alignment with management priorities for the species, implement research projects to address critical knowledge gaps, enhance protection and better inform conservation management for these species (Stantec 2024f). Consistent with the guiding value of expanding scientific knowledge, the results of the research projects will be made publicly available.

The proposed offsets demonstrate connectedness to both the physical and ecological function values of those being impacted, given they are located adjacent to the areas being impacted. The proposed offsets are also likely to provide cobenefits for Traditional Owners, ranger groups and the community by building on the conservation and research efforts already underway in the Kiwikurra and Ngururrpa, IPAs.

#### Outcome

In considering whether the offsets are likely to counterbalance the significant residual impacts, the EPA has had regard for principles 3 and 4 of the WA Environmental Offsets Policy. Given proposals for environmental offsets should be underpinned by sound information and knowledge and should be relevant and proportionate to the significance of the environmental values being impacted, the EPA advises that the offsets proposed are likely to benefit the values being impacted, but also likely to have complimentary benefits to several other values, including other threatened species utilising the same habitats as the night parrot, great desert skink and greater bilby.

Consistent with principle 6, the proposed environmental offsets have been designed to be enduring, enforceable and deliver long-term strategic environmental outcomes that result in a net gain for the greater bilby, night parrot and great desert skink over the 20-year life of the project. The offset strategy includes provisions for management, monitoring, and auditing to ensure that the expected environmental outcomes are realised. The EPA has recommended conditions which require offsets to be consistent with long term, post proposal viability of the species in the area and sustainable, funded habitat conservation and improvement models which are likely to be maintained beyond the life of the proposal.

The EPA advises the opportunities for research presented in the proposed Offset Strategy includes projects to improve knowledge of species and populations and investigate novel techniques (e.g. drone surveys; artificial burrows) that would be beneficial for increasing knowledge of the night parrot, greater bilby and great desert skink. The Offset Strategy states that findings will be published in peer-reviewed scientific journals, which is appropriate. Consistent with DCCEEWs consultation paper, the EPA has recommended a condition which requires the proponent to consider regional surveys which contribute to understanding of distribution and population structure and patterns of habitat usage.

The EPA notes that while the proposal will likely result in significant residual impacts due to the clearing of critical habitat, the proportion of critical habitat within the development envelopes to be impacted is a relatively small proportion of the available habitat of that type. The project does however have the potential to reduce the resilience of these species' populations through habitat fragmentation, increased competition and predation from feral animals, changes to fire regimes, injury, and disturbance. Consequently, while like-for-like offsets are not possible for this project, it is considered unlikely that the acquisition of additional land would provide a significant benefit to the species to be impacted. Rather, the focus of environmental offsets should be the long-term recovery and preservation of the greater bilby, night parrot and great desert skink through on ground management and research programs. Rather than setting a monetary value for contribution to the delivery of the offsets package, the EPA recommends condition B5 be imposed that defines expected outcomes for the offsets package to ensure the proposed offsets

counterbalance the likely significant residual impacts. In addition, condition B5 sets out the requirements for offsets, including:

- defining a methodology to identify the area of the night parrot, greater bilby and great desert skink habitat cleared annually
- defining a methodology to determine the amount of funding to be spent on research projects and on-ground conservation projects based on the offset rate for each hectare of greater bilby, night parrot and great desert skink habitat cleared
- identification of discrete research projects and on-ground conservation projects for the greater bilby, night parrot and great desert skink
- demonstrating how the proposed research projects and on-ground conservation projects contribute to a long-term conservation outcome for the greater bilby, night parrot and great desert skink
- identifying potential risks involved for the projects and appropriate contingency measures
- defining monitoring activities to assess progress with project implementation and for compliance purposes
- provide schedules and means for reporting details of impact reconciliation and project implementation, including outcomes.

The EPA has considered whether the proposed offsets are likely to counterbalance the likely significant residual impacts. It is the EPA's view that implementation of onground fire and feral animal management programs, to be undertaken in partnership with Traditional Owner groups on the IPAs and pastoral leases surrounding the development envelopes, and coupled with research programs, are appropriate to counterbalance the significant residual impacts of the proposal. In addition, the onground management (feral animal control and fire management) and research projects are likely to provide short, medium, and long-term benefits, enhancing the resilience and persistence of the night parrot, greater bilby and great desert skink. The EPA notes the proposed offsets are consistent with the guiding values described in the EPA's public advice and species recovery plan advice. In addition, the offset strategy aligns with relevant Recovery and Threat Abatement Plans and published research priorities for threatened species. The EPA therefore considers the proposed offsets would likely counterbalance the significant residual impacts of the proposal, thereby achieving a net environmental benefit for these species.

It is the EPA's view that while the proposed offset measures and projects are broadly appropriate, a revision of the offset strategy would be required in consultation with DBCA and DCCEEW (recommended condition B5) to ensure their expertise is utilised and to ensure the EPA's additional recommended matters are incorporated. In addition, the EPA recommended condition B4 requiring the proponent to make reasonable efforts to consult with relevant Traditional Owners on the offset strategy. The EPA has also recommended condition C1 to prevent ground disturbing activities from occurring until the CEO has confirmed that the environmental offset strategy meets all requirements of the recommended offset conditions (recommended conditions B5), including the specific environmental objectives and outcomes in

condition B5-2. Subject to these conditions, the EPA advises that the offsets are likely to counterbalance the significant residual impacts of the proposal, and the outcome is likely to be consistent with the EPA's objective for terrestrial fauna.

# 5 Matters of national environmental significance

The Commonwealth Minister for the Environment has determined that the proposal is a controlled action under the EPBC Act as it is likely to have a significant impact on one or more Matters of National Environmental Significance (MNES). It was determined that the proposed action is likely to have a significant impact on the following matters protected by the EPBC Act:

• listed threatened species and communities (s.18 and s.18A).

The EPA has assessed the controlled action on behalf of the Commonwealth as an accredited assessment under the EPBC Act.

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

#### 5.1 Commonwealth policy and guidance

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

- Commonwealth EPBC Act Environmental Offsets Policy (Commonwealth of Australia 2012)
- Recovery Plan for the Greater Bilby (*Macrotis lagotis*) (Department of Climate Change, Energy, the Environment and Water 2023)
- National Recovery Plan for the Great Desert Skink (*Liopholis kintorei*) (Department of Climate Change, Energy, the Environment and Water 2023)
- threat abatement plan for predation by feral cats
- the Threatened Species Action Plan 2022-2032 (Department of Climate Change, Energy, the Environment and Water 2022)

#### 5.2 EPA assessment

#### 5.2.1 Listed threatened species and communities (sections 18 and 18A)

Listed threatened species and communities that occur within the proposal area include:

- o Greater bilby
- o Great desert skink
- o Night parrot

The proposal has the potential to directly impact MNES due to habitat loss from clearing, injury or mortality as a result of construction, vehicle and wind turbine collisions, and entrapment in trenches. The proposal has the potential to indirectly impact MNES through the fragmentation and degradation of habitat, increases in

feral predator activity, and altered fire regimes. The full assessment of impacts to EPBC Act listed species is detailed in section 2.1 of this report.

While migratory shorebirds were not identified as part of the MNES assessment, Lake Mackay provides critical breeding and foraging habitat for several EPBC listed species. Potential impacts to migratory bird species and an evaluation of mitigation and management measures are detailed in section 2.1 of this report.

Direct mortality and injury to MNES species will be minimised through the implementation of pre-clearance surveys, avoidance buffers for night parrots and the great desert skink, and the relocation of greater bilbies, as well as limitations on the night-time use and speed limits on the haul road. The risk of mortality from entrapment in trenches will be minimised through the installation of fauna refuges and conduct of regular fauna inspections.

Habitat degradation and loss, fire and feral animals are considered key threats to all three MNES species likely to be affected by the proposal. While a considerable area of critical habitat is proposed to be cleared as part of the proposal, these habitats are generally well-distributed within the development envelope with greater than 93% of mapped significant habitat to remain post-development. The development envelope has been designed to minimise impacts to critical habitat; however complete avoidance was not considered feasible. Consequently, mitigation and management has been designed to minimise potential impacts to critical behaviours of MNES species through the implementation of avoidance buffers for greater desert skink burrows, night parrot roosting sites, and night parrot foraging habitat around ephemeral water sources.

The proponent has not proposed avoidance buffers for bilby burrows noting that they are highly mobile and do not have a high residency time within individual burrows. The home range of the bilby is understood to be about 1.5 km and given that suitable undisturbed habitat to support burrows exists within a 1.5 km radius of existing burrows, the proponent has proposed the relocation of bilbies consistent with DBCA guidelines. Noting that the loss of habitat and disturbance to critical behaviours from development and operations, as well as the presence of human infrastructure itself may exacerbate existing pressures, the proponent has committed to implementing fire and feral animal management programs to minimise the potential risk of altered fire regimes and feral predators.

The proposal has the potential for indirect impacts to habitat, including degradation and fragmentation through the construction and operation of the proposal. The EPA has recommended the use of fauna crossings (condition B1-6) to reduce the impact of habitat fragmentation on fauna species.

Outcome-based conditions, supported by the conditioned implementation of detailed monitoring and environmental management plans, have been recommended by the EPA to provide greater confidence that environmental outcomes will be met. It has also been recommended that these plans be updated with additional contingency management measures and submitted for approval by the DWER CEO.

The EPA does however consider that there remains considerable scientific uncertainty in the efficacy of proposed mitigation measures and the significance of any residual impacts, and there remains a threat of serious or irreversible harm to the night parrot because of the species' listing status, the length of the haul road, the long life of the proposal, and the uncertainty of haul road use controls after the proposal. There is also scientific uncertainty about whether contingency measures for any species will be effective even if an adaptive management framework is applied. The EPA's assessment in response to this, including application of the precautionary principle for the night parrot, is include in section 2.1 above.

The EPA considers the implementation of a substantial offsets proposal in the region that is consistent with the Recovery Plans, Threatened Species Action Plan 2022-2032 and with managing threats identified in the consultation paper (DCCEEW 2024) will provide a net benefit for the species which is likely to counter-balance potential impacts on a regional scale. The proposed offsets are likely to improve the quality of habitat away from the proposal area in the event that serious harm eventuates from the proposal, as well as improve the habitat in the area of the proposal to increase its resilience and ability to withstand impacts.

#### Summary

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

- limit the location and authorised extent of the clearing of vegetation to 16,500 ha in Table 2 of Schedule 1
- condition B1-1 that sets environmental outcomes to ensure no decline in the abundance of MNES species at monitoring sites and no disturbance to critical behaviours
- condition B1-1 that sets environmental objectives to ensure there is no increase in feral predators in the area and that the risk of predation by feral animals is minimised
- condition B1-4 that requires pre-clearance surveys
- condition B1-5 that sets out avoidance buffers and minimization measures to be implemented and limitations on haul road usage to minimize impacts to MNES
- condition B1-6 that requires the installation of fauna crossings minimise the potential risk of predation, align with ecological linkages, connect areas of good quality native vegetation, and/or connect areas with high environmental values
- condition B6 that requires the rehabilitation of the site in accordance with a mine closure plan
- condition B7 that requires environmental performance reporting on terrestrial fauna.

The EPA considers that there will be a significant residual impact from indirect impacts to and the clearing of critical habitat for the night parrot, great desert skink and greater bilby. The EPA has recommended an offset in condition B5 (see section 4) which takes into account the significant residual impact to MNES as a result of clearing. Land acquisition for the purpose of offsetting significant residual impacts was not considered to be a viable option for the proposal. However, noting that fire and feral predators are recognised as key threats to all three MNES species, the proponent has proposed to undertake fire and feral animal management programs in

the broader region to improve the resilience of the populations to other pressures. It is also noted that there are considerable limitations in the scientific understanding of these fauna species and a significant investment in research programs would be of benefit to the long-term conservation and management of the species. As a result, it is considered that a research offset of greater than 10% value of the total offset package is appropriate in this instance. The DCCEEW has also advised that a research offset comprising greater than 10% is appropriate for this species as the research would provide considerable benefit for species conservation.

