OPTIMISED MARDIE PROJECT

SECTION 40AA REFERRAL SUPPORTING DOCUMENT
OFFSHORE DREDGE SPOIL DISPOSAL / AIRSTRIP / GROUNDWATER ABSTRACTION

29 April 2025

PREPARED FOR MARDIE MINERALS PTY LTD
BY PRESTON CONSULTING PTY LTD

Proponent contact details:

MARDIE MINERALS PTY LTD

Contact Person: Snyman Van Straaten– Manager Environmental Approvals and Compliance
Email: snyman.vanstaaten@bciminerals.com.au
Phone: (+61) 400 616 790
Street Address: Level 2, 1 Altona Street, West Perth WA 6005
Postal Address: GPO Box 2811, Perth WA 6872

Document developed by:

PRESTON CONSULTING PTY LTD

Contact Person: Gavin Edwards - Director
Email: gedwards@prestonconsulting.com.au
Website: www.prestonconsulting.com.au
Phone: 0488 737 273
Street Address: Level 1, 226 Adelaide Terrace, Perth, Western Australia, 6000
Postal Address: PO Box 3093, East Perth, Western Australia, 6892

Disclaimer:

ACKNOWLEDGEMENT OF COUNTRY

Preston Consulting acknowledges the Traditional Owners of the lands on which it works, in particular the Whadjuk People of the Noongar Nation, and the Yaburara and Mardudhunera People, the Traditional Custodians of the land on which the activity is proposed. Preston Consulting pays its respects to Elders past and present, and recognise their continuing connection to land, waters, culture and community.

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Checked	Gavin Edwards Director Preston Consulting Pty Ltd		29/04/2025
Authorised	Snyman Van Straaten Manager Environmental Approvals and Compliance Mardie Minerals Pty Ltd		29/04/2025

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1 THE PROPOSAL

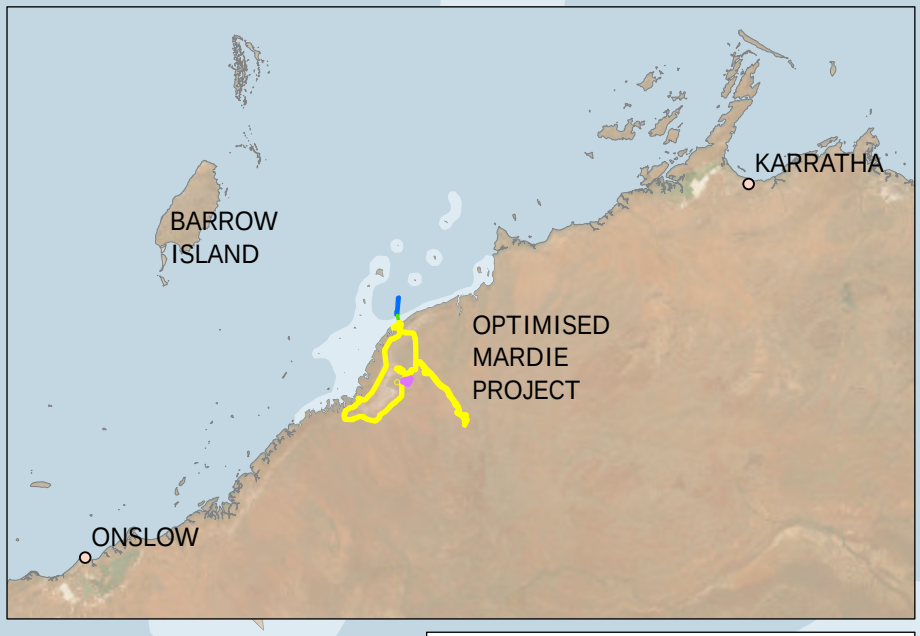
1.1 PROPOSAL INFORMATION

Proposal Name:	Optimised Mardie Project – Offshore Dredge Spoil Disposal/Airstrip/Groundwater Abstraction
Proposal Details:	Mardie Minerals Pty Ltd (Mardie Minerals; a wholly owned subsidiary of BCI Minerals Limited) is seeking to vary the Optimised Mardie Project (Approved Proposal) under Section 40AA (S40AA) of the *Environmental Protection Act 1986* (WA; EP Act) to allow the offshore disposal of dredge spoil from the approved capital and maintenance dredging activities within a new defined dredge material placement area (DMPA) 4, a minor expansion of the Terrestrial Development Envelope (TDE) to allow upgrades to an existing airstrip, and to allow for groundwater abstraction (Revised Proposal). The Approved Proposal and the amendments in this Revised Proposal are shown in Figure 1. The Revised Proposal will act as an amendment to the Approved Proposal that was approved under Ministerial Statement (MS) 1211. The amendments included as part of this Revised Proposal are defined as: • Offshore disposal of up to 355,000 cubic metres (m^3) of capital dredge spoil, and offshore disposal of maintenance dredging, within an area defined as DMPA4; • 118 ha expansion of the TDE to allow upgrades to an existing airstrip and access to groundwater bores; and • Abstraction of up to 0.7 gigalitres per year (GL/yr) of groundwater. A Proposal Content Document (PCD) was prepared for the Approved Proposal (Mardie Minerals, 2022). A revised PCD has been prepared for the Revised Proposal, and is provided in Attachment 1, with the proposed changes in blue and bold font. **<u>Offshore Dredge Spoil Disposal</u>** Mardie Minerals has approval under Condition A1-1 of MS1211 to dredge up to 800,000 m^3 within a defined dredge channel, however, design refinements have identified that only 355,000 m^3 (including 10% over dredge) is required to be dredged to form the berth pocket and channel during capital dredging. Maintenance dredging will be required to ensure safe navigational requirements are maintained in the area, consistent with other navigational hazards. The method for the disposal of the dredged material in the Approved Proposal is to a defined area onshore. However, following engagement with dredging contractors, it was found that onshore disposal would be technically challenging, due to the shallow water depths inshore and the associated long slurry pumping distance. None of the dredging contractors approached to tender for the dredging works were supportive of the proposed onshore disposal approach. Additional to these technical concerns were the likely impacts of the onshore spoil disposal area on a species originally identified as *Minuria tridens* (Vulnerable (*Environment Protection and Biodiversity Conservation Act 1999* (Cth; EPBC Act)), Priority 1 (Department of Biodiversity, Conservation and Attractions (DBCA)). This species has now been identified as *Minuria* sp. Onslow (A.J. Perkins & M. Henson AJP-WA167), however, this species may still be considered significant due to its limited extent. Several offshore disposal sites were considered, and DMPA4 was chosen as the preferred disposal location as it is close to the Approved Proposal. Surveys of DMPA4 have identified it does not contain Benthic Communities and Habitats (BCH) of particular regional or conservation significance compared to other areas within the Mardie and Pilbara region, where higher covers and diversities are observed (O2 Marine, 2024a; Attachment 2). ***Vessel route*** The proposed vessel route from the dredge channel to DMPA4 is shown in Figure 2. From the dredge channel, the vessels will initially move north along the transhipment vessel route for the Approved Proposal. The route diverts in a northwestern direction between Sholl Island and Stewart Island to reach the spoil ground. The total length of the route is approximately 14.85 Nautical Miles (NM). The proposed vessel route may change based on prevailing weather, currents and tide conditions during the transport of dredged material to DMPA4 to ensure safe passage. The transport of dredged material via marine barges are regulated under the *Navigation Act 2012*, the *Shipping Act 1981*, and the International Maritime Organization (IMO) regulations. ***Frequency*** Dredge spoil disposal for capital activities is expected to take place from 1 April 2026 – 30 September 2027. No spoil disposal will occur during the 1 October to 31 March environmental

	blackout period. The entire dredging campaign is expected to occur over a period of four to six months, followed by monitoring activities after dredging. The timing of maintenance dredging and related spoil disposal will only be between 1 April and 30 September during a calendar year; this is to comply with Condition B5-8 of MS1211 that stipulates: "*The Proponent shall not conduct dredging during the period October – March (inclusive), unless the CEO has confirmed otherwise by notice in writing*". The frequency of maintenance dredging will be determined from on-site surveys of the dredge channel and influenced by the rate of sedimentation of seabed areas and the re-suspension of fines into the water column by wave action and tidal currents, which may also include severe weather events such as tropical cyclones. The dredging frequency will also be determined by dredging vessel size and availability. It is expected that maintenance dredging will need to be undertaken every 2 - 5 years, and be required for the life of the Approved Proposal (up to 24 November 2084). **Expansion of TDE** The TDE is proposed to be expanded by 118 ha to allow upgrades to an existing airstrip and access to groundwater bores. Mardie Minerals plan to upgrade the existing airstrip to meet the Royal Flying Doctor Service (RFDS) minimum requirements for emergency evacuation of personnel requiring medical treatment. The airstrip is only proposed to be utilised in emergencies. Several groundwater abstraction bores currently lie outside the TDE, and narrow corridors are proposed to be included in the TDE to include these bores and associated water pipelines. All vegetation clearing for the airstrip and groundwater bores can be accommodated within the clearing limits in MS1211. This amendment is therefore limited to an expansion of the TDE. The location of the airstrip alongside the Approved Proposal is shown in Figure 1, and the proposed airstrip layout is shown in Figure 4. **Groundwater Abstraction** Mardie Minerals is required under Condition A1-1 of MS1211 to not undertake dewatering of groundwater for any reason except to meet the requirements of condition B3-2 (i.e., to implement the Groundwater Monitoring and Management Plan (GMMP; Mardie Minerals, 2024a)). The implementation of the Approved Proposal requires abstraction of relatively small volumes (0.7 GL/yr) of groundwater for construction and operational purposes. Mardie Minerals currently holds licences under the *Rights in Water and Irrigation Act 1914* (WA; RIWI Act) for groundwater abstraction, however it has never previously been proposed as an activity under Part IV of the EP Act. Water is a critical requirement for both construction and operation of the Approved Proposal. Groundwater is currently taken from the Pilbara, Ashburton, Carnarvon-Superficial resource under GWL205621 for ongoing operational needs, such as potable water supply to the Village, road maintenance, and other minor construction activities. This licence allows for abstraction of up to 0.15 GL/yr. Mardie Minerals recently submitted an amendment application for GWL205621 to increase water abstraction by an additional 0.05 GL/yr. This application is currently under assessment, and if approved will increase the total limit under GWL205621 to 0.2 GL/yr. The Department of Water and Environmental Regulation (DWER) recently approved a short-term 5C licence application (GWL211434) for the take of up to 0.5 GL/yr of groundwater from trenches in the footprint of the evaporation ponds to support construction. This water comes from a new coastal saline resource and will be used in conjunction with raw seawater from the Secondary Seawater Intake (SSWI) which is currently being used for major construction activities. This additional take was requested to meet daily road maintenance and dust suppression requirements into the future. The total current volume of groundwater abstraction approved under the RIWI Act is up to 0.65 GL/yr. Once the amendment application currently under assessment is approved, the total volume of groundwater abstraction under the RIWI Act will be up to 0.7 GL/yr. This Referral therefore seeks approval for 0.7 GL/yr of groundwater abstraction, which will cover the expected approved groundwater amounts under the RIWI Act. The location of production bores and water abstraction trenches for the Revised Proposal is shown in Figure 5.
Location:	The Approved Proposal is located approximately 80 kilometres (km) south-west of Karratha, Western Australia (WA) (Refer to Figure 1). DMPA4 is 30.3 hectares (ha), located in the Pilbara coastal zone of WA State marine waters, approximately 25 km (14.85 NM) offshore from the Approved Proposal, 10.5 km northwest of Sholl Island and 116 km northeast of Onslow, WA (Refer to Figure 1). DMPA4 and the predicted zones of impact (Zone of High Impact (ZoHI) and Zone of Moderate Impact (ZoMI)) are shown in Figure 3. The airstrip and groundwater abstraction bores will be incorporated into the TDE (Figure 1).

370000 380000 390000 400000 410000

7700000 7690000 7680000 7670000 7660000 7650000 7640000



Legend

- Dredge Development Envelope
- Marine Development Envelope
- Terrestrial Development Envelope
- Revised Proposal Terrestrial Development Envelope
- Revised Proposal DMPA4
- Disturbance Footprint
- Water Abstraction Trench
- Production Bores

Stewart Island
Sholl Island
Mardie Island
Round Island
Transhipment Channel
Long Island
Middle Passage Island
Jetty
Angle Island
Passage Island
Solitary Island
South Passage Island
Cowle Island

PB12 MB07 PB15 PB11 PB07 PB10 PWM2P PWM1P PB03 MP001 PB13 WS06P PB02 PB06 PB08 PB05 PB14 PB01 WS14P PB09 PB04

M08/527 M08/526 L 08/193 M08/525

Location: S:\GIS\MAP\Mardie\2024\MAR_0200-0299\MAR_0200_00_2024_DMPA4_OFFSHORE_DREDGE_DISPOSAL.aprx

370000 380000 390000 400000 410000

	0 km 4 GDA2020 MGA Zone 50 Scale: 1:175,000	Date: 29/04/2025 Drawn: BCIGIS Requested: GIS Page Size: A3	**OPTIMISED MARDIE PROJECT** **Approved Proposal and Revised Proposal Amendments**	Figure: 1

380000
390000
400000
7700000
7690000
7680000
7670000

BARROW ISLAND
KARRATHA
MARDIE PROJECT
ONSLOW

Product Transfer Area from Transhipment Vessels to Ocean-going Vessels

14.85 nm

Legend

- Optimised Proposal Development Envelope
- Project Area
- Proposed Dredge Spoil Area (DMPA4)
- Indicative Vessel Route*
- Port of Cape Preston West

Stewart Island
Fortescue Island
Sholl Island
Mardie Island
Round Island
Long Island
Middle Passage Island

Dredge Channel
Berth Pocket
Shiploader
Trestle Je t y
Mardie Project Site

* Indicative Vessel Route - may change based on prevailing weather, and navigational safety requirements

S:\GIS\MAP\Mardie\2024\MAR_0100-0199\MAR_0190_00_2024_DMPA4_Offshore_Dredge_Disposal.aprx

0 km 4

GDA2020 MGA Zone 50

Scale: 1:100,000

Date: 29/04/2025

Drawn: GIS

Requested: BCI

Page Size: A3

OPTIMISED MARDIE PROJECT

Proposed vessel route from the Approved Proposal dredge channel to DMPA4

Figure:

2

377500

380000

7697500

7695000

7692500

BARROW ISLAND

DMPA4

MARDIE PROJECT

Legend

- Project Area
- Disturbance Footprint Direct - Proposed Dredge Spoil Area (DMPA4)
- Disturbance Footprint - Indirect (ZOHI P80)
- Disturbance Footprint - Indirect (ZOMI P80)
- Indicative Vessel Route