The EPA's view is that, subject to the recommended conditions, the impacts from the proposal on the above-listed MNES are not expected to result in an impact on the threatened night parrot, great desert skink or greater bilby which affects their conservation status or is inconsistent with Recovery Plan and EPBC Act objectives.

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## 6 Recommendations

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

- environmental values which may 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)
- 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
- 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 EP Act.

The EPA is satisfied that the recommended conditions, if implemented, would mean that the proposal is likely to be consistent with the EPA's objectives.

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

## 7 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 provides the following information for consideration by the Minister.

- **Consultation with traditional owners**: the EPA commends the proponent for the nature and extent of consultation with the Parna Ngururrpa, Tjamu Tjamu and Tjurabalan Peoples during the assessment process. The EPA notes that good practice consultation with relevant Traditional Owners is vital in ensuring that significant impacts to Aboriginal cultural heritage resulting from a proposal are identified, considered early in the proposal design, and mitigated. The EPA commends the proposal elements of consultation that included:
  - ongoing involvement in the monitoring programs as the proposal progresses and to facilitate access agreements
  - ensuring that Traditional Owners have the opportunity to respond to the information provided and that their response is considered, and that Traditional Owners are advised how and if their response has been addressed
  - reasonable steps are taken to make contact with relevant knowledge holders and providing sufficient time for genuine consultation to take place
  - consultation is respectful of Aboriginal traditions, cultural protocols, and obligations.
- **Cumulative impacts**: The EPA noted in Other Advice in Report 1699 for the Lake Way Sulphate of Potash Project that there is currently no readily available comprehensive information on the existing cumulative impacts to salt lake environments in Western Australia. There is potential for this to result in impacts to migratory bird populations utilising these areas, in particular where food sources may be adversely impacted by activities.
  - The EPA has had consideration for the cumulative impacts to salt lakes within the Great Sandy Desert and Tanami bioregions and within Western Australia. The EPA advises that all future sulphate of potash projects within Western Australia (particularly within unique salt lake land systems) which have the potential to impact unique salt lake landforms will need to assess potential regional and cumulative impacts to these habitats.
  - The EPA advises that future proposals must have a clear consideration of the broader study area and its regional setting, including the existing sulphate of potash projects in Western Australia.
- **Rehabilitation and financial assurance**: The rehabilitation of Western Australia's unique environment following the closure of large-scale mines; either at end of proposal life or through market forces; is a major environmental issue and ongoing concern for the EPA. It is of particular concern for SOP projects

given recent history of projects in WA and the risk to the environment left when proposals have been part implemented and put on care and maintenance due to technical and market issues in the SOP industry.

- The EPA has recommended conditions for progressive rehabilitation to increase regulator and operator confidence and reduce rehabilitation liability over the life of an operation.
- The EPA notes the Minister may impose financial assurance requirements (under Part VA, s. 86A-86G of the EP Act), and s. 86C(2)(f) and s. 86C(3)(e) requires having regard to other decision-making processes such as the Mining Rehabilitation Fund (MRF) required under the *Mining Rehabilitation Fund Act* 2012 (MRF Act). The EPA advises that the MRF is a pooled fund, levied annually according to the environmental disturbance on a mining tenement at the annual reporting date. The intention of the MRF is to provide Western Australia with a funding source to manage current and emerging mine rehabilitation liabilities. Reporting of disturbance is compulsory for all mines operating under the Mining Act and all mines with a rehabilitation liability estimate over \$50,000 pay levies based on their areas of disturbance. It is not known whether the MRF would be adequate to manage any rehabilitation liabilities should SOP industry technical and market issues arise for this proposal.
- The EPA notes DEMIRS has the ability to require unconditional performance bonds as a mining tenement condition for proposals if it considers this reasonable and appropriate, and after consideration of the Mining Securities Policy. The EPA recommends DEMIRS consider the state of the SOP industry and the characteristics of the specific proposal to advise the Minister whether an unconditional performance bond will be considered, or whether a financial assurance would be appropriate.
- Future proposals: Consistent with its advice for the West Musgrave proposal, the EPA advises that progression of this project within the currently relatively undisturbed Mackay subregion (GSD2) of the Great Sandy Desert bioregion/Tanami Desert 1 subregion (TAN1) of the Tanami Desert bioregion, may open the area up to further progress and development. The EPA would need to carefully consider cumulative impacts of future projects on the environmental and social values of the area.

## **Appendix A: Recommended conditions**

Section 44(2)(b) of *Environmental Protection Act 1986* specifies that the EPA's report must set out (if it recommends that implementation be allowed) the conditions and procedures, if any, to which implementation should be subject. This appendix contains the EPA's recommended conditions and procedures.

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

#### MACKAY SULPHATE OF POTASH PROJECT

Proposal:	The proposal involves the development of a greenfields Sulphate of Potash fertiliser operation which is currently designed to operate for a 20-year period. The proposal involves the on-lake development of trenches and solar evaporation ponds for brine extraction and Sulphate of Potash production. The off-lake development includes a processing plant, associated site infrastructure and access roads for trucking Sulphate of Potash product to Wyndham Port. A northern linear access corridor will include the primary site access road, and potentially a water supply pipeline.
Proponent:	Agrimin Limited Australian Company Number 122 162 396
Proponent address:	2C Lock Street, Nedlands WA 6009

#### Assessment number: 2193 Report of the Environmental Protection Authority: 1777

**Introduction**: Pursuant to section 45 of the *Environmental Protection Act 1986*, it has been agreed that the proposal entitled Mackay Sulphate of Potash Project, as amended by the change to proposal approved under s. 43A on 12 June 2020 and 11 June 2021, and described in the 'Proposal Content Document' attachment to the *Mackay Sulphate of Potash Project Response to Submissions* (18 June 2024), may be implemented and that the implementation of the proposal is subject to the following implementation conditions and procedures.

#### **Conditions and procedures**

#### Part A: Proposal extent

#### Part B: Environmental outcomes, prescriptions, and objectives

#### Part C: Environmental management plans and monitoring

#### Part D: Compliance and other conditions

#### PART A: PROPOSAL EXTENT

#### A1 Limitations and Extent of Proposal

A1-1 The proponent must ensure that the proposal is implemented in such a manner that the following limitations or maximum extents are not exceeded:

Proposal element	Location	Maximum extent		
Physical elements				
On – Lake development envelope	Figure 1	Total <b>disturbance</b> footprint of up to 15,000 <b>ha</b> within a 217,261 <b>ha development</b> <b>envelope</b> .		
Off – Lake development envelope		Total <b>disturbance</b> footprint of up to 200 <b>ha</b> of native vegetation within a 688 <b>ha</b> <b>development envelope</b> .		
Bore field development envelope		Total <b>disturbance</b> footprint of up to 300 <b>ha</b> of native vegetation within a 11,799 <b>ha</b> <b>development envelope</b> .		
Haul road development envelope		Total <b>disturbance</b> of 1,000 <b>ha</b> of native vegetation within a 33,928 <b>ha development</b> <b>envelope</b> .		
Critical habitat for the night parrot ( <i>Pezoporus occidentalis</i> )		Clearing of no more than 68.02 ha of critical night parrot habitat.		
Supporting habitat for the night parrot ( <i>Pezoporus occidentalis</i> )		<b>Clearing</b> of no more than 0.55 <b>ha</b> of <b>supporting night parrot</b> <b>habitat</b>		
Critical habitat for the greater bilby ( <i>Macrotis lagotis</i> )		<b>Clearing</b> of no more than 1,345.63 <b>ha</b> of <b>critical greater bilby habitat.</b>		
Critical habitat for the desert skink (Liopholis kintorei)		<b>Clearing</b> of no more than 754.20 <b>ha</b> of <b>critical great</b> <b>desert skink habitat</b>		
Operational elements				
Groundwater abstraction		Groundwater abstraction of up to 3.5 GL per annum		

Hypersaline brine abstraction	Hypersaline brine abstraction of up to 100 <b>GL per annum</b> over 5 operational stages.	
Water treatment	Water treatment through a reverse osmosis plant of up to 0.2 <b>GL per annum</b>	
Waste salt	Disposal of waste salt to be retained on the lake surface up to 18 <b>Mtpa</b>	
Lake inundation	No access to the inundated portions of Lake Mackay when more than 20% of lake is inundated.	
Stage 1	Construct and develop <b>brine</b> <b>mining units</b> with up to 373 km of trench excavation.	
Stage 2	In addition to Stage 1, construct and develop <b>brine</b> <b>mining units</b> with up to 435 km of trench excavation.	
Stage 3	In addition to Stage 2, construct and develop <b>brine</b> <b>mining unit</b> with up to 222 km of trench excavation.	
Stage 4	In addition to Stage 3, construct and develop <b>brine</b> <b>mining units</b> with up to 405 km of trench excavation.	
Stage 5	In addition to Stage 4, construct and develop <b>brine</b> <b>mining units</b> with up to 565 km of trench excavation.	
Timing elements		
Construction and development of the <b>trenches</b>	The construction and development of the <b>trenches</b> must be undertaken in stages via <b>brine mining units.</b> The stages must include 1 <b>km</b> spacing between <b>trenches</b> and installation of <b>crossovers</b> to maintain natural hydrological processes	
Mine life	20 years	

#### PART B – ENVIRONMENTAL OUTCOMES, PRESCRIPTIONS AND OBJECTIVES B1 Terrestrial fauna

- B1-1 The proponent must ensure the implementation of the proposal to meet the following environmental **outcomes**:
  - no detectable decrease in the abundance of the great desert skink or greater bilby at any impact monitoring site as recorded in the Terrestrial Fauna Environmental Management Plan;
  - (2) no **detectable** decrease in night parrot call activity at impact sites from baseline levels, compared with reference sites, as recorded in the **Night Parrot Management Plan;**
  - (3) no **disturbance** to night parrot roosting sites;
  - no direct disturbance of occupied greater bilby burrows is to occur outside of the haul road indicative footprint, within the haul road development envelope;
  - (5) no **detectable** increase in feral predators in the development envelope from baseline levels during the life of the proposal relative to suitable reference sites;
  - (6) no detectable decrease in banded stilt breeding success within the on-lake development envelope; and
  - (7) no **disturbance** to breeding banded stilts or other waterbirds on **lake islands**.
- B1-2 The proponent must implement the proposal to achieve the following environmental objectives:
  - (1) minimise the risk of physical injury or mortality of native fauna from construction and operation;
  - (2) minimise the risk of **adverse impacts** including behavioural changes and health impacts from construction and operation on native fauna;
  - (3) minimise the risk of habitat fragmentation on night parrot (*Pezoporus occidentalis*), great desert skink (*Liopholis kintorei*) and greater bilby (*Macrotis lagotis*);
  - (4) minimise direct interactions per year (e.g., vehicle strike, wind turbine strike) to significant fauna (including waterbird species) resulting in injury or mortality; and
  - (5) no **adverse impacts** to significant fauna, including the greater bilby, great desert skink, mulgara (*Dasycercus blythi*), night parrot, and spotted

*Ctenotus (Ctenotus uber johnstonei)* as a result of increase in feral animal abundance relative to suitable reference sites; and