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0 km 1

GDA2020 MGA Zone 50

Scale: 1:20,000

Date: 29/04/2025

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Page Size: A3

OPTIMISED MARDIE PROJECT
DMPA4 **and predicted zones of impact**

Figure: 3

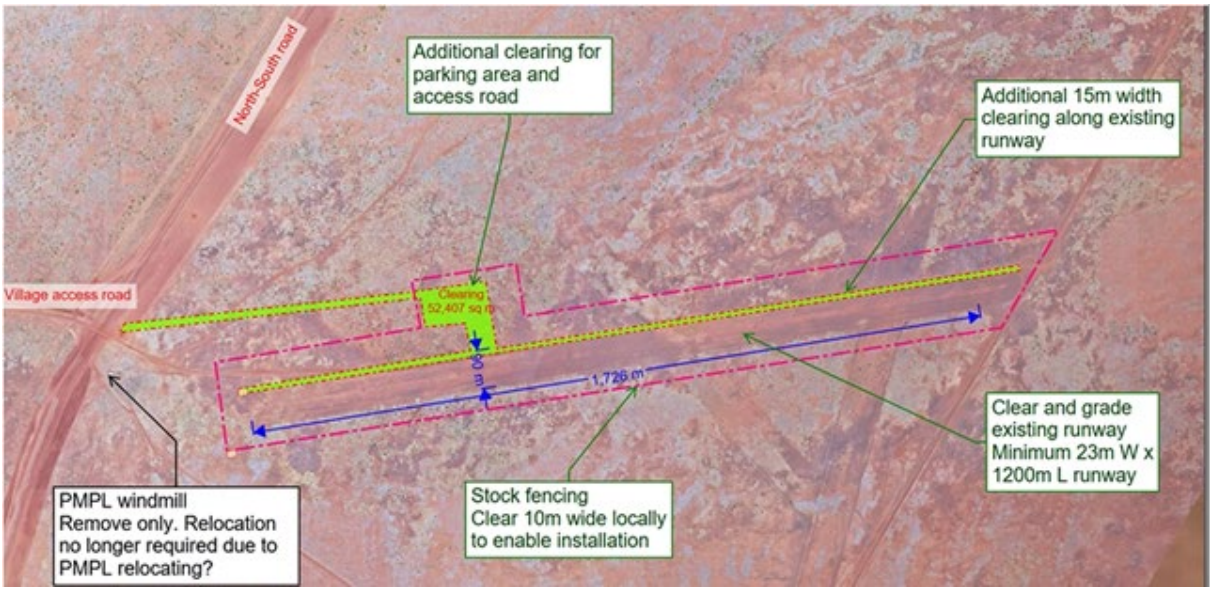
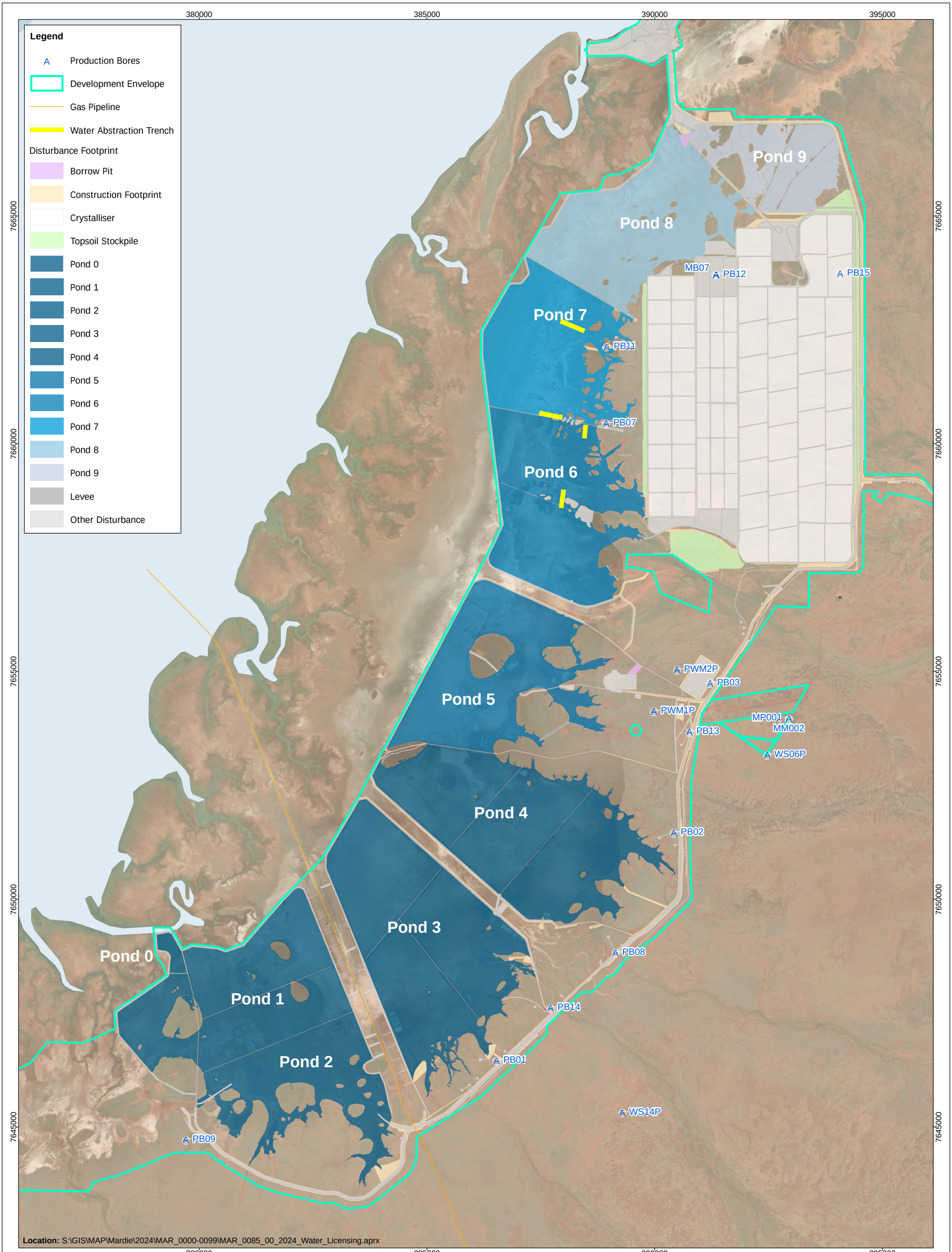


Figure 4: Proposed upgrade to airstrip



0 km 2

GDA2020 MGA Zone 50

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Date: 29/04/2025

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Requested: BCI

Page Size: A3

OPTIMISED MARDIE PROJECT

Revised Proposal production **b**ores and **w**ater **a**bstraction **t**renches

Figure: 5

1.2 PROPOSAL ELEMENTS

A PCD was prepared for the Approved Proposal (Mardie Minerals, 2022). A revised PCD has been prepared and is provided in Attachment 1, with the proposed changes in blue and bold font.

The short description of MS1211 needs to be amended to allow this Revised Proposal, as shown in blue and bold font in the excerpt from the PCD below (Table 1). Figure 1 of MS1211 should be replaced with a new figure showing DMPA4 and the proposed expanded TDE (as provided in Figure 1 of this Referral), and a new figure should be added to show the ZoHI and ZoMI boundaries associated with the dredge material disposal within DMPA4 (as provided in Figure 3 of this Referral). Figures in the PCD that show the Approved Proposal TDE will be revised to reflect the proposed expanded TDE.

Changes and descriptions of a new element required for the Revised Proposal is detailed (in blue and bold font) in Table 2. Figures depicting locations in Table 2 are located within the revised PCD (Attachment 1).

For the remainder of this Referral document, only the elements related to the Revised Proposal will be considered, as all other elements have been approved under MS1211.

Table 1: Proposed General Proposal Content Description (changed elements in blue and bold font)

Proposal Title	Optimised Mardie Project
Proponent Name	Mardie Minerals Pty Ltd
Short Description	The proposal is to develop a solar salt and sulphate of potash production plant and associated export facility at Mardie, approximately 80 km south-west of Karratha. The proposal includes two seawater intakes, brine discharge, evaporation and crystalliser ponds, processing plant, causeway, trestle jetty with associated dredge channel, **offshore disposal of dredge material**, and supporting infrastructure.

Table 2: Proposed Proposal Content Elements (changed elements in blue and bold font)

Proposal Element	Location	Existing Proposal extent, capacity or range	Proposed Amendment
Physical Elements			
Development Envelope	**Figure 1** Figure 4	Terrestrial development envelope not to exceed 19,645 ha. Marine development envelope not to exceed 53 ha. Dredge development envelope not to exceed 307.5 ha. Combined area of concentrator ponds and crystalliser ponds not to exceed 11,368 ha.	Terrestrial development envelope not to exceed **19,763 ha**. No change to other development envelopes.
Disturbance footprint	**Figure 1**	Terrestrial disturbance not to exceed 13,476 ha within 19,645 ha development envelope.	Terrestrial disturbance not to exceed 13,476 ha within **19,763 ha** development envelope.
Direct disturbance of native vegetation	**Figure 1**	Clearing of no more than 3,014 ha vegetation in 'good' to 'excellent' condition native vegetation. Clearing of no more than 863 ha landward samphire. Clearing of no more than 330 ha of coastal samphire.	No change

Proposal Element	Location	Existing Proposal extent, capacity or range	Proposed Amendment
Impacts on PEC and Mangrove Habitat	**Figure 2**	No more than 145 ha direct and 20 ha indirect impacts to Horseflat PEC. No more than 13 ha of direct disturbance to mangrove habitat outside of the RRDMMA. No more than 4 ha of clearing within the RRDMMA inclusive of any clearing conducted by the proponent prior to the issue of this statement and clearing conducted by the proponent under any other approval mechanism subject to the requirements of conditions B3-4 and C1-1.	No change
Direct disturbance to Algal mats	Figure 4	No more than 880 ha of direct impact to algal mats.	No change
Dredging	Figure 3	No more than 800,000 cubic metres, directly disturbing no more than 65 ha within the 307.5 ha dredge development envelope.	No change
Offshore Dredge Spoil Disposal	**Figure 6**	*Not previously included.*	**Capital dredging of no more than 355,000 cubic metres, and maintenance dredging as required, directly disturbing no more than 30.3 ha at Dredge Material Placement Area (DMPA) 4.**
Foraging habitat for the Pilbara leaf-nosed bat (*Rhinonicteris aurantia*)	**Figure 1**	Clearing no more than 3,254 ha.	No change
Foraging habitat for the Northern coastal free-tailed bat (*Ozimops cobourgianus*)	**Figure 1**	Clearing no more than 1,186 ha.	No change
Habitat for the Pilbara Olive Python (*Liasis olivaceus barroni*)	**Figure 1**	Clearing no more than 6 ha.	No change
Foraging habitat for the Northern Quoll (*Dasyurus hallucatus*)	**Figure 1**	Clearing no more than 80 ha.	No change
Zone of High Impact (e.g. marine)	Figure 3 **Figure 6**	Marine zone of high impact to be limited to 121 ha within the 307.5 ha dredge footprint.	Marine zone of high impact to be limited to 121 ha **at the dredge area and 355 ha at the offshore dredge spoil disposal area.**
Level of ecological protection areas (marine environmental quality)	Figure 4	Moderate ecological protection area (MEPA) not to exceed 53.9 ha. Low ecological protection area (LEPA) not to exceed 20.2 ha.	No change

Proposal Element	Location	Existing Proposal extent, capacity or range	Proposed Amendment
Distance between crystallisers and Mardie pool	**Figure 1**	Minimum distance of 1000 metres to be maintained between crystalliser ponds and Mardie pool.	No change
Drainage corridors	**Figure 1**	Minimum of two drainage corridors of a minimum of 200 metres wide to be established and aligned with existing natural drainage lines.	No change
Operational Elements			
Groundwater abstraction	**Figure 7**	No dewatering of groundwater for any reason except to meet the requirements of condition B3-2.	**Groundwater abstraction not to exceed 0.7 GL per annum.**
Marine discharge rate	Figure 4	Brine discharge not to exceed 5.5 GL per annum with a specific gravity of no more than 1.25 via diffuser.	No change
Seawater intake	-	Seawater intakes to be fitted with four-sided screens designed to ensure a rate not exceeding 0.15 metres per second through the screen. Primary seawater intake is to not exceed 180 GL per annum.	No change

1.3 Proposal Stages

Maximum proposal life:	No change to Approved Proposal.
Proposed start date:	Approved Proposal already commenced; offshore dredge spoil disposal planned to commence 01/04/2026.
Proposed end date:	No change to end date of Approved Proposal.
Construction phase length:	No change to the construction phase length of Approved Proposal.
Commissioning schedule:	No change – no commissioning required for the items in this Referral.
Operations phase length:	No change to operations phase length of Approved Proposal.
Decommissioning phase:	No change associated with the items in this Referral.
Decommissioning:	No change associated with the items in this Referral.
Rehabilitation:	No change associated with the items in this Referral.

1.4 GREENHOUSE GAS EMISSIONS

Construction	
Total Scope 1 emissions:	Negligible changes to Scope 1 Greenhouse Gas (GHG) emissions are likely due to the inclusion of items in this Referral. Scope 1 emissions associated with haulage of dredge material offshore is likely to be similar to the establishment of a dredge spoil disposal area onshore and the associated pumping emissions.
Scope 1 emissions source and quantification method:	N/A
Total Scope 2 emissions:	None
Scope 2 emissions source and quantification method	N/A
Total Scope 3 emissions:	Negligible changes to Scope 3 GHG emissions are likely due to the inclusion of items in this Referral. Scope 3 emissions associated with haulage of dredge material offshore is likely to be similar to the establishment of a dredge spoil disposal area onshore.
Scope 3 emissions source and quantification method	N/A
Operation	
Total Scope 1 emissions:	Negligible change to operational emissions – emissions from pumping groundwater from bores and trenches likely to be similar to or less than pumping from seawater intakes.
Scope 1 emissions source and quantification method:	N/A
Total Scope 2 emissions:	None
Scope 2 emissions source and quantification method	N/A
Total scope 3 emissions:	Unlikely to be significant.
Sources of Scope 3 emissions:	N/A

2 CONTACT DETAILS

2.1 REFERRER CONTACT DETAILS

Referrer Contact:	Snyman Van Straaten
Full name of the referrer:	Snyman Van Straaten
Email:	ApprovalsAndCompliance@bciminerals.com.au
Phone:	(+61) 400 616 790
Address:	Level 2, 1 Altona Street, West Perth, Western Australia, 6005 GPO Box 2811, Perth WA 6872

2.2 REFERRING PARTY DETAILS

Organisation:	Mardie Minerals Pty Ltd
ABN:	50 152 574 457
ACN:	N/A
IARN:	N/A
Email	ApprovalsAndCompliance@bciminerals.com.au
Phone:	(+61) 400 616 790
Address:	Level 2, 1 Altona Street, West Perth, Western Australia, 6005 GPO Box 2811, Perth WA 6872

2.3 PROPONENT DETAILS

Nominated Proponent Contact	Snyman Van Straaten
Nominated Proponent	Mardie Minerals Pty Ltd

3 DECISION-MAKING AUTHORITIES

3.1 APPROVALS REQUIRED

Decision-Making Authority (DMA) and department	Legislation or agreement regulating the activity	Approval required	Whether and how statutory decision-making process can mitigate impacts on the environment?		
			Relevant Impact	Relevant Key Environmental Factor and Objective	Can the DMA mitigate impacts and how will the Environmental Protection Authority (EPA) factor be met?
Offshore Dredge Spoil Disposal					
Minister for the Environment DWER	Part IV of the EP Act.	**Ministerial Statement** Required for assessing projects with the potential to impact the environment in WA.	Disturbance of BCH/potential marine fauna habitat at DMPA4. Direct impacts to significant marine fauna (vessel strike, etc.). Introduced marine pests (IMP) translocation from dredging vessels. Sedimentation impacts to Marine Environmental Quality (MEQ) and BCH within the zones of impact.	**Marine Fauna** To protect marine fauna so that biological diversity and ecological integrity are maintained. **MEQ** To maintain the quality of water, sediment and biota so that environmental values are protected. **BCH** To protect BCH so that biological diversity and ecological integrity are maintained.	Yes. Offshore dredge spoil disposal is set to take place in WA State coastal waters, as a significant amendment to the Approved Proposal via MS1211. This Revised Proposal is to include DMPA4 as an offshore dredge spoil disposal site, and therefore additional conditions specific to this activity are likely to be added to a revised MS1211.
Minister for the Environment and Water	EPBC Act	**EPBC Act Approval** Required for the assessment of the Proposal's impacts	Direct impacts to Threatened or Migratory Fauna from vessel strike	**Marine Fauna** To protect marine fauna so that biological diversity and ecological integrity are maintained.	Partially. While there is likely to be significant overlap in regulation, the EPBC Act is a Commonwealth Act and as such cannot be fully relied upon to regulate impacts

Decision-Making Authority (DMA) and department	Legislation or agreement regulating the activity	Approval required	Whether and how statutory decision-making process can mitigate impacts on the environment?		
			Relevant Impact	Relevant Key Environmental Factor and Objective	Can the DMA mitigate impacts and how will the Environmental Protection Authority (EPA) factor be met?
Department of Climate Change, Energy, the Environment and Water (DCCEEW)		on Matters of National Environmental Significance (MNES) – *referral submitted (EPBC 2024/10054)*.	Disturbance or sedimentation impacts to BCH utilised by Threatened or Migratory Fauna.	**BCH** To protect BCH so that biological diversity and ecological integrity are maintained. **MEQ** To maintain the quality of water, sediment and biota so that environmental values are protected. **Marine Fauna** To protect marine fauna so that biological diversity and ecological integrity are maintained.	under WA legislation. The approval is however predicted to include a requirement to comply with the Dredge and Spoil Disposal Management Plan (DSDMP) (O2 Marine, 2025; Attachment 3), which contains all required mitigation for this activity. Mardie Minerals has submitted a referral under the EPBC Act to use DMPA4 as a spoil disposal area. This referral is currently under assessment by DCCEEW.
	Environment Protection (Sea Dumping) Act 1981 (Cth; Sea Dumping Act)	**Sea Dumping Permit** Required for the deliberate dumping of waste within Australian waters.	Impacts to Australian marine waters.	**BCH** To protect BCH so that biological diversity and ecological integrity are maintained. **MEQ** To maintain the quality of water, sediment and biota so that environmental values are protected. **Marine Fauna** To protect marine fauna so that biological diversity and ecological integrity are maintained.	Partially. While there is likely to be significant overlap in regulation, the Sea Dumping Act is a Commonwealth Act and, as such, cannot be fully relied upon to regulate impacts under WA legislation. Offshore dredge spoil disposal is set to take place in WA State coastal waters. A permit under the Sea Dumping Act is required to undertake sea dumping activities in the marine environment. Mardie Minerals has submitted an application for a permit under the Sea Dumping Act to use DMPA4 as a spoil disposal area. This application is currently under assessment by DCCEEW. The potential impacts from this activity is likely to be adequately regulated by Sea Dumping Permit conditions (when granted).
Minister for Agriculture,	*Biosecurity Act 2015* (Cth;	Nil Provides guidance and standards	IMP translocation from dredging vessels.	**BCH**	Partially – IMP impacts only. The Biosecurity Act provides guidance and standards to be considered and implemented when a proposal could

Decision-Making Authority (DMA) and department	Legislation or agreement regulating the activity	Approval required	Whether and how statutory decision-making process can mitigate impacts on the environment?		
			Relevant Impact	Relevant Key Environmental Factor and Objective	Can the DMA mitigate impacts and how will the Environmental Protection Authority (EPA) factor be met?
Fisheries and Forestry Department of Agriculture, Fisheries and Forestry	Biosecurity Act)	documents to be considered when a Proposal could potentially spread IMPs.		To protect BCH so that biological diversity and ecological integrity are maintained. **Marine Fauna** To protect marine fauna so that biological diversity and ecological integrity are maintained.	potentially spread IMP. Offshore dredge spoil disposal is set to take place within WA marine waters, and is a new area that was not part of the Approved Proposal. Mardie Minerals plan to regulate this potential impact by adhering to the relevant guidance and standards for IMP management and prevention.
Expansion of the TDE					
Minister for the Environment DWER	Part IV of the EP Act.	**Ministerial Statement** Required for assessing projects with the potential to impact the environment in WA.	Clearing of native vegetation in 'Good' and 'Very Good' condition. Minor levels of dust settlement on vegetation during construction. Direct impacts to terrestrial fauna (i.e. vehicle strike). Predation or competition from an increased risk of introduced fauna. Alteration in fauna behaviour as a result of airstrip attracting fauna, noise, or light emissions.	**Flora and Vegetation** To protect flora and vegetation so that biological diversity and ecological integrity are maintained. **Terrestrial Fauna** To protect terrestrial fauna so that biological diversity and ecological integrity are maintained. **Social Surroundings** To protect social surroundings from significant harm.	Yes. The TDE expansion is a minor extension of the Approved TDE. This Revised Proposal is to include the expanded TDE in MS1211. No other changes to conditions are required.

Decision-Making Authority (DMA) and department	Legislation or agreement regulating the activity	Approval required	Whether and how statutory decision-making process can mitigate impacts on the environment?		
			Relevant Impact	**Relevant Key Environmental Factor and Objective**	**Can the DMA mitigate impacts and how will the Environmental Protection Authority (EPA) factor be met?**
			Introduction or spread of weed species, with particular regard to Mesquite, which is a Weed of National Significance (WoNS). Disturbance of Aboriginal Cultural Heritage.		
Minister for the Environment and Water DCCEEW	EPBC Act	**EPBC Act Approval** Required for the assessment of the Proposal's impacts on MNES.	Clearing of native vegetation in 'Good' and 'Very Good' condition. Minor levels of dust settlement on vegetation during construction. Direct impacts to terrestrial fauna (i.e. vehicle strike). Predation or competition from an increased risk of introduced fauna. Alteration in fauna behaviour as a result of airstrip attracting fauna,	**Flora and Vegetation** To protect flora and vegetation so that biological diversity and ecological integrity are maintained. **Terrestrial Fauna** To protect terrestrial fauna so that biological diversity and ecological integrity are maintained.	No. While there is likely to be significant overlap in regulation, the EPBC Act is a Commonwealth Act and as such cannot be fully relied upon to regulate impacts under WA legislation.

Decision-Making Authority (DMA) and department	Legislation or agreement regulating the activity	Approval required	Whether and how statutory decision-making process can mitigate impacts on the environment?		
			Relevant Impact	**Relevant Key Environmental Factor and Objective**	**Can the DMA mitigate impacts and how will the Environmental Protection Authority (EPA) factor be met?**
			noise, or light emissions.		
Minister for Agriculture and Food DPIRD	*Biosecurity and Agriculture Management Act 2007* (WA; BAM Act)	None – specifies requirements for management of WoNS.	Introduction or spread of weed species, with particular regard to Mesquite, which is a WoNS.	**Flora and Vegetation** To protect flora and vegetation so that biological diversity and ecological integrity are maintained.	Yes – Mesquite only. Existing controls for Mesquite will be used in the expanded areas of the TDE.
Minister for Aboriginal Affairs Department of Planning, Lands and Heritage (DPLH)	*Aboriginal Heritage Act 1972* (WA; AH Act)	**Section 18 Consent** Required if impacts to any Heritage sites are unavoidable.	Disturbance of Aboriginal Heritage sites.	**Social Surroundings** To protect social surroundings from significant harm.	Yes. The disturbance of Aboriginal heritage sites is unlikely to be required within the expanded TDE areas, however if it is unavoidable then the AH Act can adequately regulate this impact.
Minister for Mines Department of Energy, Mining, Industry Regulation and Safety (DEMIRS)	*Mining Act 1978* (WA; Mining Act)	**Mining Proposal** Required for all development activities on Mining Act tenure.	Clearing of native vegetation in 'Good' and 'Very Good' condition. Minor levels of dust settlement on vegetation during construction. Direct impacts to terrestrial fauna (i.e. vehicle strike). Predation or competition from an increased risk	**Flora and Vegetation** To protect flora and vegetation so that biological diversity and ecological integrity are maintained. **Social Surroundings** To protect social surroundings from significant harm. **Terrestrial Fauna** To protect terrestrial fauna so that biological diversity and ecological integrity are maintained.	Yes. The expanded TDE will be included under the site Mining Proposal. However, DEMIRS will divert specific conditions to MS1211.

Decision-Making Authority (DMA) and department	Legislation or agreement regulating the activity	Approval required	Whether and how statutory decision-making process can mitigate impacts on the environment?		
			Relevant Impact	**Relevant Key Environmental Factor and Objective**	**Can the DMA mitigate impacts and how will the Environmental Protection Authority (EPA) factor be met?**
			of introduced fauna. Alteration in fauna behaviour as a result of airstrip attracting fauna, noise, or light emissions.		
Groundwater Abstraction					
Minister for the Environment DWER	Part IV of the EP Act	**Ministerial Statement** Required for assessing projects with the potential to impact the environment in WA.	Reduction in aquifer levels/volume. Loss of stygofauna habitat (if present). Reduction in availability of water for groundwater-dependant ecosystems (if present).	**Flora and Vegetation** To protect flora and vegetation so that biological diversity and ecological integrity are maintained. **Inland Waters** To maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected. **Subterranean Fauna** To protect subterranean fauna so that biological diversity and ecological integrity are maintained.	Yes, but unlikely to be required. Part IV of the EP Act allows for the regulation of groundwater abstraction, however, this usually only occurs if could potentially result in a significant environmental impact. In other cases, regulation under the RIWI Act is sufficient (discussed below). This Revised Proposal includes groundwater abstraction as an activity, as it was specifically excluded in the Approved Proposal. It is likely that a simple abstraction limit will be included in a revised MS1211, and the detailed regulation of the activity will be regulated under the RIWI Act.
Minister for the Environment DWER	RIWI Act	**Groundwater Licence** Required to be able to take groundwater.	Reduction in aquifer levels/volume. Loss of stygofauna habitat (if present). Reduction in availability of	**Flora and Vegetation** To protect flora and vegetation so that biological diversity and ecological integrity are maintained. **Inland Waters** To maintain the hydrological regimes and quality of groundwater and	Yes. Groundwater abstraction has been approved under the RIWI Act for up to 0.65 GL/yr (GWL205621 and GWL211434). Once the amendment application currently under assessment is approved, the total volume of groundwater abstraction approved under the RIWI Act will be up to 0.7 GL/yr. The inclusion of a groundwater abstraction limit in MS1211 does not change any of the

Decision-Making Authority (DMA) and department	Legislation or agreement regulating the activity	Approval required	Whether and how statutory decision-making process can mitigate impacts on the environment?		
			Relevant Impact	**Relevant Key Environmental Factor and Objective**	**Can the DMA mitigate impacts and how will the Environmental Protection Authority (EPA) factor be met?**
			water for groundwater-dependant ecosystems (if present).	surface water so that environmental values are protected. **Subterranean Fauna** To protect subterranean fauna so that biological diversity and ecological integrity are maintained.	impacts already assessed and approved under the RIWI Act, and therefore potential impacts will continue to be appropriately managed through groundwater licences.
Minister for Mines DEMIRS	Mining Act	**Mining Proposal** Required for all development activities on Mining Act tenure.	Reduction in aquifer levels/volume Loss of stygofauna habitat (if present) Reduction in availability of water for groundwater-dependant ecosystems (if present)	**Flora and Vegetation** To protect flora and vegetation so that biological diversity and ecological integrity are maintained. **Inland Waters** To maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected. **Subterranean Fauna** To protect subterranean fauna so that biological diversity and ecological integrity are maintained.	Partially. Groundwater abstraction has been included under the site Mining Proposal, and the more recent changes to groundwater abstraction under the RIWI Act will be included in a future consolidated revision of the Mining Proposal. However, DEMIRS will divert specific conditions to the RIWI Act 5C Licence.

4 TENURE AND LOCAL GOVERNMENT APPROVALS

4.1 LOCAL GOVERNMENT AUTHORITY LOCATION

Location Name	The Approved Proposal is located in Mardie, approximately 80 km south-west of Karratha, WA. DMPA4 is located in WA State marine waters, approximately 13.5 NM offshore from the Approved Proposal.
RDC Region	Pilbara
Actions	Additional actions proposed in this Revised Proposal are Offshore dredge spoil disposal at DMPA4, expansion of the TDE (to incorporate expansion of the airstrip and access to groundwater bores), and groundwater abstraction.
Will the land need to be rezoned before the Proposal is implemented	No.
Rezoning Details	N/A
Current land use on the property	The current land use at DMPA4 is marine and outside Local Government Area (LGA) boundaries, with some uses for fishing and vessel transport. The airstrip is within L08/325, which is held by Mardie Minerals. The expanded TDE is situated within the Mardie Station, which is primarily used for cattle farming. The groundwater abstraction will occur within the boundary of the Approval Proposal, with the exception of bores located in the proposed expanded areas of the TDE.
Does the proponent have the legal access required for the implementation of all aspects of the proposal?	No.
Provide details of legal access authorisations and/or agreements and attach.	The airstrip occurs on L08/325, issued to Mardie Minerals under the Mining Act (Attachment 4). Groundwater abstraction occurs on tenure issued under the Mining Act (Attachment 4).
What agreements are required	Mardie Minerals will continue consultation with the Department of Transport, DPLH and Pilbara Ports (PP) to obtain the appropriate form of tenure for DMPA4. Mardie Minerals will provide evidence of tenure once obtained to DWER (if required).

4.2 TENURE DETAILS

Activity: Offshore Dredge Spoil Disposal	
Land tenure/access	Mardie Minerals will continue consultation with the Department of Transport, DPLH and PP to obtain the appropriate form of tenure for DMPA4. Mardie Minerals will provide evidence of tenure once obtained to DWER (if required).
Type of approval & regulating legislation	TBD – pending tenure confirmation.

Activity: Expansion of the TDE	
Land tenure/access	The airstrip and groundwater bores and pipelines are located on tenure issued under the Mining Act.
Type of approval & regulating legislation	All tenure is approved under the Mining Act.

Activity: Groundwater Abstraction	
Land tenure/access	Groundwater abstraction bore locations are shown in Figure 5. Groundwater abstraction is approved/proposed within the following tenements: • GWL205621 (approved): E08/1849, E08/2647, E08/2740-I, E08/2836-I, E08/2943, L08/188, L08/233, M08/525-B, M08/526-B, and M08/527-B. • GWL205621 (proposed additional): E08/2741-I, G08/93, G08/101, G08/102, G08/103, G08/104, L08/193, M08/538 and M08/539. • GWL211434 (approved): M08/526 and M08/539-B.
Type of approval & regulating legislation	Groundwater abstraction up to 0.15 GL/yr approved under GWL205621 has been included under the site approved Mining Proposals (REG ID: 111421 and 114153). These Mining Proposals were submitted and approved by DEMIRS prior to GWL211434 being granted for an additional 0.5 GL/yr, and the amendment application currently under assessment for an additional 0.05 GL/yr. These updates will be included in a future revision of a consolidated Mining Proposal.

5 STAKEHOLDERS AND CONSULTATION

5.1 KEY STAKEHOLDERS

Mardie Minerals commenced consultation with stakeholders for the offshore dredge spoil disposal in 2023, the airstrip in 2022, and groundwater abstraction in 2020.

Stakeholders have been identified based on their interest and regulatory involvement with the activities outlined in this Revised Proposal. Consultation will be ongoing with most of the stakeholders identified throughout the phases of the Revised Proposal.

Key Stakeholders	
Name: City of Karratha	
Organisation	City of Karratha
Role	The City of Karratha oversees the management of the northern regions of Karratha, Mardie etc in the Pilbara, which is where the Revised Proposal is located.
Name: Department of Biodiversity, Conservation and Attractions	
Organisation	DBCA
Role	DBCA is responsible for the management of marine reserves in WA, which is where the Revised Proposal is located.
Name: Department of Climate Change, Energy, the Environment and Water	
Organisation	DCCEEW (EPBC Assessments).
Role	The EPBC Assessments Branch of DCCEEW is responsible for assessing referrals made under the EPBC Act, including referral of offshore dredge spoil disposal for the Revised Proposal.
Name: Department of Climate Change, Energy, the Environment and Water	
Organisation	DCCEEW (Sea Dumping Branch).
Role	The EPBC Sea Dumping Branch of DCCEEW is responsible for assessing referrals made under the Sea Dumping Act and issuing Sea Dumping Permits, including assessment of offshore dredge spoil disposal for the Revised Proposal.
Name: Department of Energy, Mining, Industry Regulation and Safety	
Organisation	DEMIRS
Role	DEMIRS will regulate activities on tenure issued under the Mining Act, which includes the airstrip and groundwater abstraction.
Name: Department of Planning, Lands and Heritage	
Organisation	DPLH
Role	DPLH is responsible for the planning and management of land and heritage in WA.
Name: Department of Primary Industries and Regional Development	
Organisation	DPIRD
Role	DPIRD have a responsibility to cultivate and preserve WA's aquatic resources, which has been considered for the proposed offshore dredge spoil disposal.
Name: Department of Water and Environmental Regulation	
Organisation	DWER (EPA Services)

Key Stakeholders	
Role	DWER is responsible for administering Part IV of the EP Act, which will include this S40AA Referral.
Name: Department of Water and Environmental Regulation	
Organisation	DWER (Water Resources)
Role	DWER is responsible for administering the RIWI Act, which has assessed and approved the water abstraction included in this Revised Proposal.
Name: Pastoral Management Pty Ltd	
Organisation	PMPL
Role	PMPL run the Mardie pastoral station adjacent to the Approved Proposal. As part of the Revised Proposal (airstrip), a windmill may require decommissioning at the western end of the airstrip.
Name: Pilbara Ports	
Organisation	PP
Role	PP oversees the operation of Ports within the Pilbara region under the *Port Authorities Act 1999* (WA)
Name: Port of Ashburton Technical Advisory and Consultative Committee	
Organisation	TACC
Role	TACC is the forum of engagement between the advisory committee of the PP and other stakeholders (including industry).
Name: Recfishwest	
Organisation	Recfishwest
Role	Recfishwest are the key body representing the interests of recreational fishers in WA.
Name: Western Australian Fishing Industry Council	
Organisation	WAFIC
Role	WAFIC are the key industry body representing the interests of commercial fisheries in WA.
Name: Wirrawandi Aboriginal Corporation	
Organisation	WAC
Role	WAC is the Prescribed Body Corporate for the Mardudhunera and Yaburara People on their determination land (WCD2018/006).

5.2 Consultation Register

Issues raised and outcomes of consultation that has taken place to-date related to offshore dredge spoil disposal, the airstrip and groundwater abstraction are outlined in the attached Stakeholder Consultation Outcomes Register (Attachment 5).