- (6) no **adverse** impacts to significant fauna from artificial light spill.
- B1-3 The proponent must implement the **Night Parrot Management Plan**, **Construction Environmental Management Plan** and the **Terrestrial Fauna Environmental Management Plan** for the purpose of achieving the **outcomes** and objectives stated in B1-1 and B1-2.
- B1-4 Prior to **ground disturbing activities**, the proponent must undertake the following actions:
  - (1) within two weeks prior to clearing, undertake **pre-clearance surveys** for the night parrot, great desert skink and greater bilby; and,
  - (2) where appropriate, using a **fauna handler**, undertake approved relocation of threatened fauna.
- B1-5 The proponent must implement the following measures:
  - (1) **clearing** of native vegetation to be undertaken in daylight hours only;
  - (2) vehicle and machinery speed limits within the haul road development envelope must not exceed 80 km/hr on sealed haul road or 60 km/hr on unsealed haul road;
  - (3) vehicle and machinery speed limits within the off-lake development envelope, on-lake development envelope and bore field development envelope must not exceed 80 km/hr on sealed access roads or 60 km/hr on unsealed access roads;
  - (4) vehicle and machinery speed limits within the off-lake development envelope, on-lake development envelope and the bore field development envelope must not exceed 40 km/hr during night-time operations within a one (1) kilometre buffer of night parrot habitat;
  - (5) no haul road **operations** during **night-time hours**;
  - (6) significant fauna avoidance buffer zones will be implemented as follows:
    - (a) a 150 m buffer will be applied around great desert skink active burrows recorded during pre-clearance surveys and a 300 m buffer around known great desert skink population active burrows as described and recorded in the Terrestrial Fauna Environmental Management Plan;
    - (b) a 300 **m** buffer will be applied to night parrot roost sites as described and recorded in the **Night Parrot Management Plan**;
- (c) access to significant fauna avoidance buffer zones is restricted to authorised personnel and there are no incidents of unauthorised access; and
- (d) a 300 **m** exclusion buffer is to be placed around permanent and **prominent ephemeral water sources** within 1.5 km of recorded night parrot nest sites.
- (7) retain adequate suitable habitat and foraging resources for the greater bilby (equivalent to the home range for the bilby of 1.5 km in area) within proximity to an active bilby burrow outside of the haul road indicative footprint, within the haul road development envelope.
- B1-6 The proponent must:
  - (1) install **fauna crossings** that:
    - (a) align with **ecological linkages**;
    - (b) connect areas of good quality vegetation; and/or
    - (c) connect areas with high environmental values as described and recorded in the Terrestrial Fauna Environmental Management Plan;
  - (2) ensure the **fauna crossings** required by condition B1-6(1) are:
    - (a) provide protection from feral predators to achieve the outcomes and objectives stated in B1-1 and B1-2; and,
    - (b) able to be utilised by a variety of native fauna; and
  - (3) consult with **DBCA** on the proposed design and location of the **fauna crossings** to achieve the requirements of condition B1-6(1); and,
  - (4) maintain the **fauna crossings** required by condition B1-6(1) for the life of the proposal.

#### Trench Inspection

- B1-7 The proponent must clear trapped vertebrate fauna from open trenches (offlake development envelope, bore field development envelope and haul road development envelope), using a fauna handler:
  - (1) at least daily during construction, unless otherwise agreed to by the **CEO**;
  - (2) within one (1) hour prior to backfilling of **trenches**; and
  - (3) in the event of substantial rainfall and following the clearing of vertebrate fauna from the trench as required by B1-7, pump out any pooled water in the open trench and discharge it to adjacent vegetated areas in a manner that does not cause erosion or disturbance to vegetation.

- B1-8 The proponent must clear trapped vertebrate fauna from open trenches (**onlake development envelope**), using a **fauna handler**:
  - (1) weekly **trench** inspections of main feed canal and evaporation ponds;
  - (2) quarterly inspections of on-lake infiltration trenches; and
  - (3) the proponent must ensure a berm height of 1.5 **m** is achieved either side of **trenches** within the **on-lake development envelope.**
- B1-9 The proponent must ensure ramps providing egress points and/or fauna refuges providing suitable shelter from the sun and predators for trapped vertebrate fauna are to be placed in the **trench** (off-lake development envelope, bore field development envelope and haul road development envelope) at intervals not exceeding fifty (50) metres.
- B1-10 The proponent must produce and provide a report on fauna management no later than sixty (60) days after the completion of **construction activities** to the **CEO**. The report must include the following:
  - (1) fauna inspections **metadata**;
  - (2) the number and type of fauna **cleared** from **trenches** and actions taken;
  - (3) results of **pre-clearance survey**; and
  - (4) any vertebrate fauna species mortalities.
- B1-11 The proponent must implement an adaptive management approach to address uncertainty in the potential significance of proposal-related impacts to the night parrot, greater bilby and great desert skink and the efficacy of proposed management approaches (including significant fauna avoidance buffers) in mitigating impacts, including:
  - (1) all active night parrot roost sites, greater bilby burrows and great desert skink burrows identified during pre-clearance surveys within the haul road development envelope must be monitored during and post clearing for a minimum of two weeks to determine the efficacy of the conservation significant fauna buffer size and other management approaches; and
  - (2) if monitoring indicates there has been any instance of proposal related **disturbance** to either night parrots, greater bilby or great desert skink, all work on the haul road must stop until such a time as proposed alternative management measures have been approved by the **CEO**.

#### B2 Flora and vegetation

- B2-1 The proponent must ensure the implementation of the proposal achieves the following environmental **outcomes**:
  - directly disturb no more than 33.13 ha of riparian vegetation as described and recorded in the Flora and Vegetation Environmental Management Plan;
  - (2) no disturbance of flora and vegetation within the following exclusion zones (except for the purpose of environmental monitoring) as described and recorded in the Flora and Vegetation Environmental Management Plan:
    - (a) within 500 **m** of landform islands exclusion zone;
    - (b) within 200 **m** of intermediate and large islands exclusion zone; and,
    - (c) within 100 **m** of small islands exclusion zone;
  - (3) no **disturbance** of flora and vegetation on lake islands (except for the purposes of **environmental monitoring**);
  - (4) no **detectable** decrease in the health of **riparian vegetation**;
  - (5) no disturbance of *Stackhousia* sp. Lake Mackay;
  - no detectable decrease in the health of native vegetation supporting significant (Priority) flora species *Stackhousia sp. Lake Mackay* (P.K. Latz 12870) (Priority 1) and *Comesperma sabulosum* (Priority 3); and
  - (7) no **detectable** increase in the baseline extent of weed populations or new populations of weed species within the **development envelope** as a result of the implementation of the proposal.
- B2-2 The proponent must revegetate all areas of native vegetation cleared but not reasonably expected to be required for ongoing operations within twenty-four (24) months of completion of construction activities and maintain the revegetation, so it achieves a 'good' quality of vegetation.
- B2-3 The proponent must implement the **Flora and Vegetation Environmental Management Plan** with the purpose of ensuring the flora and vegetation environmental **outcomes** in condition B2-1 and B2-2 are monitored and achieved to the satisfaction of the **CEO**.

#### **B3** Inland waters and Subterranean Fauna

B3-1 The proponent must ensure the implementation of the proposal achieves the following environmental **outcomes**:

- (1) no detectable change to low salinity or fresh groundwater from abstraction of brine to groundwater dependent vegetation and stygofauna, relative to baseline conditions captured in the Inland Waters Environmental Management Plan, on landform islands as a result of brine or groundwater abstraction;
- (2) no detectable decrease to the shallow aquifer (Neogene alluvial deposit) from the bore field within the bore field development envelope decreasing the availability of groundwater for other bore users, groundwater dependent vegetation and stygofauna habitat;
- (3) no **detectable** increase in **contaminants** in the waters of Lake Mackay during large inundation events, relative to baseline conditions.
- (4) no **detectable** decrease in the extent and duration of surface waters in the deepest parts of the Lake Mackay basin;
- (5) **groundwater drawdown immediately adjacent** to the **groundwater monitoring bores** must be no more than:
  - (a) 6 m for the bore field (within the bore field development envelope) and maximum drawdown of no more than 2 m at groundwater monitoring bores for environmental receptors as described and recorded in the Inland Water Environmental Management Plan;
  - (b) a maximum drawdown of 0.1 m at the maximum lateral drawdown extent of 5.2 km from within the **bore field development envelope** as described and recorded in the **Inland Water Environmental Management Plan;** and,
  - (c) 3 m at groundwater monitoring bores located within the on-lake development envelope and in the riparian zone of the large and landform islands as described and recorded in the Inland Water Environmental Management Plan.
- B3-2 The proponent must implement the proposal to achieve the following environmental objectives:
  - (1) minimise the risk of **adverse impacts** to stygofauna;
  - (2) minimise adverse impacts to aquatic biota due to changes to hydraulic connectivity and/or reduction in moisture content of lake sediment, from groundwater drawdown; or changes in salinity and/or ionic composition of groundwater from lakebed sediment abstraction;
  - (3) minimise **adverse impacts** to aquatic biota from:
    - (a) windblown salt from evaporation ponds/salt piles;

- (b) soil compaction on lakebed during development of **trenches** and maintenance of salt piles;
- (c) potential **disturbance** and exposure of Acid Sulfate Soil (ASS) during **trench** excavation;
- (4) no **adverse impacts** to aquatic biota or subterranean fauna due to changes in surface water hydrology, habitat loss, fragmentation, or proposal-related **disturbance**; and
- (5) no **adverse impact** to peripheral wetlands (claypans).
- B3-3 The proponent must implement the **Inland Waters Environmental Management Plan** with the purpose of ensuring the subterranean fauna and inland waters environmental **outcomes** in condition B3-1 and objectives in condition B3-2 are monitored and achieved to the satisfaction of the **CEO**. The **Inland Waters Environmental Management Plan**, must include:
  - (1) an Acid Sulfate Soils (ASS) assessment that demonstrates how the inland waters and subterranean fauna environmental objective in condition B3-2(3) will be achieved.
- B3-4 The proposal must be implemented in a staged manner within the **on-lake development envelope**, and the proponent must demonstrate to the CEO's reasonable satisfaction that the environmental **outcomes** and objectives specified in conditions B1-1 (6), B1-1 (7), B3-1 and B3-2 are likely to be met for each stage before commencing the next stage.
- B3-5 The construction and development of the **trenches** must be undertaken in stages via **brine mining units** and as required by condition C4-5. The stages must:
  - (1) include 1 km spacing between trenches within the on-lake development envelope and installation of crossovers to maintain natural hydrological processes; and
  - (2) include five (5) stages as specified in condition A1.

#### B4 Aboriginal Cultural Heritage

- B4-1 The proponent must implement the proposal to meet the following environmental **outcomes**:
  - (1) no disturbance to Aboriginal cultural heritage unless consent is granted to disturb that site under the Aboriginal heritage Act 1972 and has involved reasonable steps to consult with relevant Traditional Owners; and

- (2) subject to reasonable health and safety requirements, no interruption of ongoing access to land utilised for traditional use or custom by relevant Traditional Owners.
- B4-2 The proponent must implement the proposal to meet the following environmental **objective**:
  - (1) avoid, where practicable, or otherwise minimise **adverse impacts** to **Aboriginal cultural heritage** within and surrounding the **development envelope**.
- B4-3 The proponent must take reasonable steps to consult with **relevant Traditional Owners** about the achievement of the **outcomes** in condition B4-1 and objectives in condition B4-2 for the life of the proposal.
- B4-4 The proponent must take reasonable steps to consult with **relevant Traditional Owners** about the **Revised Offset Strategy** (environmental management plan) required under condition B5-3.