6 LEAD AGENCY STATUS

Lead agency status (yes/no)	No
Type of lead agency status	N/A
Case Manager Department	N/A
Full name	N/A
Email	N/A
Phone	N/A

7 COMMONWEALTH GOVERNMENT APPROVALS

Actions that may be or are a controlled action under the EPBC Act (yes/no):	Yes
Referral to the Commonwealth (yes/no):	Yes
Date of referral	15 November 2024
EPBC Reference Number	EPBC 2024/10054
Is it a controlled or not controlled action?	Not yet determined.
List Matters of National Significance that a controlled action will be applied	Listed threatened species and communities. Listed migratory species.
Do you request that this proposal be assessed under a Bilateral Agreement or as an Accredited Assessment?	No
Approvals required from other Commonwealth Government department's (yes/no):	Yes
Approvals Required	**Sea Dumping Permit** A permit under the Sea Dumping Act is required to undertake sea dumping activities in the marine environment. Mardie Minerals has submitted an application for a permit under the Sea Dumping Act to use DMPA4 as a Spoil Disposal area. This application is currently under assessment by DCCEEW.

8 ENVIRONMENTAL REVIEW

8.1 ALTERNATIVES TO THE PROPOSAL

Alternative	Discussion
1. Location	**Offshore Dredge Spoil Disposal** The approved disposal method for the dredge spoil under MS1211 is onshore disposal, within the Approved Proposal TDE.. However, following engagement with dredging contractors after the issue of MS1211 it was found onshore disposal would be technically challenging due to the shallow water depths inshore and associated long slurry pumping distance. An additional concern was the likely impacts to records previously identified as *Minuria tridens* (Vulnerable (EPBC Act), Priority 1 (DBCA)) that occupy portions of the land-based dredge disposal areas. This species has now been reclassified as *Minuria sp. Onslow* (A.J. Perkins & M. Henson AJP-WA167), which has not received a current conservation listing at a State level, however it may still be considered significant due to its limited extent. The onshore spoil disposal location shown in the current Dredge Management Plan (DMP; O2 Marine, 2023a) is in close proximity with records of *Minuria sp. Onslow* (A.J. Perkins & M. Henson AJP-WA167). This is shown in Figure 6, with the onshore spoil disposal location represented by the disturbance footprint north of the causeway where the records are located. Mardie Minerals evaluated several design options and contracting strategies to address challenges associated with onshore disposal. However, the challenges identified above remained. None of the contractors approached to tender for the dredging works were supportive of the proposed onshore disposal approach. As a result of the above considerations, offshore disposal was considered to be the preferred disposal method for the dredge material. Several offshore disposal sites have been identified and investigated for this Revised Proposal, including (shown on Figure 7): • Spoil Ground E; • DMPA1; • DMPA2; and • DMPA3. ***Spoil Ground E*** Spoil Ground E was previously used for the Chevron Wheatstone Project as a spoil disposal site (Chevron, 2016). Spoil Ground E is situated in Commonwealth Marine Waters, approximately 120 km (65 NM) southwest of the Approved Proposal. Due to the extensive travel distance between the dredge channel and Spoil Ground E (over 80 NM), it was not considered to be a viable option. Furthermore, the longer vessel route increases the risk of vessel related impacts to marine fauna, such as vessel strike and product spillage. ***DMPA1, DMPA2 and DMPA3*** Several offshore disposal sites closer to the Approved Proposal (within approximately 14.5 NM) were investigated by Baird (2024a; Attachment 6). These locations are shown in Figure 7. In order to determine the most suitable disposal location, Baird was engaged to undertake spoil ground disposal plume modelling for two sites; DMPA1 (Baird, 2024b; Attachment 7) and DMPA4 (Baird, 2024a; Attachment 6). A comparison of the extent of the sediment plumes resulting from Baird's offshore disposal modelling at DMPA1 (first pass and second pass) and DMPA4 was undertaken. Analysis using GIS was performed and the differences in area measurements presented. In summary, the extent of the sediment plumes resulting from offshore disposal at DMPA4 were at least 53% lower when compared with the plumes at the two DMPA1 option sites. Furthermore, DMPA2 and DMPA3 were deemed unsuitable as they are situated closer to Stewart, Fortescue, Scholl and Mardie Islands and the sensitive BCH areas in proximity to these islands which would likely be impacted by sediment plumes from dredge spoil disposal. These locations are known to provide important habitat to significant species,

Alternative	Discussion
	and therefore avoiding these areas would lessen the potential impact to habitat, as well as vessel movements near the Island. ***Summary*** DMPA4 was chosen as the preferred disposal location as it is close to the Approved Proposal, it is located further from Sholl Island and sensitive areas than other sites, and it was considered unlikely that the BCH within DMPA4 would have particular regional or conservation significance compared to other areas within the Mardie and Pilbara region, where higher BCH cover and diversities are observed (O2 Marine, 2024a; Attachment 2). **Expansion to the TDE** The airstrip and groundwater bores and pipelines are existing infrastructure, the activities proposed as part of this Revised Proposal are to upgrade the airstrip to allow it to be used by RFDS and to include the use of the bores. **Water abstraction** Sourcing water from external sources and an onsite desalination plant was originally considered and have been implemented, however, the small volume requirements and availability of brackish and saline water onsite meant that groundwater abstraction became a viable additional water supply option.
2. Technology	No alternatives available.
3. Timeline	No alternatives available.
4. No Development	The 'no development' option is not possible for dredge spoil disposal, as dredging is required to develop the port. Maintenance dredging will be required to ensure safe navigational requirements are maintained in the area, consistent with other navigational hazards. The 'no development' option was originally considered for the airstrip, however, providing safe access for emergency services for staff safety was determined to be a viable additional option, particularly when utilising the pre-existing airstrip. The 'no development' option was originally pursued for water supply, however, groundwater supply was determined to provide a viable additional source with minimal environmental impacts.
5. Activity	As detailed above, alternate dredge spoil disposal activities (onshore) were considered but were not deemed viable. Having alternative methods of emergency services was originally considered for the Approved Proposal, however, providing safe access for emergency services for staff safety was determined to be a viable additional option, particularly when utilising the pre-existing airstrip. Sourcing water from external sources and an onsite desalination plant was originally considered and have been implemented, however the small volume requirements and availability of brackish and saline water onsite meant that groundwater abstraction became a viable additional water supply activity option.
6. Element	Elements are linked to associated elements of the Approved Proposal, therefore no alternatives were available.

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7670500 7670000 7669500 7669000 7668500 7668000 7667500 7667000

Legend

- Original Development Envelope
- Optimised Development Envelope
- Indicative Disturbance Footprint
- Onshore Dredge Disposal Area
- *Minuria* sp. Onslow Communities

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Location: S:\GIS\MAP\Mardie\2025\MAR_0000-0099\MAR_0069_00_2025_MINURIA_TRIDENS.aprx

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GDA2020 MGA Zone 50
Scale: 1:10,000

Date: 29/04/2025
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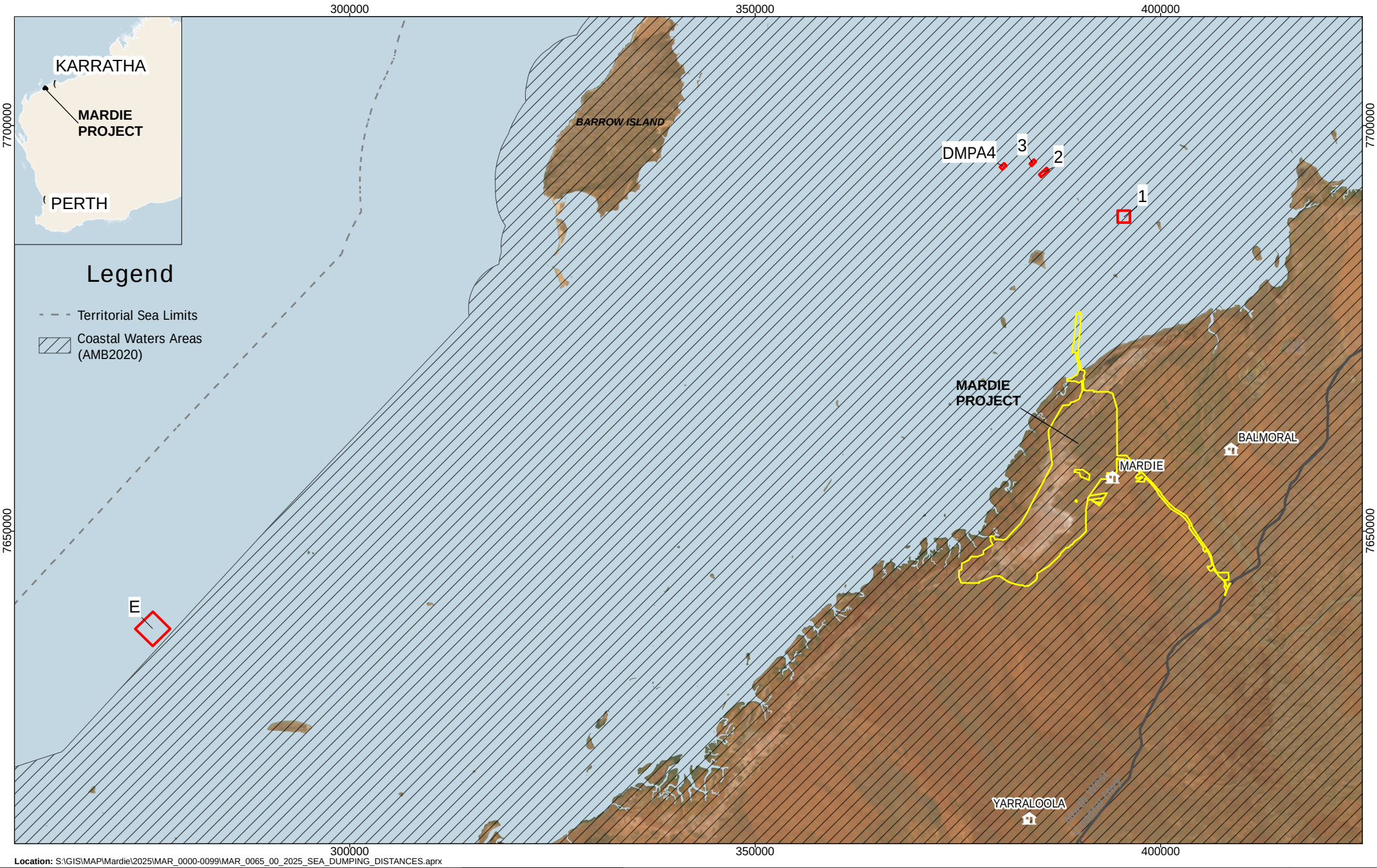
OPTIMISED MARDIE PROJECT

Onshore spoil disposal locations and *Minuria* sp. Onslow (A.J. Perkins & M. Henson AJP WA167) records

Figure: 6



Location: S:\GIS\MAP\Mardie\2025\MAR_0000-0099\MAR_0065_00_2025_SEA_DUMPING_DISTANCES.aprx

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OPTIMISED MARDIE PROJECT
Offshore spoil disposal locations investigated

Figure: 7

8.2 ASPECTS

Aspect 1: Sedimentation, smothering and increased turbidity associated with Offshore Spoil Disposal	
Type	Direct sedimentation, smothering and increased turbidity associated with Offshore Spoil Disposal
Description	The Revised Proposal is to dispose of up to an estimated 355,000 m^3 (including 10% over dredge) of capital dredge material, and disposal of maintenance dredge material, into DMPA4. The disposal will result in the direct loss of BCH where the material is dumped, and indirect impacts to surrounding BCH due to sedimentation.
Characterisation	Direct permanent loss of up to 4.6 ha of sparse to moderate filter feeders on unconsolidated sediment and up to 25.7 ha of sparse to moderate filter feeder on low profile reef with sand veneer within DMPA4. Indirect permanent loss of up to 355 ha of sparse to moderate filter feeders within the ZoHI, and indirect recoverable impact of up to 720 ha of sparse to moderate filter feeders within the ZoMI.
Elements and Activities Sources	Physical Elements (*Offshore Dredge Spoil Disposal*) Physical Elements (*Zone of High Impact*)

Aspect 2: Hydrocarbon or dredge spoil spills	
Type	Hydrocarbon or dredge spoil spills
Description	Offshore dredge spoil disposal will require vessel movements between the dredge channel and DMPA4.
Characterisation	Impacts associated with the potential spillages of dredge spoil or hydrocarbon spills from vessels travelling between the dredge channel and DMPA4.
Elements and Activities Sources	Physical Elements (*Offshore Dredge Spoil Disposal – vessel movements*)

Aspect 3: Increased risk of IMP translocation	
Type	Increased risk of spreading IMPs
Description	Offshore dredge spoil disposal will require vessel movements between the dredge channel and DMPA4.
Characterisation	Increased risk of IMP translocation from dredging vessels.
Elements and Activities Sources	Physical Elements (*Offshore Dredge Spoil Disposal*)

Aspect 4: Impacts to Marine Fauna during Offshore Spoil Disposal	
Type	Impacts to Marine Fauna during disposal of dredge spoil
Description	The Revised Proposal is to dispose of up to an estimated 355,000 m^3 (including 10% over dredge) of capital dredge material, and disposal of maintenance dredge material, into DMPA4. The disposal of the dredge material may directly impact marine fauna that are present within DMPA4 at the time of disposal.
Characterisation	Disturbance, injury or death of marine fauna as a result of disposal operations.
Elements and Activities Sources	Physical Elements (*Offshore Dredge Spoil Disposal*)

Aspect 5: Vessel Strike	
Type	Vessel Strike
Description	Offshore dredge spoil disposal will require vessel movements between the dredge channel and DMPA4.
Characterisation	Injury or death of marine fauna due to vessel movement (strike);
Elements and Activities Sources	Physical Elements (*Offshore Dredge Spoil Disposal*)

Aspect 6: Underwater Noise	
Type	Underwater Noise from vessel movements and disposal of dredge material
Description	Offshore dredge spoil disposal will require vessel movements between the dredge channel and DMPA4, and the dumping of dredge material within DMPA4.
Characterisation	Injury or alteration of behaviour in marine fauna from underwater noise.
Elements and Activities Sources	Physical Elements (*Offshore Dredge Spoil Disposal*)

Aspect 7: Artificial Light Emissions	
Type	Artificial Light Emissions
Description	Offshore dredge spoil disposal will require vessel movements between the dredge channel and DMPA4, which will require lighting at night. Construction and operation of the airstrip will require vehicle and aircraft movements, which will require lighting at night, however, night flights are unlikely and the airstrip will only be used for emergencies.
Characterisation	Alteration of behaviour from artificial light from vessels during dredging and disposal, and vehicles/aircrafts during construction and operation of the airstrip.
Elements and Activities Sources	Physical Elements (*Offshore Dredge Spoil Disposal*) Physical Elements (*Terrestrial Development Envelope*)

Aspect 8: Decreased Water Quality	
Type	Decreased Water Quality
Description	The Revised Proposal is to dispose of up to an estimated 355,000 m^3 (including 10% over dredge) of capital dredge material, and disposal of maintenance dredge material, into DMPA4. The disposal will result in a reduction in water quality due to sedimentation in the water column.
Characterisation	Direct impacts on marine water quality.
Elements and Activities Sources	Physical Elements (*Offshore Dredge Spoil Disposal*) Physical Elements (*Zone of Impact)*

Aspect 9: Vehicle Strike	
Type	Vehicle Strike
Description	Construction of the airstrip upgrade will require vehicle movements.
Characterisation	Injury or death of terrestrial fauna due to vehicle movement (strike);
Elements and Activities Sources	Physical Elements (*Terrestrial Development Envelope*)

Aspect 10: Increased risk of spread of weeds	
Type	Increased risk of spreading weeds
Description	Construction of the airstrip upgrade will require vehicle movements.
Characterisation	Increased risk of weed translocation from vehicles.
Elements and Activities Sources	Physical Elements (*Terrestrial Development Envelope*)

Aspect 11: Aircraft and/or Airstrip construction noise	
Type	Noise Emissions
Description	Construction and operation of the airstrip will require vehicle and aircraft movements.
Characterisation	Injury or alteration of behaviour in terrestrial fauna from noise produced during construction and operation of the airstrip.
Elements and Activities Sources	Physical Elements (*Terrestrial Development Envelope*)

Aspect 12: Impacts to groundwater aquifers	
Type	Impacts to groundwater aquifers due to abstraction
Description	The abstraction of 0.7 GL/yr of groundwater could result in the reduction of aquifer levels and volume if not sustainably abstracted.
Characterisation	Potential reduction in aquifer levels and volume.
Elements and Activities Sources	Operational Elements (*Groundwater Abstraction*)

8.3 MITIGATIONS

Mitigation 1: Dredge and Spoil Disposal Management Plan	

Description	A DSDMP has been prepared to mitigate and manage the environmental impacts on BCH, MEQ and Marine Fauna from both the Approved Proposal dredging and Revised Proposal spoil disposal activities (O2 Marine, 2025; Attachment 3). The DSDMP will be implemented to ensure residual impacts to BCH, MEQ and Marine Fauna as a result of the Revised Proposal are not significant. Avoidance and mitigation measures within the DSDMP relevant to the Revised Proposal include:
	• Pre- and post-dredge bathymetric surveys;
	• Scheduling activities to avoid key ecological windows (1 October - 31 March);
	• Marine water quality monitoring;
	• BCH monitoring;
	• Monitoring and management zones;
	• Noise management protocols and procedures:
	  ○ When in transit, all Proposal vessels will be operated in accordance with EPBC Regulations 2000 - Part 8, Division 8.1 (Interacting with Cetaceans);
	  ○ Minimise the duration of run-time for vessel engines, thrusters and dredging vessels by avoiding stand-by or running mode to the degree practical and consistent with safe operations;
	• Dredge spoil or vessel strike avoidance strategies:
	  ○ Dedicated Marine Fauna Observers (MFOs) on all dredge vessels during humpback whale season (June to November) including transit to Spoil Ground DMPA4 and at DMPA4 for the disposal operations;

Mitigation 1: Dredge and Spoil Disposal Management Plan	
	○ Report any injured or deceased marine fauna (whale, dugong, turtle, manta ray or dolphin, fish) or indications of coral mass spawning; ○ Vessels to operate at a safe speed to avoid interaction with marine fauna at all times within Proposal boundaries. Vessels of at least 20 m in length will not exceed the maximum speed of 8 knots within port operational waters and 12 knots outside port operational waters. All vessels operated for the Proposal will not exceed 8 knots within 500 m of any identified cetacean, dugong, or marine turtle; • Chemical/oil spill controls: ○ All vessel equipment to be designed and operated to prevent spills and leaks through the provision of in-built safeguards such as, but not limited to, relief valves, overflow protection, and automatic and manual shut-down systems; • Recording and reporting requirements; • IMP control measures: ○ All relevant vessels should comply with Commonwealth Australian Ballast Water Management Requirements (DAWE, 2020) and the National Biofouling Management Guidelines for commercial vessels (MPSC, 2018); and ○ All vessels that mobilise to DMPA4 are required to complete the WA 'Vessel Check' risk assessment (DPIRD, 2021).
Related aspects:	Aspects 1 - 8.

Mitigation 2: Construction Environmental Management Plan	
Description	A Construction Environmental Management Plan (CEMP) has been prepared for the Approved Proposal to mitigate and manage the environmental impacts from the Approved Proposal construction activities (BCI, 2024). Mardie Minerals will update the CEMP to include the airstrip upgrade, which will be implemented to ensure residual impacts to environmental values as a result of construction of the Revised Proposal are not significant. Avoidance and mitigation measures that will be detailed within the CEMP relevant to the Revised Proposal include (but are not limited to): • Training and competency requirements, including inductions, task-specific training/assessment, environmental awareness, and environmental qualifications; • Communication between relevant parties; • Recording and reporting requirements; • Implementation of associated management plans; • Dust minimisation strategies; • Mapping and maintaining accurate spatial records; • Implementation of vehicle speed limits; and • Waste management.
Related aspects:	Aspects 7, 9-11

Mitigation 3: Groundwater Licences	
Description	Mardie Minerals hold approved Groundwater Licences for the groundwater abstraction in this Revised Proposal (GWL205621 and GWL211434). The amendment to GWL205621 currently being assessed to increase groundwater abstraction by an additional 0.05 GL/yr is expected to be appropriately managed under the existing licence requirements, given the increase is minor.
Related aspects:	Aspect 12: Impacts to groundwater aquifers

8.4 Environmental Assessments

8.4.1 Legislative Context

EP Act- Part IV

Part IV of the EP Act makes provisions for the EPA to undertake an Environmental Impact Assessment (EIA) of significant proposals, strategic proposals and land use planning schemes.

The EPA uses environmental principles, factors and associated objectives as the basis for assessing whether a proposal or land use planning scheme's impact on the environment is acceptable. The environmental principles, factors and objectives, therefore, underpin the EIA process.

The Approved Proposal was originally referred in 2018 as the Mardie Project, which was assessed by the EPA under Part IV of the EP Act at the level of Public Environmental Review (EPA Assessment No. 2167). Implementation of the Mardie Project was approved on 24 November 2021 via MS1175. Mardie Minerals subsequently referred the Optimised Mardie Project to the EPA as a significant amendment to the Mardie Project, which was assessed at the level of Public Environmental Review (EPA Assessment No. 2336). Implementation of the Optimised Mardie Project (Approved Proposal) was approved via MS1211 on 19 October 2023, which superseded MS1175.

This Revised Proposal is to include offshore dredge spoil disposal, an expanded TDE, and groundwater abstraction. This Revised Proposal is considered to be significant due to the inclusion of offshore dredge spoil disposal as a new activity, and as such requires assessment under Part IV of the EP Act (via this S40AA Referral).

EP Act- Part V

No approval under Part V of the EP Act is required for the new activities proposed in the Revised Proposal.

Mining Act

Approval under the Mining Act is required for the development of the groundwater abstraction bores and use of the bore for water supply. This approval has been obtained under REG ID 111421 and 114153, which were submitted and approved by DEMIRS prior to the additional 0.5 GL/yr licence being applied for and granted (GWL211434), and the amendment application to GWL205621 (currently under assessment) for an additional 0.05 GL/yr. This additional groundwater abstraction will be included in a future revision of a consolidated Mining Proposal.

EPBC Act

The Approved Proposal has been referred in two stages. The Mardie Project was assessed by DCCEEW and approved in January 2022 (EPBC 2018/8236). The Optimised Project was referred to DCCEEW in April 2022 and approved in September 2024 (EPBC 2022/9169). In October 2024, DCCEEW authorised the decision to amend the original EPBC 2018/8236 conditions to mirror the conditions of EPBC 2022/9169.

According to the Significant Impact Guidelines 1.1 (DotE, 2013), the offshore dredge spoil disposal aspects of this Revised Proposal have the potential to impact listed threatened and migratory species and therefore requires referral under the EPBC Act. An EPBC Referral was submitted to DCCEEW on 15 November 2024 for the offshore dredge spoil disposal component of this Revised Proposal (EPBC 2024/10054).

The minor expansion of the TDE is unlikely to require referral under the EPBC Act, as no additional clearing is proposed, and the expanded areas do not contain any new fauna habitats. Mardie Minerals will conduct a self-assessment to inform the decision to refer under the EPBC Act.

Sea Dumping Act

A permit under the Sea Dumping Act is required to undertake sea dumping activities in the marine environment. Mardie Minerals has submitted an application for a permit under the Sea Dumping Act to use DMPA4 as a Spoil Disposal area. This application is currently under assessment by DCCEEW.

RIWI Act

A groundwater licence is required under the RIWI Act to undertake groundwater abstraction activities in WA. Mardie Minerals have obtained groundwater licences for the Approved Proposal, with an allowable abstraction limit of 0.65 GL/yr across the two licences (GWL205621 and GWL211434). Mardie Minerals has submitted an amendment application for GWL205621 for an additional 0.05 GL/yr, which is currently under assessment. Once this has been approved, Mardie Minerals will have a total allowable abstraction limit of 0.7 GL/yr across the two licences (GWL205621 and GWL211434).

8.4.2 Local And Regional Context

The Approved Proposal is located in Mardie, approximately 80 km south-west of Karratha in WA. Groundwater abstraction proposed in this Revised Proposal will take place within the boundaries of the Approved Proposal., with the exception of bores located in the proposed expansion of the TDE.

DMPA4 is 30.3 ha in size and is located in the Pilbara coastal zone of WA State marine waters, approximately 25 km (13.5 NM) offshore from the Mardie port, 10.5 km (5.7 NM) northwest of Sholl Island and 116 km (63 NM) northeast of Onslow, WA (Refer to Figure 1).

The seafloor in the nearshore coastal zone (i.e., shoreward of DMPA4) is predominantly flat with the exception of numerous small islands, which form a semi-enclosed barrier. This coastal platform slopes mildly seaward with turbid waters (particularly to 10 m and deeper in the north) and increasing tidal influence from south to north. Outside of the island chain, the bathymetry deepens and waters are much less influenced by turbidity (O2 Marine, 2024a; Attachment 2).

Water depths at DMPA4 are around 20 m with a depth range of less than 2 m. DMPA4 contains a largely featureless seafloor comprised of unconsolidated sediments with no visual evidence of hard substrate, suggesting an absence of any exposed reef systems in the survey area. Subtle ridge features (<40 cm elevation) can be observed at several locations across the area. While the hydrographic data only provided limited evidence, it is probable that much area is underlain by

pavement reef that is covered by a thin veneer of unconsolidated sediments (O2 Marine, 2024a; Attachment 2).

The closest Marine Protected Area to DMPA4 is the Great Sandy Island Nature Reserve (Sholl Island), which is located approximately 10.5 km (5.7 NM) to the southeast.

8.5 Environmental Factor Assessments

Environmental Factor Assessments	
Air Quality:	No
Benthic communities and habitats:	**Yes**
Coastal processes:	No
Flora and vegetation:	**No – justification provided**
Greenhouse gas emissions:	No
Human health:	No
Inland waters:	**No – justification provided**
Landforms:	No
Marine environmental quality:	**Yes**
Marine fauna:	**Yes**
Social surroundings:	**No – justification provided**
Subterranean fauna:	No
Terrestrial environmental quality:	No
Terrestrial fauna:	**No – justification provided**

8.5.1 Benthic Communities and Habitats

Description of receiving environment

The information in this section has been sourced from O2 Marine (2024a; Attachment 2) unless stated otherwise.

O2 Marine was engaged to undertake a bathymetric survey, a BCH investigation, and sediment sampling of DMPA4. The field survey was conducted over a period of seven days from 20 – 26 September 2024. The purpose of this investigation was to determine the suitability of DMPA4 as a spoil disposal site and to inform this Referral and other related documents/approvals.

The key objectives of the DMPA4 investigation were to:

1. Undertake a Multibeam Eco Sounder (MBES) survey to provide bathymetric and backscatter data;
2. Undertake a Side Scan Sonar (SSS) survey within DMPA4 to provide backscatter data to help inform BCH classification;
3. Undertake ground-truthing (via towed video transects) to identify key BCH and validate SSS and backscatter data;
4. Undertake sediment sampling within DMPA4 (reported in Appendix A of Attachment 2 (O2 Marine, 2024a)); and
5. Report on bathymetric and BCH results (reported in Attachment 2 (O2 Marine, 2024a)).

The field survey was conducted within the Detailed Study Area (encompassing DMPA4) and the predicted zones of impact (Refer to Figure 8). MBES, backscatter and SSS surveys were undertaken within the Detailed Study Area to allow for detailed mapping of the broader area. Towed video survey was conducted across the Detailed Study Area to ground-truth the MBES, backscatter and SSS data, and additionally collected across the predicted zones of impact (ZoMI, ZoHI) to characterise BCH within these areas.

Further detail about the survey effort and methods are provided in Attachment 2 (O2 Marine, 2024a). The findings of this investigation relevant to BCH are summarised in the sections below.

Figure 8: DMPA4, the Detailed Study Area, and the predicted zones of impact that were surveyed (O2 Marine, 2024a)

Assemblage

Ground-truthing revealed a diversity of benthic assemblage types inhabiting sandy sediments across DMPA4, and predicted zones of impact (Refer to Table 3 and Figure 9). The dominant classes of BCH observed in underwater video were Sparse to Low Cover Mixed Assemblage (~49%) and Moderate Cover Mixed Assemblage (~23%). Mixed Assemblage classes were filter feeder dominant, comprising of ascidians (*Polycarpa sp.*, *Pyura sp.*), sponges (species unidentified), soft (*Alcyonacea*, *Sinularia sp.*) and hard corals, gorgonians (*Juncella fragilis*) and several unidentified species of macroalgae.

Other assemblages of BCH that were observed less frequently included High Cover Mixed Assemblage (~8.8%), Bare Sediment (~8.4%), Sparse to Low Cover Macroalgae (~7.7%). The remaining classes collectively comprised less than 5% of observations, including Sparse to Low Cover Filter Feeders (~2.3%), Moderate Cover Filter Feeders (~0.2%) and Moderate and Sparse to Low Cover Seagrass (~0.3%, <0.1%). Seagrasses were small ephemerals (*Halopola ovalis*) with low to moderate cover, as were macroalgae (e.g. *Padina*).

While BCH classes appeared clustered in areas, there were no obvious patterns in the distribution of any particular assemblage type in towed video data. The lack of clear patterns in BCH distribution reflects a similar lack of apparent feature in the SSS or backscatter data, suggesting the seafloor is comprised of a homogenous substrate.

Table 3: Towed video BCH classifications in DMPA4 (O2 Marine, 2024a)

BCH Classification	Description	Points classified	Percentage (%)
Sparse to Low Cover Mixed Assemblage	Sparse to low cover (3 – 10%) mixed assemblage on sand with shell fragments. Mixed macroalgae, filter feeders, ascidians (*Polycarpa sp.*, *Pyura sp.*) sponges, hard corals (*Sinularia sp.*), *Alcyonacea*, gorgonians (*Juncella fragilis*).	4,536	49.1
Moderate Cover Mixed Assemblage	Moderate cover (10 – 25%) mixed assemblage on sand with shell fragments. Mixed macroalgae, filter feeders, ascidians (*Polycarpa sp.*, *Pyura sp.*) sponges, hard corals (*Sinularia sp.*), *Alcyonacea*, gorgonians (*Juncella fragilis*).	2,139	23.1
High Cover Mixed Assemblage	High cover (25 – 75%) mixed assemblage on sand with shell fragments. Mixed macroalgae, mixed filter feeders (Ascidians (*Polycarpa sp. Pyura sp.*), Sponge, hard corals (*Sinularia sp.*), *Alcyonacea*, *Crinoidea spp.*, gorogonians (*Juncella fragilis*).	817	8.8
Bare Sediment	Bare sediment (sand with shell fragments). No ripple features/bioturbation.	777	8.4
Sparse to Low Cover Macroalgae	Sparse to low coverage (3 – 10%) of macroalgae (including *Padina sp.*) on sand with shell fragments.	714	7.7
Sparse to Low Cover Filter Feeders	Sparse to low coverage (3 – 10%) of filter feeders on sand with shell fragments.	211	2.3
Moderate Cover Seagrass	Moderate coverage (10 - 25%) of ephemeral seagrass (*Halophila ovalis*) on sand with shell fragments.	28	0.3
Moderate Cover Filter Feeders	Moderate coverage (10 - 25%) of filter feeders on sand with shell fragments.	17	0.2
Sparse to Low Cover Seagrass	Sparse to low coverage (3 -10%) of ephemeral seagrass (*Halophila ovalis*) on sand with shell fragments.	3	<0.1
	Total	**7,392**	**100**

Distribution

Two mapping classifications were assigned to DMPA4, as shown in Figure 10 and Table 4

Overall, the towed video transects indicated a heterogenous pattern of BCH types and cover, not revealing any clear correlation with observable changes in bathymetry or substrate type. BCH types and levels of cover are likely to be more closely associated with minor differences in substrate form and the depth of unconsolidated sediments. Despite the observed heterogeneity of BCH types and cover across the area, filter feeders were largely dominant throughout. As such, DMPA4 can be characterised by a sparse to moderate cover mixed assemblage predominantly comprised of sessile filter feeders (including soft corals, gorgonians, sponges, hydroids, and ascidians), alongside varying covers of subdominant species such as macroalgae, hard corals, and ephemeral seagrass. While other classes and densities of BCH were noted within the survey area, it was not feasible to further refine the classification or accurately represent the level of heterogeneity. Analysis of elevation and terrain in the MBES data allows delineation of areas unconsolidated sediments (~15.2%) from areas of low-profile reef covered by a sediment veneer (~84.8%) (Table 4).

Table 4: BCH Classifications within DMPA4 (O2 Marine, 2024a)

BCH Classification	Description	Area (ha)	Area (%)
Sparse to Moderate Filter Feeders on Low Profile Reef with Sand Veneer	Mixed assemblage dominated by sessile filter feeders (including soft corals, gorgonians, sponges, hydroids, and ascidians) on low-profile reef with sand veneer. Predominantly sparse to moderate cover, with some isolated areas of high cover. Subdominant biota includes sparse to low covers of macroalgae, hard corals, and ephemeral seagrass	25.65	84.8
Sparse to Moderate Filter Feeders on Unconsolidated Sediment	Mixed assemblage dominated by sessile filter feeders (including soft corals, gorgonians, sponges, hydroids, and ascidians) on unconsolidated sandy sediment. Predominantly sparse to moderate cover, with some isolated areas of high cover. Subdominant biota includes sparse to low covers of macroalgae, hard corals, and ephemeral seagrass.	4.61	15.2
	Total	**30.26**	**100**

Towed video transects from across the predicted zones of impact reveal a continuation of the filter feeder-dominant habitat observed within DMPA4 and the Detailed Study Area. The spatial distribution of low-profile reef features could not be mapped with the same level of confidence as in the Detailed Study Area, however, observations of similar biota and levels of cover infer a similar mix of substrate types, including unconsolidated sediment, and sand-veneered low-profile reef. As such, 'Sparse to Moderate Filter Feeders' was assigned as the classification for the predicted zones of impact (Table 5).