#### **B5** Environmental Offsets

- B5-1 The proponent must implement offsets to counterbalance the significant residual impacts of the proposal on the following environmental values:
  - (1) greater bilby;
  - (2) night parrot; and
  - (3) great desert skink.
- B5-2 The proponent must ensure the implementation of the offsets achieves the following environmental **outcomes** and objectives:
  - (1) counterbalance the significant residual impacts to the environmental values identified in condition B5-1;
  - (2) contribute to the preservation of the species listed in condition B5-1;
  - (3) deliver a **net-gain** in the quality of critical habitat for the greater bilby, great desert skink and night parrot in the Great Sandy Desert bioregion, through alignment with key recovery actions including:
    - (a) predator and feral pest control;
    - (b) regional surveys which contribute to understanding of distribution and population structure and patterns of habitat usage; and
    - (c) fire management;

- (4) contributes to the improved conservation and management of the species through targeted and meaningful research programs; and
- (5) ensure **on-ground management** takes place within the **Offset Management Area** as described in the **Revised Offset Strategy** required by B5-3;
- (6) staging of offsets **on-ground management** with reference to the construction of the haul road, to ensure:
  - (a) offsets increase the resilience in the critical fauna habitats for as long as possible before they are at risk of indirect impacts; and
  - (b) in any event so the habitat resilience in an area is increased before the construction of the haul road commences in that area;
- (7) threat abatement actions commencing, and adequate baseline monitoring being completed, before construction on the haul road commences;
- (8) contributes to the long-term, post proposal viability of the species in the area;
- (9) consistency with sustainable, funded habitat conservation and improvement models which are likely to be maintained beyond the life of the proposal.
- B5-3 The proponent must, in consultation with **DBCA** and **DCCEEW**, update the **Revised Offset Strategy** (Environmental Management Plan) to satisfy the requirements of condition C4 and demonstrate how the environmental outcomes and objectives in condition B5-2 will be achieved, and how this achievement will be substantiated, and submit it to the **CEO**. The offset strategy must:
  - (1) demonstrate that the environmental outcomes and objectives in condition B5-2 will be met;
  - (2) identify an area, or areas, for on-ground management that contains the environmental values identified in condition B5-1;
  - (3) demonstrate how the environmental values within the Offset Management Area will be maintained and improved in order to counterbalance the significant residual impact to the environmental values in condition B5-1 and achieve the environmental outcomes and objectives in condition B5-2;

- (4) demonstrate application of the principles of the WA Environmental Offsets Policy, the WA Environmental Offsets Metric and the WA Offsets Template, as described in the WA Environmental Offsets Guidelines, and the Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy Assessment Guide, or any subsequent revisions of these documents;
- (5) identify how the ongoing performance of the offset measures, and whether they are achieving the outcomes and objectives in conditions B5-1 and B5-2, will periodically be made publicly available;
- include a procedure for incorporating the findings of the research required by condition B5-4 into future revisions of the **Revised Offset** Strategy;
- B5-4 The proponent must update the **Revised Offset Strategy** to include a targeted Research and Conservation Plan for each of the species listed in condition B5-1 that demonstrates how the environmental **outcomes** and objectives in condition B5-2 will be achieved, and submit it to the **CEO**. The Research and Conservation plans for each species must:
  - (1) demonstrate that the environmental **outcomes** and objectives in condition B5-2 will be met;
  - (2) be prepared in consultation with **DCCEEW** and **DBCA** prior to implementation;
  - (3) outline the methodology to identify the area of greater bilby, great desert skink and **night parrot habitat cleared** annually within the **development envelope**;
  - (4) include the methodology to determine the amount of funding to be spent on research projects and on-ground conservation projects based on the likely cost of implementation of all research and **on-ground management** actions to achieve the **outcomes** and objectives stated in B5-2 over the life of the project;
  - (5) propose discrete research projects and on-ground conservation projects which align with relevant **Recovery and Threat Abatement Plans** for the greater bilby, great desert skink and night parrot;
  - (6) demonstrate how the proposed research projects contribute to a longterm conservation **outcome** for the greater bilby, great desert skink and night parrot and are aligned with **published research priorities** for these species;
  - (7) identify how the research will result in a positive conservation **outcome**, and will either improve management and protection or address priority knowledge gaps that have been identified as a research priority needed to improve management and protection, for the environmental values

identified in condition B5-1 as relevant to each respective research program;

- (8) identify how the ongoing performance of the offset measures and whether they are achieving the **outcomes** and objectives in conditions B5-1 and B5-2 will periodically be made publicly available;
- (9) identify the governance arrangements including responsibilities for implementing, and oversight of, each respective research program, agreements with government agencies, agreements with any third parties, and **contingency measures;**
- (10) provide an implementation schedule for each project including an outline of key activities, all deliverables, stages of implementation, reporting of research results (including interim results), and milestones towards completion criteria;
- (11) outline the agreed governance arrangements, including stakeholder responsibilities for implementing the projects, and any contractual arrangements for third parties involved and legal obligations;
- (12) detail the financial and financial auditing arrangements including project budget and recipients of funds if projects are being undertaken by any third parties;
- (13) outline any potential risks involved for the projects and appropriate **contingency measures**;
- (14) identify monitoring activities to assess progress with project implementation and for compliance purposes;
- (15) include schedules and means for reporting details of impact reconciliation and project implementation, including **outcomes**;
- (16) provide details of the stakeholder consultation undertaken regarding the projects; and
- (17) where **on-ground management** is proposed:
  - (a) state the targets for each environmental value to be achieved by the on-ground management, including completion criteria, which will result in a tangible improvement to the environmental values listed in condition B5-1;
  - (b) identify and justify how the research will support **on-ground management** in achieving a positive conservation **outcome**;
  - (c) demonstrate the consistency of the targets with the environmental **outcomes** and objectives in condition B5-1 and B5-2 and the objectives of any relevant guidance, including but not limited to, recovery plans or area management plans;
  - (d) detail the **on-ground management** actions, with associated timeframes for implementation and completion, to achieve the targets identified in condition B5-4(17)(a);

(e) detail the monitoring, reporting and evaluation mechanisms for the targets and actions identified under condition B5-4(17)(a).

#### Contingency Offsets

- *B5-5* If, after receiving the ongoing performance review of the offset measures, reporting and evaluation required by condition B5-4(17), the **CEO** determines that the proposal has not met the environmental **outcomes** and objectives in condition B5-1 and condition B5-2, and after notifying the proponent in writing, the proponent must undertake additional offsets to counterbalance the significant residual impact from the additional impact to greater bilby, night parrot and great desert skink.
- *B5-6* Within twelve (12) months of receiving notice in writing from the **CEO** that an additional offset is required under condition B5-5 the proponent must update the **Revised Offset Strategy** required by condition B5-3 to include additional offsets to counterbalance the significant residual impacts to greater bilby, night parrot and great desert skink.

#### **B6** Rehabilitation and Closure

- **B6-1** The proponent must implement the proposal to meet the following environmental **outcomes**:
  - (1) rehabilitated vegetation is self-sustaining, including not adversely impacted by environmental weeds;
  - (2) strategic breaching of **trenches** (within the **on-lake development envelope**), evaporation ponds and canals to maintain hydrology;
  - (3) groundwater quality is returned to baseline conditions as captured in the Inland Waters Environmental Management Plan;
  - (4) supporting infrastructure including pumps and pipelines to be dismantled and removed and either disposed of at a licensed landfill or reused/recycled;
  - (5) land based **disturbances** remaining after removal of infrastructure will be backfilled to the natural surface level and re-contoured, covered with topsoil if and where available, and ripped and seeded with local provenance species;
  - (6) rehabilitate habitat for the benefit of fauna where practicable to provide **self-sustaining**, re-established fauna habitat; and
  - (7) closure planning and rehabilitation are undertaken in a progressive manner consistent with achievement of the above **outcomes**, during **operations**, where practicable, and as soon as practicable upon closure.

- **B6-2** The proponent must include the environmental **outcomes** of condition B6-1 in the Mine Closure Plan required under the *Mining Act 1978* and submitted for approval to the **DEMIRS**.
- **B6-3** The proponent must monitor the progress towards achievement of environmental **outcomes** of condition B6-1 and include the findings in the Environmental Performance Reporting required by condition B7.

#### **B7** Environmental Performance Reporting

- **B7-1** The proponent must submit an Environmental Performance Report to the **CEO** every five (5) years, until the **CEO** has **confirmed** in writing that submission of an Environmental Performance Report is no longer required.
- **B7-2** The first Environmental Performance Report must be submitted within three (3) months of the expiry of the five (5) year period commencing from the date of substantial commencement of the proposal, or such other time as may be approved by the **CEO**.
- **B7-3** Each Environmental Performance Report must report on the following:
  - (1) terrestrial fauna outcomes and objectives in condition B1-1 and B1-2;
  - (2) utilisation of **fauna crossings** by native terrestrial fauna;
  - (3) flora and vegetation outcomes in condition B2-1;
  - (4) inland waters and subterranean fauna outcomes and objectives in condition B3-1 and B3-2; and
  - (5) environmental outcomes and delivery of the Revised Offsets Strategy, Recovery and Threat Abatement Plans and implementation matters in condition B5.
- B7-4 The Environmental Performance Report must include:
  - a comparison of the environmental values identified in condition B7-3 at the end of the 5-year period; against the state of each environmental value at the beginning of the 5-year period;
  - (2) a comparison of the environmental values identified in condition B7-3 at the end of the 5-year period; against the state of the environmental values identified in first Environmental Performance Report submitted in accordance with condition B7-3;
  - (3) proposed adaptive management and continuous improvement strategies; and

- (4) an assessment of the progress of achievement of environmental outcomes of condition B6-1.
- B7-5 Each Environmental Performance Report must be published on the proponent's website and provided to the **CEO** in electronic form suitable for on-line publication by the Department of Water and Environmental Regulation within twenty (20) business days of being provided to the **CEO**.

#### PART C – ENVIRONMENTAL MANAGEMENT PLANS AND MONITORING

#### C1 Environmental Management Plans: Conditions Related to Commencement of Implementation of the Proposal

- C1-1 The proponent must not undertake:
  - ground disturbing activities until the CEO has confirmed in writing that the environmental management plans required by conditions B1-3, B2-3, B3-3 and B5-3 meets the requirements of that condition and conditions C4 and C5;
  - (2) **ground disturbing activities** until the **CEO** has **confirmed** in writing that the two years of baseline data collection outlined in the environmental management plan required by condition B3-3 has been completed.
  - (3) brine or groundwater abstraction activities until the CEO has confirmed in writing that the environmental management plan required by condition B3-3 meets the requirements of that condition and condition C4;
  - (4) **ground disturbing activities** until a process for the hydrogeochemical characterisation of lakebed sediments (eg. analysis of sediment cores) has been completed and the results are submitted to the **CEO**.
  - (5) **ground disturbance activities** for the **haul road development envelope** until the **CEO** has **confirmed** in writing that the **on-ground management** actions, as outlined in the environmental management plan required by condition B5-3, has been undertaken for 1 year.

#### C2 Environmental Management Plans: Conditions Relating to Approval, Implementation, Review and Publication

- C2-1 Upon being required to implement an environmental management plan under Part B, or after receiving notice in writing from the **CEO** under condition C1-1 that the environmental management plan(s) required in Part B satisfies the relevant requirements, the proponent must:
  - (1) implement the most recent version of the **confirmed** environmental management plan; and
  - (2) continue to implement the **confirmed** environmental management plan referred to in condition C2-1(1), other than for any period which the **CEO** confirms by notice in writing that it has been demonstrated that the relevant requirements for the environmental management plan have been met, or are able to be met under another statutory decision-making

process, in which case the implementation of the environmental management plan is no longer required for that period.

- C2-2 The proponent:
  - (1) may review and revise a **confirmed** environmental management plan provided it meets the relevant requirements of that environmental management plan, including any consultation that may be required when preparing the environmental management plan;
  - (2) must review and revise a **confirmed** environmental management plan and ensure it meets the relevant requirements of that environmental management plan, including any consultation that may be required when preparing the environmental management plan, as and when directed by the **CEO**; and
  - (3) must revise and submit to the **CEO** the **confirmed** Environmental Management Plan if there is a material risk that the **outcomes** or objectives it is required to achieve will not be complied with, including but not limited to as a result of a change to the proposal.
- C2-3 Despite condition C2-1, but subject to conditions C2-4 and C2-5, the proponent may implement minor revisions to an environmental management plan if the revisions will not result in new or increased **adverse impacts** to the environment or result in a risk to the achievement of the limits, **outcomes** or objectives which the environmental management plan is required to achieve.
- C2-4 If the proponent is to implement minor revisions to an environmental management plan under condition C2-3, the proponent must provide the **CEO** with the following at least twenty (20) business days before it implements the revisions:
  - (1) the revised environmental management plan clearly showing the minor revisions;
  - (2) an explanation of and justification for the minor revisions; and
  - (3) an explanation of why the minor revisions will not result in new or increased **adverse impacts** to the environment or result in a risk to the achievement of the limits, **outcomes** or objectives which the environmental management plan is required to achieve.
- C2-5 The proponent must cease to implement any revisions which the **CEO** notifies the proponent (at any time) in writing may not be implemented.
- C2-6 **Confirmed** environmental management plans, and any revised environmental management plans under condition C2-4(1), must be published on the proponent's website and provided to the **CEO** in electronic form suitable for on-

line publication by the Department of Water and Environmental Regulation within twenty (20) business days of being implemented, or being required to be implemented (whichever is earlier).

#### C3 Conditions Related to Monitoring

- C3-1 The proponent must undertake monitoring capable of:
  - (1) substantiating whether the proposal limitations and extents in Part A are exceeded; and
  - (2) **detecting** and substantiating whether the environmental **outcomes** identified in Part B are achieved (excluding any environmental **outcomes** in Part B where an environmental management plan is expressly required to monitor achievement of that **outcome**).
- C3-2 The proponent must submit as part of the Compliance Assessment Report required by condition D2, a compliance monitoring report that:
  - (1) outlines the monitoring that was undertaken during the implementation of the proposal;
  - (2) identifies why the monitoring was capable of substantiating whether the proposal limitation and extents in Part A are exceeded;
  - (3) for any environmental **outcomes** to which condition C3-1(2) applies, identifies why the monitoring was scientifically robust and capable of **detecting** whether the environmental **outcomes** in Part B are met;
  - (4) outlines the results of the monitoring;
  - (5) reports whether the proposal limitations and extents in Part A were exceeded and (for any environmental **outcomes** to which condition C3-1(2) applies) whether the environmental **outcomes** in Part B were achieved, based on analysis of the results of the monitoring; and
  - (6) reports any actions taken by the proponent to remediate any potential non-compliance.

#### C4 Environmental Management Plans: Conditions Relating to Monitoring and Adaptive Management for Outcomes Based Conditions

- C4-1 The environmental management plans required under conditions B1-3, B2-3, B3-3 and B5-3 must contain provisions which enable the substantiation of whether the relevant **outcomes** of those conditions are met, and must include:
  - (1) **threshold criteria** that provide a limit beyond which the environmental **outcomes** are not achieved;

- (2) **trigger criteria** that will provide an early warning that the environmental **outcomes** are not likely to be met;
- (3) monitoring parameters, sites, control/reference sites, methodology, timing and frequencies which will be used to measure threshold criteria and trigger criteria. Include methodology for determining alternate monitoring sites as a contingency if proposed sites are not suitable in the future;
- (4) baseline data;
- (5) data collection and analysis methodologies;
- (6) adaptive management methodology;
- (7) **contingency measures** which will be implemented if **threshold criteria** or **trigger criteria** are not met; and
- (8) reporting requirements.
- C4-2 Without limiting condition C3-1, failure to achieve an environmental **outcome**, or the exceedance of a **threshold criteria**, regardless of whether threshold **contingency measures** have been or are being implemented, represents a non-compliance with these conditions.
- C4-3 The environmental management plan required under condition B1-3 is also required to include:
  - (1) if there are instances of bird strike from wind turbines, then **best practice** management and contingency actions must be implemented;
  - (2) where threshold criteria are exceeded, immediate steps to remedy the situation must be implemented. If there are no immediate actions that can be implemented, the aspect of **operations** responsible for the exceedance must be ceased until such a time as investigations are completed and the cause of the exceedance can be resolved, to the satisfaction of the CEO;
  - (3) outcome based management for dust, noise, and vibration from haul road **operations** in proximity to great desert skink critical habitat and night parrot critical habitat;
  - (4) contingency measures that can be implemented should monitoring indicate that there is a material decline in the utilisation of the Lake system by migratory shorebird and waterbird species; and

- (5) where additional monitoring or scientific studies have been undertaken, revise plans consistent with adaptive management, including a revision of relevant **trigger criteria** and **threshold criteria**.
- C4-4 The environmental management plan required under the condition B2-3 must:
  - (1) include advice from a **biostatistician** to verify that proposed methodologies can provide statistically valid inferences about direct and indirect impacts to ensure that the cause(s) of change can be assessed.
  - (2) include monitoring of vegetation and population health of the known locations of **conservation significant flora** and suitable reference sites populations.
- C4-5 The environmental management plan required under the condition B3-3 must be revised and submitted to the **CEO** prior to the construction of each stage required by Condition B3-4 and as defined in Condition A1, to:
  - include a review of monitoring data and modelling outputs against predicted hydrological and hydrogeochemical impacts, including but not limited to groundwater table drawdown and the behaviour of lakebed sediments;
  - (2) establish a comprehensive groundwater level and quality monitoring site during the construction of stage one trenches that will enable:
    - (a) documenting the transient behaviour of groundwater levels near the trench in the **on-lake development envelope**;
    - (b) comprehensive groundwater quality monitoring;
  - (3) update the monitoring data collection/modelling strategy;
  - (4) demonstrate how the environmental outcomes and objectives in B1-1 (6), B1-1 (7), B3-1 and B3-2 will be achieved in the next stage as a result of ongoing monitoring and revised model outputs;
  - (5) include a verification study of the detailed hydrological modelling of surface water flows, including the simulation of 1:100-year rainfall events; and
  - (6) confirm that the requirements under conditions C4 and C5 will be achieved;

## C5 Environmental Management Plans: Conditions Related to Management actions and Targets for Objective Based Conditions

C5-1 The environmental management plans required under conditions B1-3, B2-3, B3-3 and B5-3 must contain provisions which enable the achievement of the

relevant objectives of those conditions and substantiation of whether the objectives are reasonably likely to be met, and must include:

- (1) management actions;
- (2) management targets;
- (3) contingency measures if management targets are not met; and
- (4) reporting requirements.
- C5-2 Without limiting condition C2-1, the failure to achieve an environmental objective, or implement a **management action**, regardless of whether **contingency measures** have been or are being implemented, represents a non-compliance with these conditions.
- C5-3 Without limiting condition C2-1, the failure to achieve an environmental objective, or implement a management action, regardless of whether contingency measures have been or are being implemented, represents a non-compliance with these conditions.

#### PART D – COMPLIANCE, TIME LIMITS, AUDITS AND OTHER CONDITIONS D1 Non-compliance Reporting

- **D1-1** If the proponent becomes aware of a potential non-compliance, the proponent must:
  - (1) report this to the **CEO** within seven (7) days;
  - (2) implement contingency measures;
  - (3) investigate the cause;
  - (4) investigate environmental impacts;
  - (5) advise rectification measures to be implemented;
  - (6) advise any other measures to be implemented to ensure no further impact; and
  - (7) provide a report to the **CEO** within twenty-one (21) days of being aware of the potential non-compliance, detailing the measures required in conditions D1-1(1) to D1-1(6) above.
- D1-2 Failure to comply with the requirements of a condition, or with the content of an environmental management plan required under a condition, constitutes a non-compliance with these conditions, regardless of whether the **contingency measures**, rectification or other measures in condition D1-1 above have been or are being implemented.

#### D2 Compliance Reporting

- D2-1 The proponent must provide an annual Compliance Assessment Report to the **CEO** for the purpose of determining whether the implementation conditions are being complied with.
- D2-2 Unless a different date or frequency is approved by the **CEO**, the first annual Compliance Assessment Report must be submitted within fifteen (15) months of the date of this Statement, and subsequent reports must be submitted annually from that date.
- D2-3 Each annual Compliance Assessment Report must be endorsed by the proponent's Chief Executive Officer, or a person approved by proponent's Chief Executive Officer to be delegated to sign on the Chief Executive Officer's behalf.
- D2-4 Each annual Compliance Assessment Report must:
  - (1) state whether each condition of this Statement has been complied with, including:
    - (a) exceedance of any proposal limits and extents;

- (b) achievement of environmental **outcomes**;
- (c) achievement of environmental objectives;
- (d) requirements to implement the content of environmental management plans;
- (e) monitoring requirements;
- (f) implement contingency measures;
- (g) requirements to implement adaptive management; and
- (h) reporting requirements;
- include the results of any monitoring (inclusive of any raw data) that has been required under Part C in order to demonstrate that the limits in Part A, and any **outcomes** or any objectives are being met;
- (3) provide evidence to substantiate statements of compliance, or details of where there has been a non-compliance;
- (4) include the corrective, remedial and preventative actions taken in response to any potential non-compliance;
- (5) be provided in a form suitable for publication on the proponent's website and online by the Department of Water and Environmental Regulation;
- (6) be prepared and published consistent with the latest version of the Compliance Assessment Plan required by condition D2-5 which the CEO has confirmed by notice in writing satisfies the relevant requirements of Part C and Part D.
- D2-5 The proponent must prepare 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 D2-2, or prior to implementation of the proposal, whichever is sooner.
- D2-6 The Compliance Assessment Plan must include:
  - (1) what, when and how information will be collected and recorded to assess compliance;
  - (2) the methods which will be used to assess compliance;
  - (3) the methods which will be used to validate the adequacy of the compliance assessment to determine whether the implementation conditions are being complied with;
  - (4) the retention of compliance assessments;

- (5) the table of contents of Compliance Assessment Reports, including audit tables; and
- (6) how and when Compliance Assessment Reports will be made publicly available, including usually being published on the proponent's website within sixty (60) days of being provided to the **CEO**.

#### D3 Contact Details

D3-1 The proponent must 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.

#### D4 Time Limit for Proposal Implementation

- D4-1 The proposal must be substantially commenced within five (5) years from the date of this Statement.
- D4-2 The proponent must provide to the **CEO** documentary evidence demonstrating that they have complied with condition D4-1 no later than fourteen (14) days after the expiration of period specified in condition D4-1.
- D4-3 If the proposal has not been substantially commenced within the period specified in condition D4-1, implementation of the proposal must not be commenced or continued after the expiration of that period.

#### D5 Public Availability of Data

- D5-1 Subject to condition D5-2, within a reasonable time period approved by the **CEO** upon the issue of this Statement and for the remainder of the life of the proposal, the proponent must make publicly available, in a manner approved by the **CEO**, all validated environmental data collected before and after the date of this Statement relevant to the proposal (including sampling design, sampling methodologies, monitoring and other empirical data and derived information products (e.g. maps)), environmental management plans and reports relevant to the assessment of this proposal and implementation of this Statement.
- D5-2 If:
  - (1) any data referred to in condition D5-1 contains trade secrets; or
  - (2) any data referred to in condition D5-1 contains particulars of confidential information (other than trade secrets) that has commercial value to a person that would be, or could reasonably be expected to be, destroyed, or diminished if the confidential information were published,

the proponent may submit a request for approval from the **CEO** to not make this data publicly available and the **CEO** may agree to such a request if the **CEO** is satisfied that the data meets the above criteria.

D5-3 In making such a request the proponent must provide the **CEO** with an explanation and reasons why the data should not be made publicly available.

#### D6 Independent Audit

- D6-1 The proponent must arrange for an independent audit of compliance with the conditions of this statement, including achievement of the environmental **outcomes** and/or the environmental objectives and/ or environmental performance with the conditions of this statement, as and when directed by the **CEO**.
- D6-2 The independent audit must be carried out by a person with appropriate qualifications who is nominated or approved by the **CEO** to undertake the audit under condition D6-1.
- D6-3 The proponent must submit the independent audit report with the Compliance Assessment Report required by condition D2, or at any time as and when directed in writing by the **CEO**. The audit report is to be supported by credible evidence to substantiate its findings.
- D6-4 The independent audit report required by condition D6-1 is to be made publicly available in the same timeframe, manner and form as a Compliance Assessment Report, or as otherwise directed by the **CEO**.