Table 5: BCH classification assigned to predicted zones of impact (O2 Marine, 2024a)

BCH Classification	Description
Sparse to Moderate Filter Feeders	Mixed assemblage dominated by sessile filter feeders (including soft corals, gorgonians, sponges, hydroids, and ascidians) on low-profile reef with sand veneer. Predominantly sparse to moderate cover, with some isolated areas of high cover. Subdominant biota includes sparse to low covers of macroalgae, hard corals, and ephemeral seagrass.

Overview

Bathymetric data indicates minimal depth variation of less than 2 m (ranging from -20.2 m to -21.6 m) across the Detailed Study Area. Several small ridges, with approximately 0.3 m elevation changes, suggest the potential existence of low-profile reefs (limestone pavement) beneath the sandy substrate. This possibility is further supported by the presence of certain organisms which typically require hard substrates, such as hard corals and macroalgae (Hubbard and Scaturo, 2005). Low-profile reefs are recognised as significant features that support various marine organisms by providing hard substrates for filter feeders like sponges and soft corals. Surveys conducted by the University of WA (UWA, 2009) found that sand-inundated reefs generally supported less dense sponge assemblages, aligning with the dominant observation of sparse to low cover assemblages throughout DMPA4. Since only sand was observed in the towed video transects, the presence of low-profile reefs can only be inferred. However, based on the observed terrain and existing knowledge of the prevalence of this type of morphology in this region (Scott et al., 2006; UWA, 2009), this is likely accurate.

At a fine scale (metres), the BCH types and densities across towed video transects displayed a reasonably heterogenous pattern not showing any clear correlation with detectable changes in bathymetry or boundaries in assemblage extent, therefore BCH types and densities may be more closely associated with minor differences in substrate form and the depth of unconsolidated sediments. Overall, however, DMPA4 can be characterised as a relatively homogenous habitat, supporting a sparse to moderate cover mixed assemblage predominantly comprised of sessile filter feeders (including soft corals, gorgonians, sponges, hydroids, and ascidians), alongside varying cover of subdominant species such as macroalgae, hard corals, and ephemeral seagrass. Such sessile filter feeder assemblages are typical of sand-veneered and exposed pavements, which are prevalent on the inner North West Shelf and represent one of the most widespread BCH types in the Pilbara region (Chevron, 2014). Whilst the spatial distribution of unconsolidated sediment and sand-veneered low-profile reef could not be mapped within the predicted zones of impact, towed video collected across these areas reveals the continued presence of filter-feeder dominant assemblages with predominantly sparse to moderate levels of cover.

Figure 9: Towed video data across DMPA4 and the predicted zones of impact (O2 Marine, 2024a)

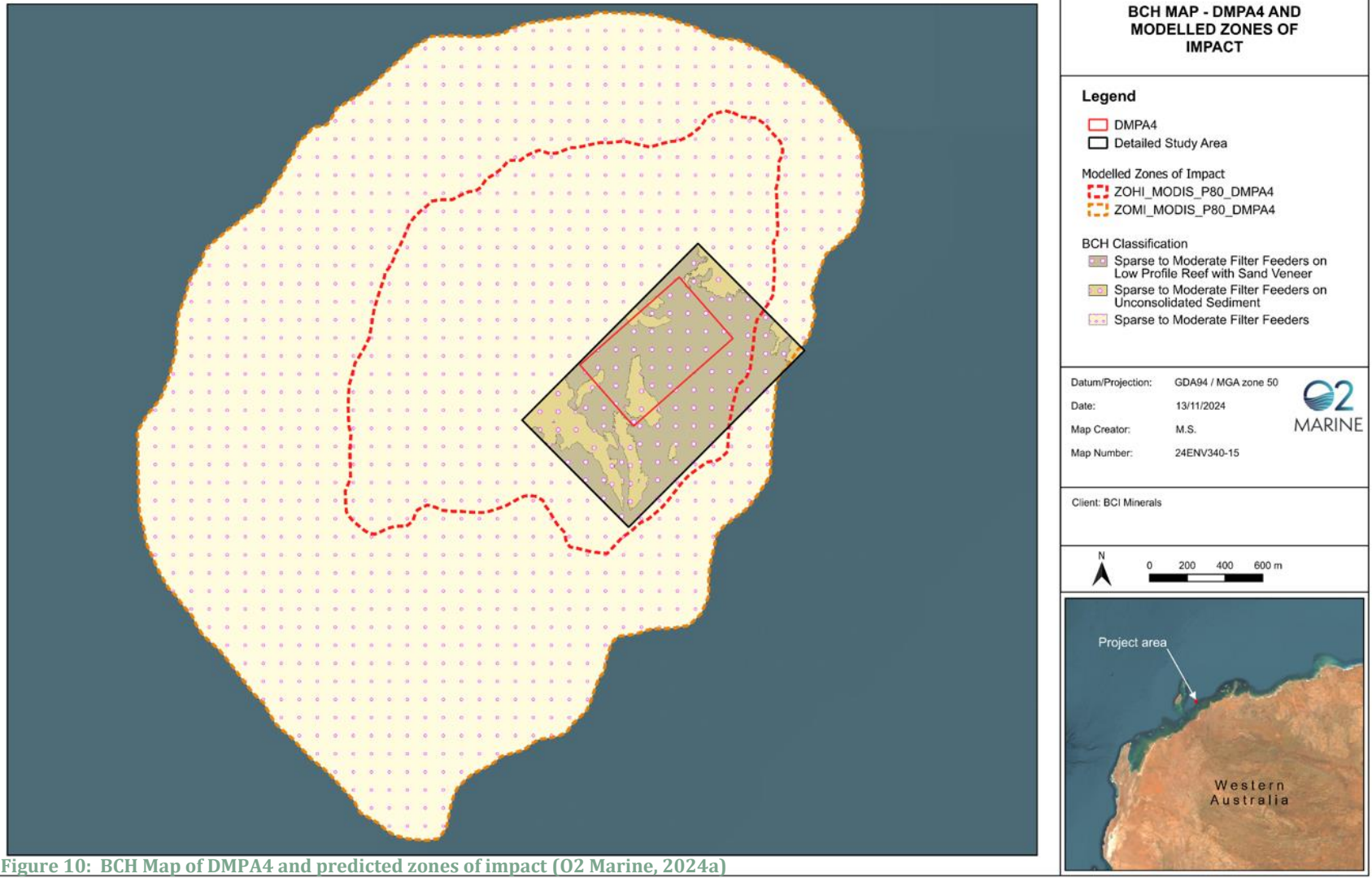

Figure 10: BCH Map of DMPA4 and predicted zones of impact (O2 Marine, 2024a)

Potential Key Environmental factor (Yes/No)

Yes

Policy & Guidance

EPA Objective

To protect BCH so that biological diversity and ecological integrity are maintained.

Key EPA Documents:

- Statement of Environmental Principles, Factors, Objectives and aims of EIA (EPA, 2023a);
- Statutory Guidelines for Mine Closure Plans (DMIRS, 2023);
- EIA (Part IV Divisions 1 and 2) Administrative Procedures (EPA, 2024a);
- EIA (Part IV Divisions 1 and 2) Procedures Manual (EPA, 2024b); and
- Instructions on how to prepare EP Act Part IV Environmental Management Plans (EPA, 2024c).

Relevant EPA Factor Guidelines:

- Environmental Factor Guideline – Benthic Communities and Habitats (EPA, 2016a);
- Technical Guidance – Protection of Benthic Communities and Habitats (EPA, 2016b); and
- Technical Guidance – EIA of marine dredging proposals (EPA, 2021a).

Application of Policies and Guidance:

The S40AA Referral has been prepared by utilising the advice contained within the 'Key EPA Documents' listed above.

Surveys, studies and consultation for this factor have been conducted in accordance with the guidance identified above.

Environmental Impacts

The Revised Proposal includes the disposal of up to 355,000 m^3 (including 10% over dredge) of capital dredge material, and the disposal of maintenance dredge material, into DMPA4. The offshore disposal will result in the direct loss of BCH where the material is dumped, as well as the permanent or temporary loss of BCH within areas affected by sedimentation.

Modelling results show that the plume generated by disposal of sediments at the DMPA4 site result in both the ZoMI and ZoHI plumes being confined to deep waters (>16 m). The plumes are predicted to extend from the DMPA4 in a general northeast-southwest direction, which mimics the movement of the tidal flow (averaging a 1-1.5 knot velocity) in this area (Baird, 2024a; Attachment 6).

The overall map of the dredge spoil plume impact area for DMPA4 that exceeds the WA Marine Science Institute (WAMSI) thresholds was determined using 80th percentile (P80) background suspended sediment concentration (SSC) and is shown in Figure 4 of Attachment 6 (Baird, 2024a). This presents the ZoMI and ZoHI for the representative model run period based on the release of dredge spoil from a 1,200 m^3 capacity split hull hopper barge. DMPA4 has an area of 30.3 ha, and the dumping is predicted to result in a maximum ZoHI (P80) of 355 ha (surrounding but excluding DMPA4) and ZoMI (P80) of 720 ha (surrounding but excluding the ZoHI and DMPA4). It is noted

that the ZoHI/ZoMI area differs slightly from the Baird report, due to Baird's use of an older coordinate reference system for calculating areas.

Potential direct and indirect impacts to BCH due to offshore dredge spoil disposal are summarised below.

Direct Impacts:

- Direct permanent loss of up to 4.6 ha sparse to moderate filter feeders on unconsolidated sediment within DMPA4; and
- Direct permanent loss of up to 25.7 ha of sparse to moderate filter feeder on low profile reef with sand veneer within DMPA4.

Indirect Impacts:

- Indirect permanent loss of up to 355 ha of sparse to moderate filter feeders within the ZoHI;
- Indirect recoverable impact of up to 720 ha of sparse to moderate filter feeders within the ZoMI; and
- Unplanned impacts such as reduction in BCH quality as a result of hydrocarbon or dredge spoil spills, or IMPs.

Assessment of Offsets

N/A

Application of Mitigation Hierarchy

Mardie Minerals has mitigated the potential impacts to BCH according to the mitigation hierarchy; avoid, minimise, rehabilitate, offset. Avoidance and mitigation measures are detailed within a DSDMP (O2 Marine, 2025; Attachment 3). The DSDMP will be implemented to ensure residual impacts to BCH as a result of the Revised Proposal are not significant. Avoidance and mitigation measures within the DSDMP relevant to BCH include:

- Pre- and post-dredge bathymetric surveys;
- Marine water quality monitoring;
- BCH monitoring;
- Monitoring and management zones;
- Chemical/oil spill controls:
    - All vessel equipment to be designed and operated to prevent spills and leaks through the provision of in-built safeguards such as, but not limited to, relief valves, overflow protection, and automatic and manual shut-down systems;
- Recording and reporting requirements;
- IMP control measures:
    - All relevant vessels should comply with Commonwealth *Australian Ballast Water Management Requirements* (DAWE, 2020) and the *National Biofouling Management Guidelines for commercial vessels* (MPSC, 2018); and
    - All vessels that mobilise to DMPA4 are required to complete the WA 'Vessel Check' risk assessment (DPIRD, 2021).

Assessment and Significance of Residual Impacts

DMPA4 was chosen because there are limited BCH values within it and the predicted ZoMI/ZoHI, with the BCH types classified are represented broadly throughout the region.

Mardie Minerals will implement industry best-practice mitigation measures to minimise the direct and indirect impacts to BCH, which are discussed in the section above. These monitoring and management measures will minimise the likelihood of impacts such that they are no longer considered significant.

The mitigation actions required to minimise impacts to BCH from dredge material disposal activities are detailed within the DSDMP (O2 Marine, 2025; Attachment 3). The DSDMP implements a precautionary approach and includes the measures summarised in the section above.

Up to 121 ha of subtidal BCH is to be disturbed for the Approved Proposal, and indirect impacts are likely to occur within the dredging Zones of Influence (ZoI) (Preston Consulting, 2022). The Revised Proposal will impact up to an additional 385 ha (30.3 ha DMPA4 and 355 ha ZoHI) of subtidal BCH, and result in additional recoverable indirect impacts within the DMPA4 ZoMI. This equates to a total increase in cumulative impacts to BCH, for a total of up to 506 ha, comprising:

- 8 ha of filter feeder/macroalgae/seagrass BCH (no change);
- 8.3 ha of coral/macroalgae BCH (no change);
- 48.6 ha of bare 'unvegetated' substrate (no change); and
- 385 ha of sparse to moderate filter feeders (additional).

Disturbance to significant BCH habitat (coral, etc.) remains unchanged from the Approved Proposal. The BCH within DMPA4 and the predicted dredge spoil disposal zones of impact are not considered locally or regionally significant.

The residual impacts after mitigation are therefore predicted to be limited to:
Direct Impacts:

- Direct permanent loss of up to 4.6 ha sparse to moderate filter feeders on unconsolidated sediment within DMPA4; and
- Direct permanent loss of up to 25.7 ha of sparse to moderate filter feeder on low profile reef with sand veneer within DMPA4.

Indirect Impacts:

- Indirect permanent loss of up to 355 ha of sparse to moderate filter feeders within the ZoHI; and
- Indirect recoverable impact of up to 720 ha of sparse to moderate filter feeders within the ZoMI.

These residual impacts to BCH are not considered significant on a local or regional scale, given the lower value BCH to be impacted.

Environmental Outcomes

Potential impacts from the Revised Proposal on BCH will be managed through the implementation of the DSDMP (O2 Marine, 2025; Attachment 3) and through achieving the environmental outcomes listed for BCH in MS1211. However, it is noted that amendments to a few of the

environmental outcomes are required in order to address the Revised Proposal, which is described further in Section 10.3.

The Revised Proposal can be implemented while being consistent with the EP Act principles and achieving the EPA's objective to protect BCH so that biological diversity and ecological integrity are maintained.

8.5.2 Flora and Vegetation

Description of receiving environment

The information in this section relates to the airstrip portion of the expanded TDE, and has been sourced from Phoenix (2025; Attachment 8) unless stated otherwise. Details on survey methodology (incorporating desktop and field surveys) and general results are detailed in the Phoenix report (2025; Attachment 8), with the key findings detailed below. The groundwater bores and associated water pipelines in the expanded TDE are existing infrastructure and therefore no clearing will be required in those areas.

Vegetation

The airstrip study area is completely within the Horseflat Land System, with the Colluvium 38491 surface geology. The airstrip survey recorded 60 flora taxa, with the most prominent families being Fabaceae (17 taxa), Poaceae (13 taxa), and Asteraceae (7 taxa). The Fabaceae and Poaceae were also prominent in all previous surveys (refer to Table 4-1 of Attachment 8 (Phoenix, 2025)).

Regional scale pre-European vegetation mapping for WA (Beard et al., 2013; DPIRD, 2018) identified one vegetation association in the airstrip study area that is restricted to the Pilbara bioregion. This vegetation association is 601 (Mosaic: Sedgeland; various sedges with very sparse snakewood / Hummock grasslands, shrub steppe; kanji over soft spinifex). The total area of the pre-European vegetation association is 109,686.98 ha, whilst the current extent is 109,618.49 ha. At the sub-regional scale, the pre-European extent is 107,810.14 ha and the current extent is 107,741.65 ha. This demonstrates that at a regional and sub-regional scale, 99.94% of pre-European extent of association 601 remains. There has been no significant depletion of this vegetation association at any scale, and so the conservation status remains as being considered of least concern (Government of Western Australia, 2019).

There were three vegetation types defined for the airstrip study area based on the cluster analysis. All were grasslands with isolated shrubs, often with the Declared Pest and WoNS Mesquite prominent in the shrub layer (Figure 11). The cleared areas within the airstrip study area were roads and tracks, which encompassed 28.5 ha (8.7%) of the airstrip study area.

No vegetation types identified during the airstrip survey were considered significant. All vegetation types were considered abundant within and outside the airstrip study area.