Acronym or abbreviation	Definition or term
Aboriginal Cultural Heritage	Means the tangible and intangible elements that are important to the Aboriginal people of the State, and are recognised through social, spiritual, historical, scientific or aesthetic values, as part of Aboriginal tradition to the extent they directly affect or are affected by physical or biological surroundings.
Adverse impact / adversely impacted	Negative change that is neither trivial nor negligible that could result in a reduction in health, diversity or abundance of the receptor/s being impacted, or a reduction in <b>environmental</b> <b>value</b> . <b>Adverse impacts</b> can arise from direct or indirect impacts, or other impacts from the proposal.
	In relation to flora and vegetation, this includes but is not limited to, decline in health of vegetation from groundwater abstraction, brine abstraction, changes to surface hydrology, changes to water flows during inundation, spread or introduction of <b>environmental weeds</b> , dust emissions, altered fire regimes, hydrological change and changes in erosion and edge effects.
	In relation to terrestrial fauna, this includes but is not limited to, habitat fragmentation, vehicle strike, collision with wind turbines, artificial light and vibration, noise emissions and increased predation.
	In relation to inland waters, this includes but is not limited to, changes to water quality and hydrological changes resulting from reduction in surface water catchments and altered water flow regimes.
	In relation to <b>Aboriginal cultural heritage</b> , this includes but is not limited to, hydrological change, introduction or spread of non-indigenous flora and/or fauna, alteration of fauna behaviour, artificial light, dust, vibration, and noise emissions.
Banded stilt breeding success	As described in Mackay Sulphate of Potash Terrestrial Fauna Environmental Management Plan (V5.0, October 2024).
Best practice	The most effective combination of technologies and design, construction, maintenance, operation, and decommissioning to minimize environmental impacts.
Brine Mining Unit (BMU)	Seventeen representative areas of the Lake Mackay which have similar physical and chemical characteristics as

Table 1: Abbreviations and definitions

	described in Mackay Sulphate of Potash Project Environmental Review Document (V3, April 2022).
Biostatistician	Suitability qualified and experienced persons having special knowledge, experience or responsibility in regard to mathematics and/or statistical methods related to environmental science.
CEO	The Chief Executive Officer of the Department of the Public Service of the State responsible for the administration of section 48 of the <i>Environmental Protection Act 1986</i> , or the <b>CEO's</b> delegate.
Cleared/ Clearing	Has the same meaning as in section 51A of the <i>Environmental Protection Act</i> 1986.
Conservation significant fauna	Threatened fauna species listed under the <i>Environment</i> <i>Protection and Biodiversity Conservation Act</i> 1999 and <i>Biodiversity Conservation Act</i> 2016, and Priority fauna listed by the <b>DBCA</b> .
Conservation significant flora	Threatened flora species and/or communities listed under the <i>Environment Protection and Biodiversity Conservation Act</i> 1999 and <i>Biodiversity Conservation Act</i> 2016, and Priority flora and/or communities listed by the <b>DBCA</b> .
Confirmed	In relation to a plan required to be made and submitted to the <b>CEO</b> , means, at the relevant time, the plan that the <b>CEO confirmed</b> , by notice in writing, meets the requirements of the relevant condition. In relation to a plan required to be implemented without the need to be first submitted to the <b>CEO</b> , means that plan until it is revised, and then means, at the relevant time, the plan that the <b>CEO confirmed</b> , by notice in writing, meets the requirements of the requirements of the relevant condition.
Contaminants	Having a substance present at above background concentrations that presents, or has the potential to present, a risk or harm to human health, the environment, or any <b>environmental value</b> .
Contingency measures	Planned actions for implementation if it is identified that an environmental <b>outcome</b> , environmental objective, <b>threshold</b> <b>criteria</b> or <b>management target</b> are likely to be, or are being, exceeded. <b>Contingency measures</b> include changes to <b>operations</b> or reductions in <b>disturbance</b> or <b>adverse</b> <b>impacts</b> to reduce impacts and must be decisive actions that will quickly bring the impact to below any relevant threshold, <b>management target</b> and to ensure that the environmental <b>outcome</b> and/or objective can be met.
Construction activities	Activities that are associated with the substantial implementation of a proposal including but not limited to, earthmoving, trenching, vegetation <b>clearing</b> , grading or construction of right of way. <b>Construction activities</b> do not include Geotechnical investigations (including potholing for

	services and the installation of piezometers) and other preconstruction <b>activities</b> where no <b>clearing</b> of vegetation is required.
Critical great desert skink habitat	As recorded and described in Mackay Sulphate of Potash Project Revised Offset Strategy (V9.0, October 2024) (spinifex sandplain habitat).
Critical greater bilby habitat.	As recorded and described in Mackay Sulphate of Potash Project Revised Offset Strategy (V9.0, October 2024) (Gravel spinifex plain, Spinifex sandplain, Claypan and claypan mosaics, Dune-field and Dune habitat).
Critical night parrot habitat	As recorded and described in Mackay Sulphate of Potash Project Revised Offset Strategy (V9.0, October 2024) (claypan mosaic, saline flats and depressions, lake margin and complex habitat).
Construction Environmental Management Plan	Mackay Sulphate of Potash Project Construction Environmental Management Plan (V4.0, October 2024).
Crossovers	As described in Mackay Sulphate of Potash Project Environmental Review Document (V3, April 2022).
DBCA	Department of Biodiversity, Conservation and Attractions
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DEMIRS	Department of Energy, Mines, Industry Regulation and Safety
Development envelope	The spatial area as depicted in Figure 1 and defined by geographic coordinates in Schedule 1.
Disturb/disturbance	Means directly has or materially contributes to the <b>disturbance</b> effect on health, diversity or abundance of the receptor/s being impacted or on an <b>environmental value</b> .
	In relation to flora, vegetation, or fauna habitat, includes to result in the death, destruction, removal, severing or doing substantial damage to its detriment.
	In relation to fauna, includes to have the effect of altering the natural behaviour of fauna to its detriment.
Detecting/ Detectable	The smallest statistically discernible effect size that can be achieved with a monitoring strategy designed to achieve a statistical power value of at least 0.8 or an alternative value as determined by the <b>CEO</b> .
DWER	Department of Water and Environmental Regulation
Ecological linkages	Ecological linkages are a series (both contiguous and non- contiguous) of patches of native vegetation which, by virtue of their proximity to each other, act as habitat stepping stones that help maintain ecological processes. Ecological
	linkages support the movement of organisms within and

	across a landscape and enable them to access refugia during seasonal and climatic variability.
Environmental monitoring	Installation and monitoring infrastructure required for environmental monitoring.
Environmental value(s)	A beneficial use, or ecosystem health condition (from the <i>Environmental Protection Act 1</i> 986)
EPA technical guidance	Technical Guidance for Terrestrial vertebrate fauna surveys for environmental impact assessment available at <u>EPA WA  </u> <u>EPA Western Australia</u>
Fauna crossing	Infrastructure to reduce fauna vehicle strike and facilitate fauna movement including, but not be limited to, fauna overpasses, fauna underpasses (which must contain furniture for ground-dwelling fauna), dual-use culverts (that is for fauna and drainage) and fencing to facilitate access to the fauna crossing structure.
Fauna handler	A person who is suitably qualified or trained and licenced under section 40 of the <i>Biodiversity Conservation Act 2016</i> and Biodiversity Conservation Regulations 2018.
Flora and Vegetation Environmental Management Plan	Mackay Sulphate of Potash Project Flora and Vegetation Environmental Management Plan (Version 3.0, October 2024)
Groundwater abstraction	The process of taking water from a ground source.
'good'	Means the condition of native vegetation rated in accordance with the <i>Technical guidance – Flora and vegetation surveys for environmental impact assessment (EPA 2016)</i> including any revision to this technical guidance.
Ground disturbing activities	Any activity or activities undertaken in the implementation of the proposal, including any <b>clearing</b> , civil works or construction.
Groundwater- dependant vegetation	Terrestrial vegetation that mainly depend on the subsurface presence of groundwater, often accessed via capillary fringe. Not all <b>groundwater dependent vegetation</b> draw on groundwater
ha	Hectare(s)
Haul road development envelope	The spatial area as depicted in Figure 1 and defined by geographic coordinates in Schedule 1.
Haul road indicative footprint	Northern infrastructure indicative disturbance footprint as depicted in Figure 1 and defined by geographic coordinates in Schedule 1.

Inland Waters Environmental Management Plan	Mackay Sulphate of Potash Project Inland Waters Environmental Management Plan (Version 3.0, October 2024)	
km	Kilometre(s)	
km/hr	Kilometres per hour	
m	Metre(s)	
Management action	The identified actions implemented with the intent of to achieving the environmental objective.	
Management target	A type of indicator to evaluate whether an environmental objective is being achieved.	
Metadata	<ul> <li>Describes the content, quality, currency and availability of data. It documents the characteristics of data, including but not limited to:</li> <li>Contact information for the custodians, owners, and collectors of the data</li> <li>Geographical details</li> <li>Data collection dates and methods</li> <li>All standards used when collecting data</li> <li>Additional notes and comments.</li> </ul>	
Mtpa	Million tonnes per annum	
Net-gain	The extent of the environmental benefit associated with the offset must exceed the extent of the significant residual impact, allowing for natural background variation, seasonal changes, or other factors outside the control of the proponent and as agreed to by the CEO in writing.	
Night parrot habitat	As recorded in Mackay Sulphate of Potash Project Night Parrot Management Plan (V6.0, October 2024). Potential Night Parrot habitat as revised throughout proposal implementation based on additional survey results, observations and habitat modelling.	
Night Parrot Management Plan	Mackay Sulphate of Potash Night Parrot Management Plan (V6.0, October 2024).	
Night Parrot roost	As defined in Mackay Sulphate of Potash Project Night Parrot Management Plan (V6.0, October 2024).	
Night-time hours	The period between sunset and sunrise on any given day.	
Occupied greater bilby burrow	As outlined in <i>The conservation and management of the bilby (Macrotis lagotis) in the Pilbara</i> (Department of Biodiversity, Conservation and Attractions, 2018).	
Offset Management Area	As described in Mackay Sulphate of Potash Project Revised Offset Strategy (V9.0, October 2024).	
On-ground management	This includes threat abatement actions such as feral animal control and fire management, revegetation (re-establishment of native vegetation in degraded areas) and rehabilitation	

	(repair of ecosystem processes and management of weeds, disease, or feral animals) with the objective to achieve a <b>tangible improvement</b> to the environmental values in the <b>Offset Management Area.</b>
On-Lake Development	The spatial area as depicted in Figure 1 and defined by geographic coordinates in Schedule 1.
Outcome	A proposal-specific result to be achieved when implementing the proposal.
Operations / Commencement of operations	Operation of the plant infrastructure for the proposal and includes pre-commissioning, commissioning, start-up, and operation of the plant infrastructure for the proposal.
Pre-clearance surveys	Surveys designed to identify the presence or evidence of threatened fauna listed under the <i>Biodiversity Conservation Act 2016</i> prior to ground disturbing activities, undertaken by a suitably qualified specialist, in alignment with relevant EPA technical guidance and DBCA guidelines for surveys for threatened fauna, including but not limited to night parrot (DBCA 2024) and bilby (DBCA 2017) and subsequent revisions."
Prominent ephemeral water source	Water sources (surface fed or impermeable claypans) with a width greater than 150m that hold water irregularly for a period of several months.
Published research priorities	As outlined in <i>Informing conservation management of the</i> <i>bilby (Macrotis lagotis) in the Pilbara: a review of research</i> <i>and future directions</i> (Northover Amy S., Dziminski Martin A., Carpenter Fiona M., Moore Harry A., Ottewell Kym, Palmer Russell, Gibson Lesley A. (2024), Australian Mammalogy 46, AM24002, https://doi.org/10.1071/AM24002) or other research priorities agreed with the <b>DBCA.</b>
Recovery and Threat Abatement Plans	Recovery Plan for the Greater Bilby (Macrotis lagotis) (Department of Climate Change, Energy, the Environment and Water 2023), National Recovery Plan for the Great Desert Skink (Liopholis kintorei) 2023-2033 (Department of Climate Change, Energy, the Environment and Water 2023), Threat abatement plan for predation by feral cats, The Threatened Species Action Plan 2022-2032 (Department of Climate Change, Energy, the Environment and Water 2022) or any subsequent revisions of these plans.
Relevant Traditional Owners	In relation to the land subject to the proposal, means one or more of the following:
	- a registered native title body corporate for the land; or
	- a registered native title claimant for the land; or
	- a group of persons with Aboriginal traditional and cultural associations with the land
Revised Offset Strategy	Mackay Sulphate of Potash Project Revised Offset Strategy (V9.0, October 2024)

Riparian vegetation	As described in Mackay Sulphate of Potash Project Flora and Vegetation Environmental Management Plan (Version 3.0, October 2024) which includes, but not limited to, trees that may be utilising groundwater such as <i>Allocasuarina</i> <i>decaisneana</i> .
Self-sustaining	Refers to vegetation that can survive (continue indefinitely) without on-going <b>management actions</b> such as watering, weed control or infill planting.
Suitable habitat and foraging resources for the greater bilby	As recorded and described in Mackay Sulphate of Potash Project Revised Offset Strategy (V9.0, October 2024).
Supporting night parrot habitat	As recorded and described in Mackay Sulphate of Potash Project Revised Offset Strategy (V9.0, October 2024) (drainage line and ridge slope).
Tangible improvement	A perceptible, measurable and definable improvement that provides additional ecological benefit and/or value
Terrestrial Fauna Environmental Management Plan	Mackay Sulphate of Potash Terrestrial Fauna Environmental Management Plan (V5.0, October 2024)
Trench /trenches	Any excavation that is of sufficient depth that would cause vertebrate fauna to be become trapped and unable to escape and would include, but not be limited to, <b>trenches</b> or pits for utilities, pipelines, dewatering pits or bell holes.
Trigger criteria	Indicators that have been selected for monitoring to provide a warning that, if exceeded, the environmental <b>outcome</b> may not be achieved. They are intended to forewarn of the approach of the <b>threshold criteria</b> and trigger response actions.
Threshold criteria	The indicators that have been selected to represent limits of impact beyond which the environmental <b>outcome</b> is not being met.

#### Figure (attached)

Figure 1 Mackay Sulphate of Potash Project development envelope (This map is a representation of the co-ordinates referenced in Schedule 1)



Figure 1 Mackay Sulphate of Potash Project development envelope

#### Schedule 1

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 are held by the Department of Water and Environmental regulation. Record no. DWERDT974212.

# Appendix B: Regulation by other DMA processes

#### Table B1: Identified relevant decision-making authorities for the proposal

Statutory decision- making process	Environmental outcome	
Aboriginal Heritage Act 1972	No disturbance to Aboriginal cultural heritage, unless consent is granted to disturb that site under the <i>Aboriginal Heritage Act 1972</i> and has involved reasonable steps to consult with relevant Traditional Owners.	
<i>Biodiversity</i> <i>Conservation Act 2016</i>	The EPA has recommended conditions in relation to impacts on listed threatened species protected by the BC Act, including the night parrot, greater bilby and great desert skink.	
Mining Act 1978	The proposal is located on exploration tenure and will require the relevant mining tenure to be granted. The EPA has recommended conditions in relation to rehabilitation and closure to ensure the environmental outcomes are included in the Mine Closure Plan required under the <i>Mining Act 1978</i> .	
Department of Climate Change, Energy, the Environment and Water (DCCEEW)	The EPA has recommended conditions in relation to impacts on listed threatened species and communities protected by the EPBC Act. The DCCEEW may impose additional conditions under the EPBC Act for the night parrot, greater bilby and great desert skink.	
Environmental Protection Act 1986	Regulate emissions and discharges from construction and operations to achieve the following outcomes:	
-part V works approval and operating license	<ol> <li>Operation and management of the landfill, bioremediation facility, wastewater treatment plant and associated with the proposal to ensure environmental values are not subject to pollution or environmental harm.</li> </ol>	
	<ol><li>Management of dust emissions to ensure social surroundings are not subject to significant impacts.</li></ol>	

## **Appendix C: Decision-making authorities**

#### Table B1: Identified relevant decision-making authorities for the proposal

Decision-Making Authority	Legislation (and approval)
1. Minister for Aboriginal Affairs	<ul> <li>Aboriginal Heritage Act 1972</li> <li>Section 18 consent to impact a registered Aboriginal heritage site)</li> </ul>
2. Minister for Environment	<ul> <li>Biodiversity Conservation Act 2016</li> <li>Section 40 authority to take or disturb threatened species</li> </ul>
3. Minister for Mines and Petroleum	<i>Mining Act 1978</i> - Granting of a new mining lease
4. Minister for Water	<ul> <li><i>Rights in Water and Irrigation Act 1914</i></li> <li>Permit to interfere with beds and banks</li> <li>Permit to take water</li> <li>Groundwater abstraction licence</li> <li>Licence to construct bores</li> </ul>
5. Chief Executive Officer, Department of Biodiversity, Conservation and Attractions	<ul> <li>Biodiversity Conservation Act 2016</li> <li>Authority to take flora and fauna (other than threatened species)</li> </ul>
<ol> <li>Chief Health Officer, Department of Health</li> </ol>	<i>Health Act 1911</i> Health (Treatment of Sewage and Disposal of Effluent and Liquid Waste) Regulation 1974
<ol> <li>Chief Dangerous Goods Officer Department of Energy, Mines, Industry Regulation and Safety</li> </ol>	Dangerous Goods Safety Act 2004 - Storage and handling of dangerous goods
8. Executive Director Resource and Environmental Compliance, Department of Energy, Mines, Industry Regulation and Safety	<i>Mining Act 1978</i> - Mining proposal and mine closure plan
<ol> <li>Director Worksafe Mines Safey Directorate</li> <li>Department of Energy, Mines, Industry Regulation and Safety</li> </ol>	<ul> <li>Work Health and Safety (Mines) Regulations 2022</li> <li>Information about commencement of non- exploration mining operations r. 675UC</li> <li>Information about commencement of additional mining operations r. 675UD</li> </ul>
10. Chief Executive Officer Department of Water and Environmental Regulation	<ul> <li>Environmental Protection Act 1986</li> <li>Part V works approval and licence</li> <li>Part IV compliance (Ministerial Statements)</li> </ul>
11. Chief Executive Officer Shire of East Pilbara	Building Act 2011 - Permit for worker accommodation Planning and Development Act 2005

- extractive industries licence

### **Appendix D: Environmental Protection Act principles**

EP Act principle	Consideration
<b>1. The precautionary principle</b> The E had particular the principle of the prin	EPA has considered the precautionary principle in its assessment and has barticular regard to this principle in its assessment of terrestrial fauna. EPA considers there is a threat of serious or irreversible harm to the night t, and there will be significant residual impacts to the greater bilby and the desert skink because of the species' listing status, the length of the haul the long life of the proposal, and the uncertainty of haul road use controls the proposal. There is also scientific uncertainty about whether contingency sures will be effective if an adaptive management framework is applied. efore, after through consideration of the precautionary principle; he EPA has carefully evaluated options to avoid serious or irreversible harm, icluding whether the proposal should be implemented, whether proportionate nanagement and contingency measures are available, and whether an offsets rogram could provide a net benefit for the species; he EPA does not consider there are likely to be additional management or pontingency measures which can provide assurance there will not be a serious meat risk; and he EPA considers the implementation of a significant offsets proposal in the agion that is consistent with relevant species plans and with managing threats lentified in those plans will provide a net benefit for the species which is likely o counter-balance potential impacts on a regional scale. The offsets proposal likely to improve the quality of habitat away from the proposal area in the vent that serious harm eventuates from the proposal, as well as improve the abitat in the area of the proposal to increase its resilience and ability to

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

EP Act principle	Consideration
	<ul> <li>(a) offsets increase the resilience in the most high value fauna habitats for as long as possible before they are at risk of indirect impacts; and</li> </ul>
	(b) In any event so the habitat resilience in an area is increased before the construction of the haul road commences in that area;
	The EPA advises that some residual impacts resulting from the clearing of critical habitat will remain even with the additional recommended mitigation and management. However, noting that the key threats to all three of these species are from unmanaged fire and feral animals, the EPA is satisfied that an offset approach of managing fires and feral pests, combined with investment in research to improve species conservation and management outcomes, will achieve a net benefit for all three species, as well as provide benefits for other terrestrial fauna in the area such as brush tailed mulgara, spotted <i>Ctenotus</i> , northern/southern marsupial mole and princess parrot.
	The EPA is satisfied that these additional measures, if implemented, would mean that the proposal is not likely to be inconsistent with the EPA's objectives and consideration of these measures is consistent with consideration of the matters in the precautionary principle.
	The EPA believes that recommending that the proposal be implemented with conditions which reflect the above measures would be a reasonably proportionate response in order to prevent irreversible or serious damage to the night parrot, greater bilby and the great desert skink and not go beyond what is appropriate and necessary to achieve likely consistency with the EPA's objective. The EPA advises that without these recommended conditions it does not believe the proposal could be implemented in a way which is likely to be consistent with its objectives.
2. The principle of intergenerational equity	The EPA has considered the principle of intergenerational equity in its assessment
The present generation should ensure that the health, diversity and productivity of the environment is maintained and enhanced for the benefit of future generations.	fauna, inland waters, subterranean fauna, flora and vegetation and social surroundings.
	The EPA considers consistency with this principle could be achieved with the implementation of its recommended conditions, which requires the proponent to:
EP Act principle	Consideration
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	<ul> <li>limit disturbance of critical and supporting habitat for the night parrot, great desert skink and greater bilby</li> </ul>
	no disturbance of breeding waterbirds on lake islands
	<ul> <li>limit groundwater drawdown immediately adjacent to the groundwater monitoring bores</li> </ul>
	<ul> <li>continue ongoing engagement with relevant Traditional Owners to manage interactions and engagements and ensure the safety, protection, and sustainable cultural management of the landscape.</li> </ul>
	The EPA has also recommended that offsets are imposed to ensure that the significant residual impacts for terrestrial fauna values are counterbalanced. This includes direct and indirect offsets through on ground threat abatement management actions and includes funding towards research projects.
	The EPA has concluded that the environmental values are likely to be protected and that the health, diversity and productivity of the environment is likely to be maintained and enhanced for the benefit of future generations.
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 flora and vegetation, terrestrial fauna and subterranean fauna. The EPA has considered to what extent the potential impacts from the proposal to terrestrial fauna can be ameliorated to ensure consistency with the principle of conservation of biological diversity and ecological, including by provision of offsets. The EPA has concluded that the actions to avoid and minimise impacts to flora and vegetation, terrestrial fauna and subterranean fauna, which are also recommended as conditions, will likely conserve biological diversity and ecological diversity and ecological diversity and ecological diversity and subterranean fauna, which are also recommended as conditions, will likely conserve biological diversity and ecological integrity, so that environmental outcomes are achieved.
<ul> <li>4. Principles relating to improved valuation, pricing and incentive mechanisms</li> <li>Environmental factors should be included in the valuation of assets and services.</li> </ul>	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 terrestrial fauna, inland waters, flora and vegetation, subterranean fauna and social surroundings. The EPA has provided

EP Act principle	Consideration
<ul> <li>The polluter pays principle — those who generate pollution and waste should bear the cost of containment, avoidance or abatement.</li> <li>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.</li> <li>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.</li> </ul>	other advice about DEMIRS role in considering the most appropriate mechanism to ensure rehabilitation and closure costs are met by the proponent, in the face of recent technical and financial challenges in the SOP industry. The EPA recommends DEMIRS provide advice to the Minister accordingly.
<b>5. The principle of waste minimisation</b> 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 inland waters and terrestrial environmental quality. In considering this principle, the EPA notes that the proponent states waste would be minimised by adopting the hierarchy of waste controls; avoid, minimise, reuse, recycle and safe disposal across all phases of the project. The EPA also notes the requirement for Part V EP Act works approvals and licences to apply waste minimisation principles.