Vegetation condition varied within the airstrip study area, as it encompassed all condition ratings from 'Completely Degraded' to 'Excellent' (Figure 12). The 'Completely Degraded' areas included roads and tracks. The 'Excellent' area, encompassing the smallest portion of the airstrip study area, was within the *NgExTa vegetation type. Whilst the *NgExTa vegetation type is described as having Mesquite within the shrub layer, this small patch (4.1 ha) was almost free of introduced species, including the Declared Pest and WoNS Mesquite. The majority of the airstrip study area

(78.7%) was in 'Poor' to 'Good' condition. 'Poor' rated areas consisted of 35.5% and 'Good' areas consisted of 43.2% of the airstrip study area. Weed infestation and grazing were disturbances identified within the quadrats.

Significant Flora and Vegetation

No threatened or priority flora were recorded within the airstrip study area. There were also no significant range extensions or potential new species encountered during the airstrip survey.

No threatened ecological communities or Priority Ecological Communities (PECs) were identified within the airstrip study area, with the closest PEC record identified in the airstrip desktop survey being the Horseflat Land System of the Roebourne Plains, approximately 34.7 km to the northeast. None of the vegetation types were identified as habitat for significant flora, role as a refuge, having a restricted distribution, or any additional criteria for measuring vegetation significance.

The likelihood of occurrence assessment deemed that all 48 significant species identified in the airstrip desktop survey were unlikely to occur, the majority of these records were discounted due to a lack of suitable habitat within the airstrip study area or the airstrip study area was outside the known distribution for the species.

Introduced Flora

The Declared Pest and WoNS, **Neltuma glandulosa x velutina* (Mesquite) was recorded in seven of the nine quadrats, with cover values reaching 5%. Due to its prevalence, it is one of the primary characteristics in the two most extensive vegetation types (*NgExTa and *NgTw). Mesquite in the Mardie region is allocated to the category 3 (C3) management category under the Western Australian Organism List, as categorised under the BAM Act (DPIRD, 2024). C3 management refers to organisms that should have some form of management applied that will alleviate the harmful impact of the organism, reduce the numbers, or distribution of the organism or prevent or contain the spread of the organism.

Overview

The most notable result of the airstrip flora survey was the presence and abundance of Mesquite, the Declared Pest and WoNS.

The airstrip survey found no significant flora or vegetation values within the airstrip study area. The majority of the airstrip study area showed a degree of disturbance caused by anthropogenic activities and therefore considered lower quality. Furthermore, the three vegetation types recorded were observed to be abundant outside the airstrip study area. These findings suggest that any clearing to the vegetation within the airstrip study area is unlikely to create any substantial threat to these vegetation types.

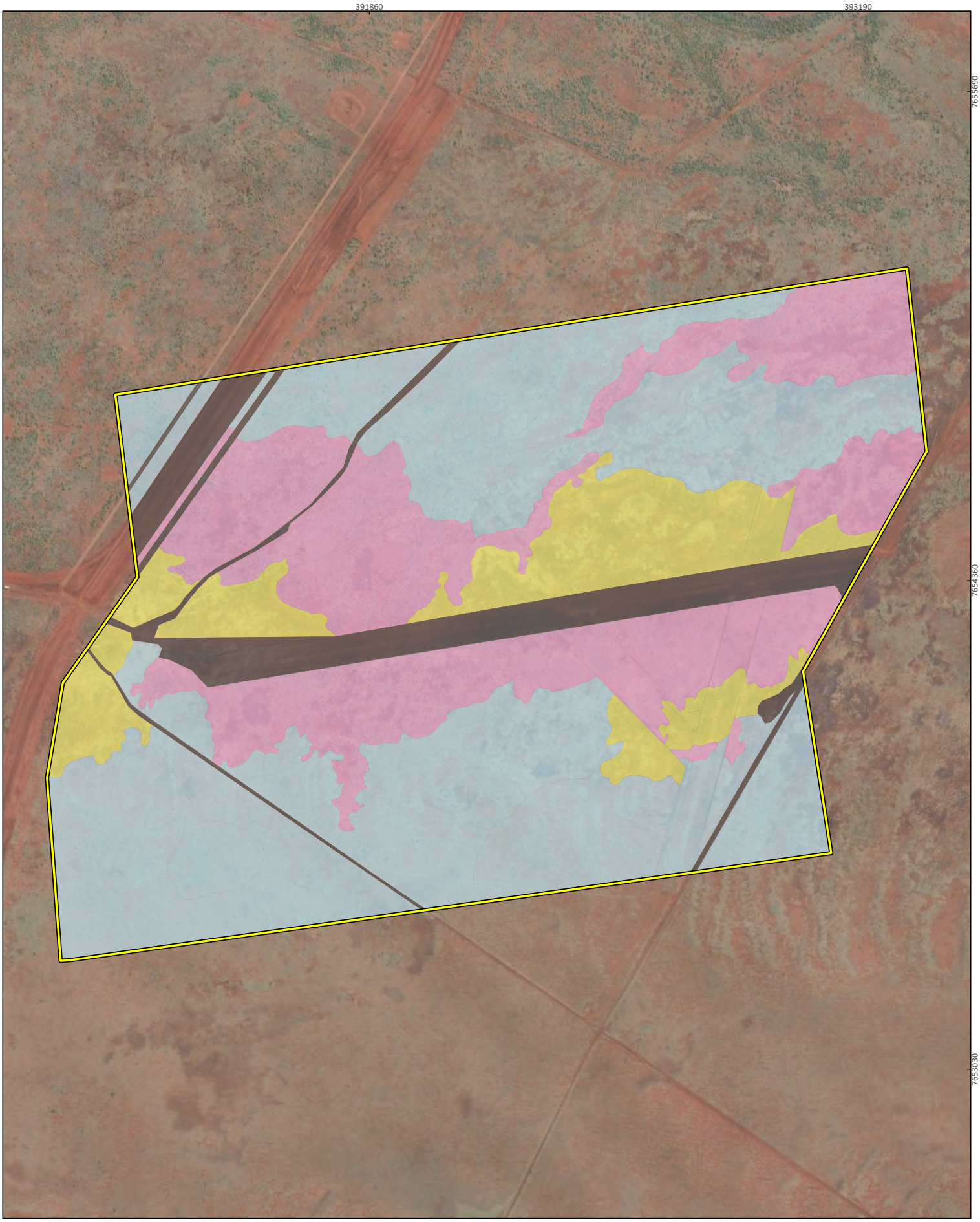

Figure 11: Vegetation types in the airstrip study area (Phoenix, 2025)

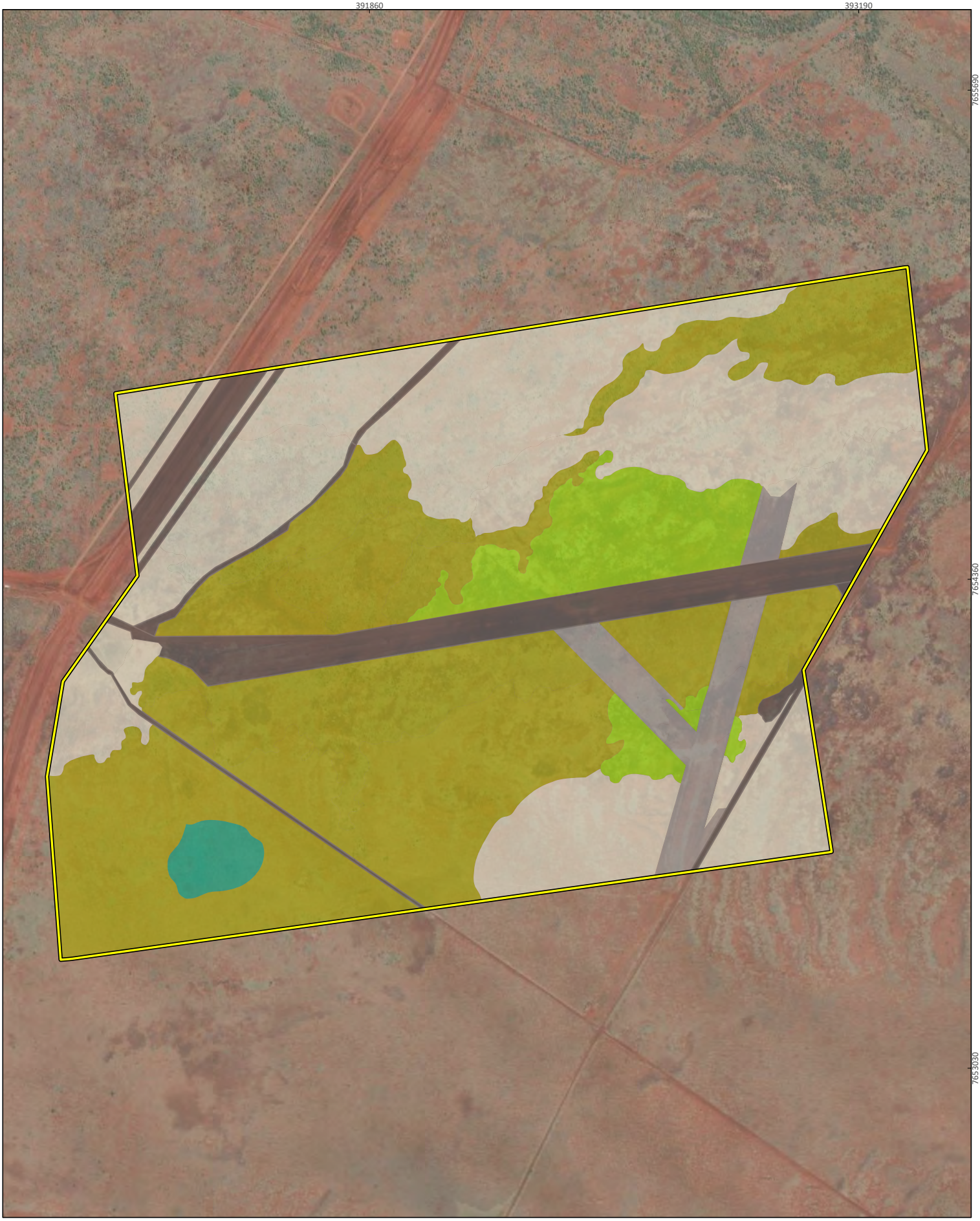

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Figure 12: Vegetation condition in the airstrip study area (Phoenix, 2025)

Potential key environmental factor

No

Justification

The Revised Proposal includes an expansion of the TDE, however, no additional vegetation clearing is proposed above the limits in the Approved Proposal.

The expanded TDE contains no significant flora or vegetation values, with the majority showing a degree a disturbance caused by anthropogenic activities and lower quality vegetation. Furthermore, the three vegetation types recorded within the airstrip study area were observed to be abundant in the surrounding region. These findings suggest that any clearing to the vegetation within the airstrip study area is unlikely to create any substantial threat to these vegetation types.

Mardie Minerals will implement industry best-practice mitigation measures to minimise the direct and indirect impacts to Flora and Vegetation. These monitoring and management measures will minimise the likelihood of impacts such that they are no longer considered significant.

8.5.3 INLAND WATERS

Description of receiving environment

The following information was sourced from the Approved Proposal Environmental Review Documents (Preston Consulting, 2020; Preston Consulting, 2022).

Hydrogeology

The information provided in this section has been sourced from Soilwater Group (2019).

The Approved Proposal is located on the northern portion of the Peedamullah Shelf, which forms the southeastern-most division of the Northern Carnarvon Basin, fringing the western margin of the Pilbara Craton. Sediments in the Peedamullah Shelf range in age from Ordovician to Pleistocene, with a total basin depth up to 5 km.

The area in which the Approved Proposal is located is generally underlain by a moderately to highly calcreted shelly calcarenite layer, likely equivalent to the regionally extensive Quaternary Bibra Limestone and older Tertiary Bundera Calcarenite. On the eastern side of the Supratidal Flats, the calcarenite is unconformably overlain by Pleistocene to Holocene aeolian, alluvial and colluvial sediments forming the current surface of the Onslow Land System. The calcarenite layer dips westerly under the Supratidal Flats (corresponding to the Littoral Land System), creating an undulating surface onto which the mudflats were deposited. In areas where the calcarenite layer outcrops the mudflat surface, or where significant secondary agglomeration of calcirudite and/or calcisiltite occurs, it anchors a thin veneer of eolian (dunal) sand.

The Supratidal Flats that occur extensively across area, on top of the calcarenite layer, have formed by prolonged deposition of terrestrial and marine sediments. Several large creek systems, including Peter Creek (catchment area 422 km^2), Gerald Creek (catchment area 153 km^2), Trevarton Creek (catchment area 172 km^2) and 6 Mile Creek (catchment area 164 km^2), discharge directly into the Supratidal Flats. Depending on the rainfall intensity within the various creek catchments, and the distance from the discharge point, the sediments making up the Supratidal

Flats will vary from heavy clays to sands to gravels, with each deposition event interfingering with the last deposition event.

The quality of the groundwater within the isolated gravel lenses in the Supratidal Flats and the underlying calcarenite aquifer is summarised below:

- Groundwater within the Supratidal Flats is generally neutral, whilst the groundwater in the calcarenite aquifer is more alkaline, likely reflecting the presence of the calcarenite. The majority of the alkalinity is in the form of Bicarbonate, with minor Carbonate alkalinity;
- Groundwater within the Supratidal Flats is hypersaline, with 2 – 5 times higher salinity than seawater; likely due to its sluggish permeability and resulting evaporative concentration of salts. The groundwater in the calcarenite aquifer is brackish to saline. All groundwater is generally classified as NaCl (sodium chloride) type, although groundwater in the Supratidal Flats may also be considered CaSO4 (calcium sulfate) type, likely reflecting the formation of gypsum;
- All groundwater in the development envelopes has low to very low nutrient levels; and
- All groundwater in the development envelopes has low levels of measured metals, although some bores contain elevated Zn (zinc) and minor Cd (cadmium) and Cu (copper).

Fortescue River Alluvial Aquifer

The information provided in this section has been sourced from AQ2 (2021).

The Fortescue River alluvial aquifer forms a delta which begins approximately 30 km inland at its narrowest point near North West Coastal Highway, fanning out to the northwest to be almost 25 km wide near the coast (Figure 13). The main channel of the Fortescue River meanders along the eastern boundary of the alluvial fan, incised into the valley sediments to a depth of 4 – 6 m.

General groundwater levels and flow direction within the Approved Proposal (Figure 13) have been estimated from historical and recent groundwater level measurements as no full concurrent set of levels has been located. Historical hydrographs sourced from DWER indicate significant long term and seasonal changes in groundwater level at most recorded bores within the range +/- 1 mAHD.

The alluvial aquifer consists of interbedded clay, gravel and calcrete overlying relatively impermeable limestone, sandstone and shale units. Basement rocks consist of Proterozoic chert and banded iron formation which outcrop along Mardie Road and to the east of the Fortescue River. The permeable units have a saturated thickness of up to 15 m (Commander, 1989) within a maximum sequence thickness of 30 m. Figure 14 displays a representative cross-section developed from extensive drilling in the Lower Fortescue River (Haig, 2009).

The estimated average annual recharge to the alluvial aquifer is 11 GL. This recharge occurs directly from the Fortescue River to the alluvial gravels by periodic streamflow (median flow 121 GL/yr). The gravel deposits carry a freshwater lobe (<1000 mg/L) toward the coast. This freshwater lobe grades into saline water at the seawater interface and towards the margins of the alluvial fan (Figure 15).