# Appendix E: 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	The proposal will directly impact approximately 15,000 ha (5% of the total lakes surface) within a 217,261 ha on-lake DE. The proposal activities have the potential to disrupt ecological and hydrological function of Lake Mackay due to construction of 2000 km infiltration trenches, evaporation ponds, crystalliser ponds, access roads, infrastructure corridors, salt pile storage and has the potential to lead to long-term alteration of Lake Mackay.	No comments were received for this factor during consultation.	Landforms was not identified as a preliminary key environmental factor when the EPA set the level of assessment. Lake Mackay covers an area of approximately 3,500 km <sup>2</sup> and measures approximately 100 km east to west and 100 km north to south. Lake Mackay is the largest salt lake in Western Australia and 4 <sup>th</sup> largest in Australia. Less than 5% of the lakes surface will be impacted by the proposal (Stantec 2022). The location and layout of the on-lake DE has been designed to minimise impacts to the lake islands and the lake fringe riparian zone, including avoidance buffers ranging from 100 m to 500 m. At closure, trenches are likely to infill naturally which is likely to occur within approximately 10 years (Stantec 2023). EPA notes, although trenches will remain at closure, it is likely they will eventually be reintegrated in the Lake surface. In accordance with the Mining Act, the proponent will be required to ensure the Mine Closure Plan is consistent with the Statutory Guidelines for Mine Closure Plans (DMIRS 2023). Having regard to the extent of the likely impacts to landforms, the proponent's mitigation measures, and the six criteria outlined in the <i>Environmental Factor Guideline – Landforms</i> (EPA 2018) being variety, integrity, ecological importance, scientific importance, rarity, and social

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
			importance. The EPA considers the proposal will not significantly alter the form or function of the Lake in the landscape.
			Although the geomorphology of the lake is unique, the on-lake disturbance will be limited (5%). The EPA does not consider the impacts to the landform's completeness to be significant given its ecological and social value and has considered impacts to its environmental values under terrestrial fauna, flora and vegetation and social surroundings, and these are likely to meet EPA's objectives.
			Accordingly, the EPA did not consider landforms to be a key environmental factor at the conclusion of its assessment.
Terrestrial environmental quality (TEQ)	The proposal has the potential to impact soil quality due to soil acidification, contamination, increased salinity, and erosion and scouring.	No comments were received for this factor during consultation.	Terrestrial environmental quality was not identified as a preliminary key environmental factor when the EPA set the level of assessment.
			In considering the potential impacts to TEQ, EPA had regard to the following:
			• the significance of considerations in the Statement of Environmental Principles, Factors, Objectives and Aims of EIA (EPA 2021) and the <i>Environmental factor guideline – Terrestrial Environmental Quality</i> (EPA 2016)
			<ul> <li>landfill, bioremediation facility (treatment of contaminated fill, soil or sediment) and the Wastewater Treatment Plant can likely be managed in accordance with Part V of the EP Act</li> </ul>
			• The Mining Act will mitigate impacts to soil quality and requires the proponent to prepare a Mine Closure Plan which will detail closure objectives for disturbed areas
			<ul> <li>potential impacts from ASS have been considered under key environment factor flora and vegetation (section 2.2) and inland waters (section 2.3)</li> </ul>

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
			<ul> <li>implementation of Inland Waters Environmental Management Plan which requires an Acid Sulfate Soils assessment (recommended condition B3-3)</li> </ul>
			<ul> <li>salts from evaporation ponds and salt piles will have cohesive properties that will prevent movement by wind</li> </ul>
			• trenches and evaporation ponds will be located on the open playa of the lake, avoiding soil disturbance and salinisation of the terrestrial environment
			<ul> <li>flood prone areas will be avoided, and trenches will be staged to minimise impacts to lake sediments</li> </ul>
			topsoil stripping will be undertaken in stages to minimise erosion
			<ul> <li>plant areas have been modelled on levelled and battered pads that will be built up above the natural surface using borrowed fill and minimising excavation and cut required</li> </ul>
			suitable engineering and drainage designs to maintain surface water movement patterns and prevent erosion and sedimentation
			• pipelines to be installed in earthen bunded culverts to prevent spills from discharging into the surrounding environment
			• topsoil stockpiles will be monitored for erosion, pre and post wet season erosion and deposition observations will be undertaken.
			Considering the above, EPA considers it unlikely that the proposal would have a significant impact on terrestrial environmental quality.
			Accordingly, the EPA did not consider terrestrial environmental quality to be a key environmental factor at the conclusion of its assessment.
Air	•		

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
Greenhouse gas emissions (GHG)	The proposal is estimated to emit a total of 75,000 tCO2-e from year 2 to year 20 (life of mine).		GHG emissions was not identified as a preliminary key environmental factor when EPA set the level of assessment.
			Scope 1 emissions will be generated from:
	The peak emissions will occur during year 1 of the proposal (91,000 tCO2-e) prior to renewable sources coming online and		<ul> <li>Combustion of fossil fuels to generate electricity for generation and operation of the processing plant.</li> </ul>
	from initial vegetation clearing required.		<ul> <li>Combustion of fossil fuels to generate heat and electricity for the processing plant, the boiler and dryer.</li> </ul>
			<ul> <li>Combustion of fossil fuels (diesel combustion) for mobile and stationary fleet and product haulage to Wyndham Port.</li> </ul>
			There are no scope 2 emissions associated with the proposal as the proponent will produce their own electricity through Liquefied Natural Gas- fired power plant for power generation and operation of the processing plant and solar and wind operation alternatives (Stantec 2022).
			Scope 3 emissions include:
			• 14,000 tCO2-e emissions during the construction of the proposal
			• 5,931 tCO2-e emissions in year 1 of operations and 5,302 tCO2-e emissions from year 2 to year 20.
			Having regard to:
			<ul> <li>the significance considerations in the Statement of Environmental Principles, Factors and Objectives (EPA 2020)</li> </ul>
			• the <i>Environmental factor guideline</i> – <i>Greenhouse gas emissions</i> (GHG guideline) (EPA 2024) which states that generally, GHG emissions from a proposal will be considered where the scope 1 emissions or Scope 2 emissions exceed 100,000 t CO2-e in any year
			the highest annual scope 1 GHG emissions of 91,000 tCO2-e during construction and prior to renewable sources coming online and annual

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
			<ul> <li>scope 1 emissions of 75,000 tCO2-e during operations is well below the GHG guideline threshold of 100,000 t CO2-e scope 1 emissions</li> <li>there are negligible Scope 2 emissions</li> <li>the EPA considers that the proposal is consistent with the EPA's GHG guideline.</li> </ul>
			Accordingly, the EPA did not consider greenhouse gas emissions to be a key environmental factor at the conclusion of its assessment.

# 7-day comment on referral

## Organisations and public

• Three public comments were received from three individuals

## Government agencies

None

# Public review of proponent information

## Organisations and public

• One public comment from one individual

#### **Government agencies**

None

# Appendix G: Assessment timeline

Date	Progress stages	Time (weeks)
30 January 2019	EPA decided to assess – level of assessment set	
10 September 2020	EPA approved Environmental Scoping Document	84
20 April 2022	EPA accepted Environmental Review Document	83
4 May 2022	Environmental Review Document released for public review	2
30 May 2022	Public review period for Environmental Review Document closed	3
30 April 2024	EPA received proponent's Response to Submissions	100
18 June 2024	EPA received final information for assessment	7
9 Jul 2024	EPA accepted proponent's Response to Submissions	10
10 December 2024	EPA provided report to the Minister for Environment	6
10 December 2024	EPA report published	1 day
31 December 2024	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 EPA decides to assess the proposal and records the level of assessment.

In this case, the EPA did not meet its timeline objective to complete its assessment and provide a report to the Minister.

# Appendix H: Relevant policy, guidance, procedures and references

Cane and Wohlan 2019 A Cultural Heritage Assessment of a proposed Development Corridor through the Ngururrpa Native Title Determination Area

Dennison, S. (2015). Social organisation and population genetics of the threatened great desert skink, *Liopholis kintorei*. Ph.D. Thesis, Macquarie University, Sydney

EPA 2016a, *Environmental factor guideline – Flora and vegetation*, Environmental Protection Authority, Perth, WA.

EPA 2016b, *Environmental factor guideline – Landforms*, Environmental Protection Authority, Perth, WA.

EPA 2016c, *Environmental factor guideline – Social surroundings*, Environmental Protection Authority, Perth, WA.

EPA 2016d, *Environmental factor guideline – Subterranean fauna*, Environmental Protection Authority, Perth, WA.

EPA 2016e, *Environmental factor guideline – Terrestrial environmental quality*, Environmental Protection Authority, Perth, WA.

EPA 2016f, *Environmental factor guideline – Terrestrial fauna*, Environmental Protection Authority, Perth, WA.

EPA 2016g, *Technical guidance – Flora and vegetation surveys for environmental impact assessment*, Environmental Protection Authority, Perth, WA.

EPA 2016X, *Technical guidance – Protecting the quality of Western Australia's marine environment*, Environmental Protection Authority, Perth, WA.

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

EPA 2018, *Environmental factor guideline – Inland waters*, Environmental Protection Authority, Perth, WA.

EPA 2020b, *Technical guidance – Terrestrial vertebrate fauna surveys for environmental impact assessment*, Environmental Protection Authority, Perth, WA.

EPA 2021a, *Environmental impact assessment (Part IV Divisions 1 and 2) procedures manual*, Environmental Protection Authority, Perth, WA.

EPA 2021b, *Statement of environmental principles, factors, objectives and aims of EIA*, Environmental Protection Authority, Perth, WA.

EPA 2021c, *Technical guidance – Subterranean fauna surveys*, Environmental Protection Authority, Perth, WA.

EPA 2024, *Environmental factor guideline – Greenhouse gas emissions*, Environmental Protection Authority, Perth, WA.

EPA 2024, Public Advice: Considering environmental offsets at a regional scale. Environmental Protection Authority, Perth, WA.

DCCEEW 2024, Consultation on Species Listing Eligibility and Conservation Actions *Pezoporus occidentalis* (night parrot). Department of Climate Change, Energy, the Environment and Water, Canberra, ACT.

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Rodgers Jr JA & Schwikert ST. 2002. Buffer-zone distances to protect foraging and loafing waterbirds from disturbance by personal watercraft and outboard-powered boats. *Conservation Biology* 16, 216-224

Stantec 2018 *Detailed Flora and Vegetation Assessment of the Mackay SOP Project,* prepared for Agrimin Limited.

Stantec 2021a *Baseline Aquatic Ecology Study of Lake Mackay And Peripheral Wetlands,* prepared for Agrimin Limited.

Stantec 2021b *Detailed Flora and Vegetation Survey and Consolidation,* prepared for Agrimin Limited.

Stantec 2022, *Mackay Sulphate of Potash Project Environmental Review Document,* prepared for Agrimin Limited.

Stantec 2023 *Mackay Sulphate of Potash Project – Mine Closure Plan,* prepared for Agrimin Limited.

Stantec 2024a, *Mackay Sulphate of Potash Project – Construction Environmental Management Plan*, prepared for Agrimin Limited.

Stantec 2024b *Mackay Sulphate of Potash Project – Flora and Vegetation Management Plan,* prepared for Agrimin Limited.

Stantec 2024c *Mackay Sulphate of Potash Project – Inland Waters Environmental Management Plan,* prepared for Agrimin Limited.

Stantec 2024d *Mackay Sulphate of Potash Project – Night Parrot Management Plan,* prepared for Agrimin Limited.

Stantec 2024e *Mackay Sulphate of Potash Project – Revised Offset Strategy,* prepared for Agrimin Limited, August 2024

Stantec 2024f *Mackay Sulphate of Potash Project – Revised Offset Strategy,* prepared for Agrimin Limited, October 2024

Stantec 2024g *Mackay Sulphate of Potash Project – Terrestrial Fauna Environmental Management Plan,* prepared for Agrimin Limited.

State of Western Australia 2021, *Western Australia Government Gazette, No. 180, Environmental Impact Assessment (Part IV Divisions 1 and 2) Administrative Procedures 2021, 22 October 2021.*