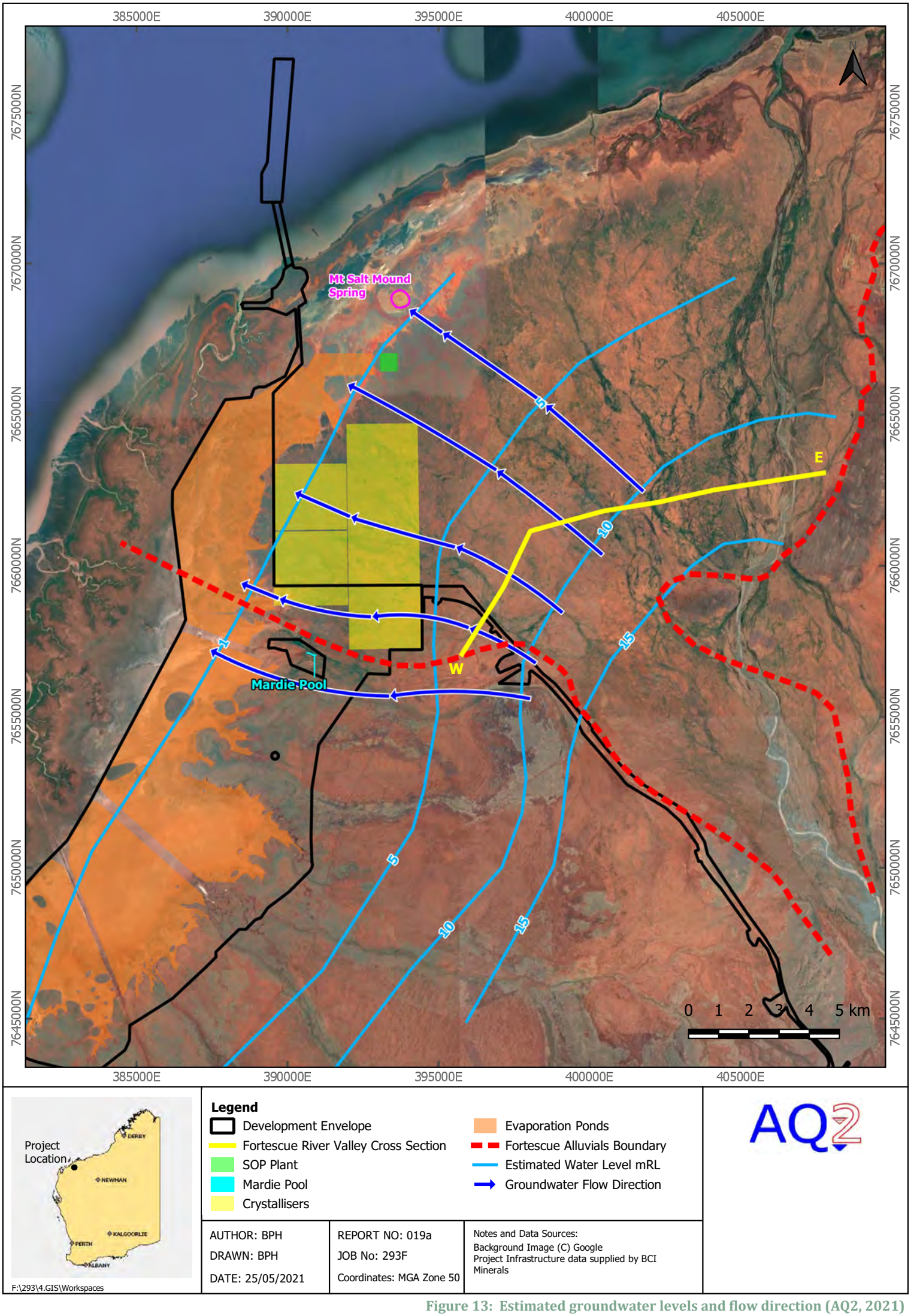

Figure 13: Estimated groundwater levels and flow direction (AQ2, 2021)

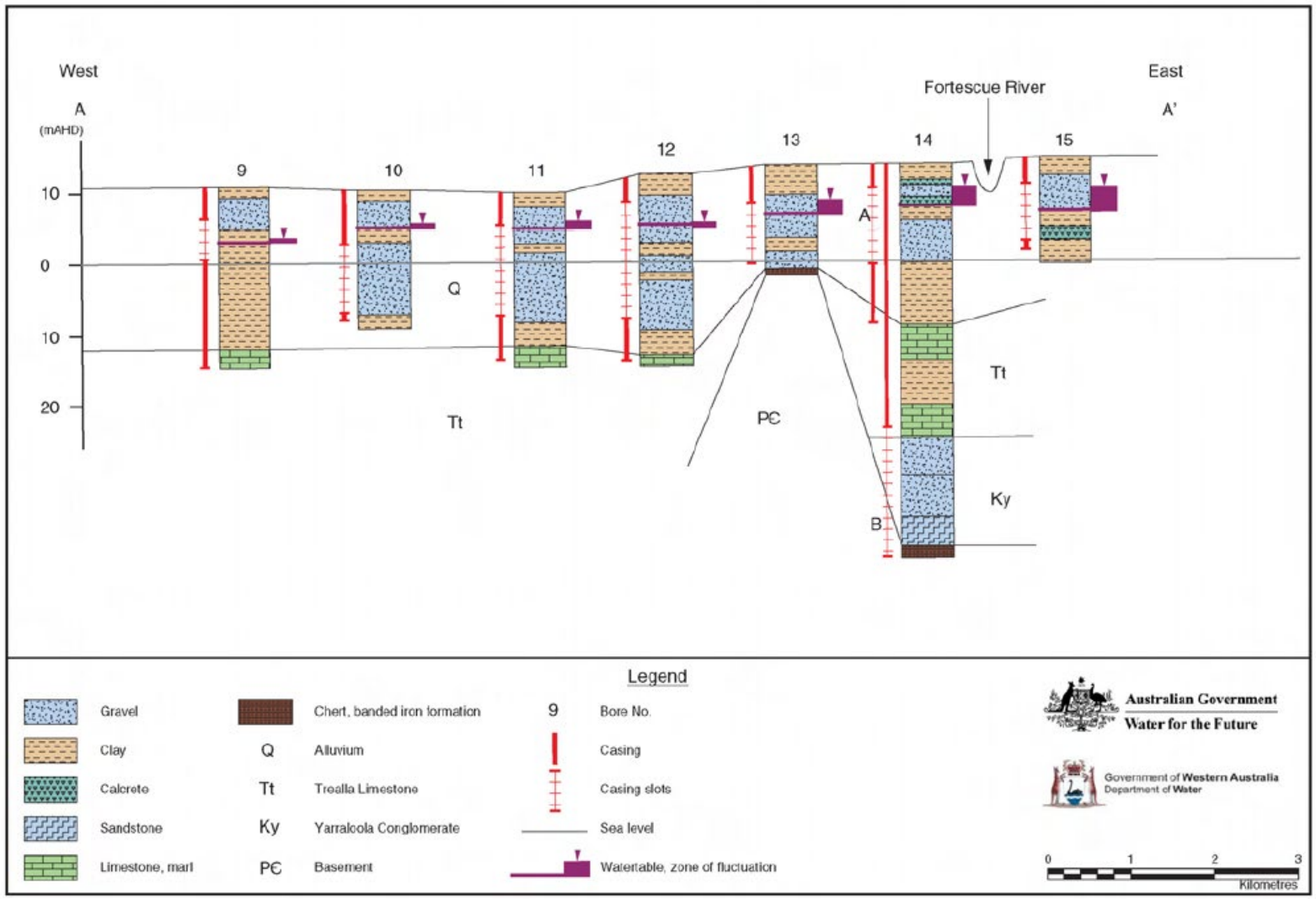

Figure 14: Cross section – Fortescue River Alluvial Valley (from Haig, 2009)

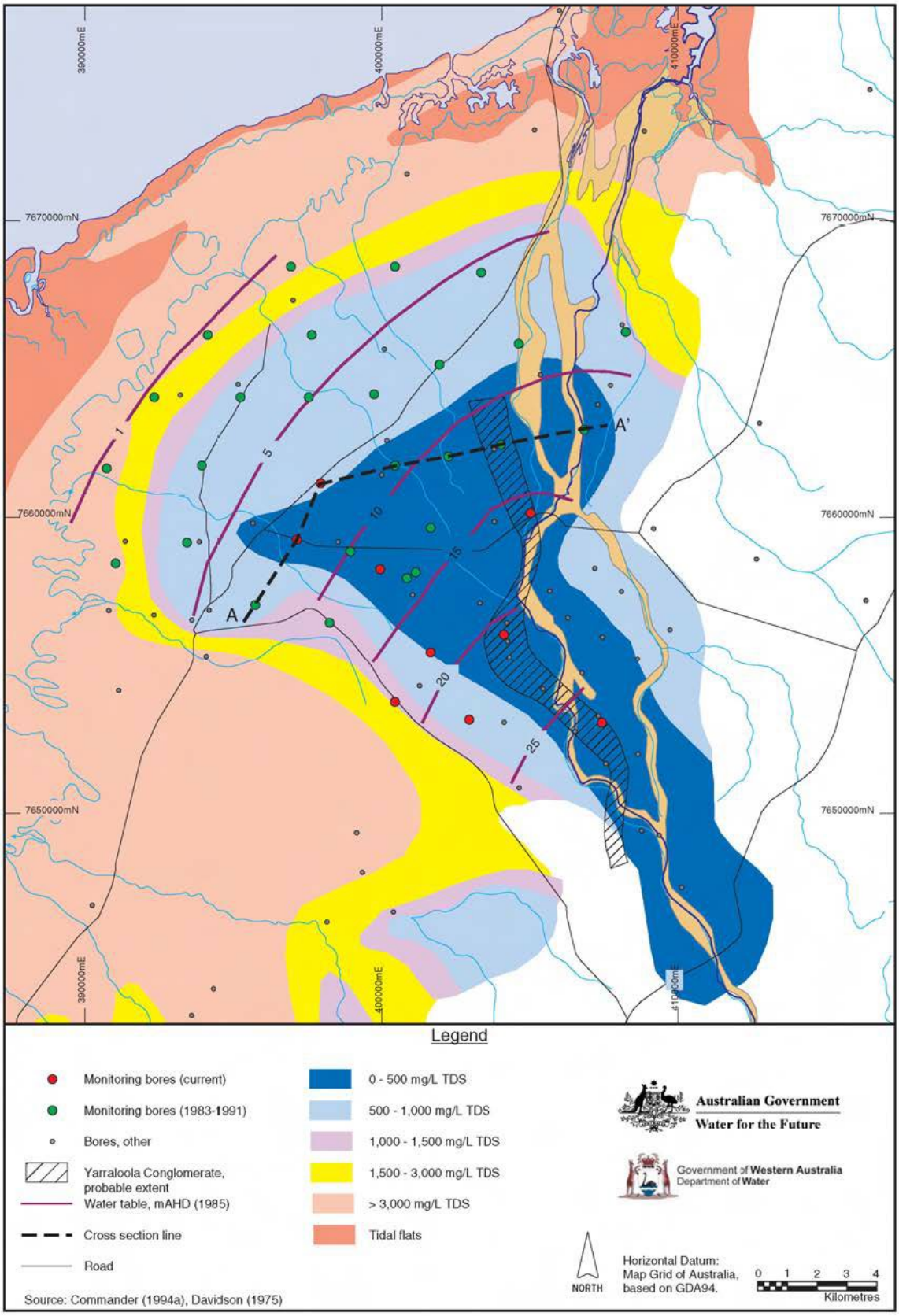

Figure 15: Fortescue River Alluvial Valley groundwater salinity and levels (from Haig, 2009)

Potential key environmental factor

No

Justification

Water is a critical requirement for both construction and operation of the Approved Proposal. The groundwater abstraction activities required in this Revised Proposal have already received approval from DWER via the RIWI Act, but have been requested by DWER to be added to MS1211 to provide clarity for DMAs and Mardie Minerals by ensuring all aspects of the Approved Proposal are included in the scope of MS1211.

Groundwater is currently taken from the Pilbara, Ashburton, Carnarvon-Superficial resource under GWL205621 (up to 0.15 GL/yr) for ongoing operational needs at the site, such as potable water supply to the Village, road maintenance, and other minor construction activities. An additional groundwater licence (GWL211434) was approved to allow for the abstraction of an additional 0.5 GL/yr to support construction. This water comes from a new coastal saline resource and will be used in conjunction with seawater from the SSWI, which is currently being used for major construction activities.

An amendment application to GWL205621 was recently submitted to DWER for an additional 0.05 GL/yr of groundwater abstraction. This amendment is currently under assessment, and is required to meet road maintenance and dust suppression needs into the future. The supporting letter sent to DWER by EMM (on behalf of Mardie Minerals) for this licence application is provided as Attachment 9.

The total groundwater abstraction requirements approved via groundwater licences is up to 0.65 GL/yr. With the inclusion of the amendment application under assessment, the total abstraction requirements under the groundwater licences is up to 0.7 GL/yr. The groundwater abstraction volumes are low, with little to no concerns raised by the Water Resources section of DWER during their assessment of the 5C Licence applications. The abstraction is being regulated under the RIWI Act and does not require assessment or conditions under Part IV of the EP Act.

The key environmental factors 'Flora and Vegetation' and Subterranean Fauna' were included within the DMA's approval assessment in Section 3.1 for groundwater abstraction. However, the text above discusses how impacts to the aquifer is negligible, therefore indirect impacts are unlikely.

8.5.4 Marine Environmental Quality

Description of receiving environment

Water Quality

Nearshore waters typical of this region are characterised by variable turbidity and high sedimentation rates, with associated highly variable light regimes and seawater temperatures. Offshore waters exhibit fewer extremes in the water quality, but still display occasional high levels of sedimentation and turbidity, low light and variable seawater temperatures (Pearce et al., 2003).

Light, turbidity, seawater temperature and sedimentation rates are typically weather dependent and show a strong seasonal transition from the dry to the wet seasons. Large daily tidal ranges

(>5 m), strong winds (gusts >50 km/h) and increased wave activity (such as associated with cyclonic activity) can impact background conditions resulting in increased turbidity (in the form of increased SSC due to coastal runoff and wind/wave driven sediment resuspension. In summary, waters in the vicinity of DMPA4 are subject to naturally elevated levels of turbidity and a reduced light climate heavily influenced by discrete weather events (Pearce et al, 2003).

O2 Marine (2020a) identified the following from marine water quality baseline studies conducted at the Approved Proposal (noting this is located further inshore from DMPA4):

- Salinity levels recorded a median value of 37.5 parts per thousand (ppt), and appeared to be indicative of a sheltered bay, which was thought to be due to the influence of the Passage Islands which act as a natural barrier and appear to restrict mixing with lower salinity oceanic waters;
- Turbidity and SSC were found to be higher at the inshore monitoring location than at the offshore location, which is consistent with other Pilbara water quality investigations (Jones et al., 2019; MScience, 2009; Pearce et al., 2003);
- Derived Daily light Integral (DLI) around the coastal islands was highest during wet season and lowest during the dry season and correlated with seasonal change in solar elevation angle, which is a primary factor influencing the amount of available benthic light in these areas. Conversely, DLI was low year-round at the inshore location (i.e., dredge channel). Factors influencing benthic light levels are different between the islands and dredge channel. However, the lowest light levels in both areas corresponded closely with high SSC and turbidity levels, associated with the passing of several Tropical Cyclones and low-pressure systems over the sampling period; and
- Laboratory analysis of marine water samples showed no evidence of contamination and the current allocation of maximum and high levels of ecological protection are appropriate for the marine waters surrounding the Approved Proposal.

<u>*Sediment*</u>

Dredge Channel and surrounds

A baseline sediment assessment of the Approved Proposal dredge channel and surrounding sediments (O2 Marine, 2019) identified that of the Contaminants of Potential Concern (CoPC) analysed, only arsenic and nickel (95% upper confidence level (UCL) of mean) concentrations exceeded the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG, 2018) and National Australian Guidelines for Dredging (NAGD) screening levels (Interim Sediment Quality Guideline (ISQG)-Low) (NAGD, 2009). In comparison to other marine sediment programs in similar areas of the Pilbara (DEC, 2006), some concentrations of metals and nutrients were naturally higher than previously recorded. However, sediment is still deemed suitable for offshore disposal.

As per the recommendations of O2 Marine, revised site-specific environmental quality criteria (EQC) were developed for the Approved Proposal (refer to Table 18 of O2 Marine, 2019).

Further sediment sampling within the revised dredge channel was undertaken in 2023 (O2 Marine, 2023b). All contaminants analysed during this sampling campaign were below the NAGD screening levels (ISQG-Low). In comparison to the site-specific EQC developed, sediments were also below these EQC values.

Maintenance Dredging

Mardie Minerals engaged Baird in 2019/2020 to estimate the annual maintenance dredging volumes for the Approved Proposal (Baird, 2020; Attachment 10). The estimate is based on sediment transport modelling of ambient wet and dry season periods, and measured turbidity data, geotechnical borehole data and seabed sediment samples.

Baird estimated that sedimentation rates for the dredging proposed as part of the Approved Proposal ranges from 39,000 - 65,500 m^3 annually (Baird, 2020; Attachment 10). The dredge channel for which this estimate was made required up to 800,000 m^3 of dredge spoil removal during capital dredging. The dredge channel has since been revised to *inter alia* avoid significant dredging and make best use of the natural seabed level, which ensures more of the offshore area is at design depth where no capital (and maintenance) dredging will be required. The revised dredge channel represented an approximate 20% reduction to the original channel footprint. Accordingly, Baird re-estimated the annual maintenance dredging volumes for the revised dredge channel to be on average 34,000 m^3 annually.

As per the analysis undertaken of seabed samples and geotechnical borehole logs at the dredge channel, the sediment composition of the maintenance dredge spoil was conservatively predicted to have a lower fines content (i.e., will have more sand) than that of the capital dredging spoil. The assumed loss rate of dredge spoil during maintenance dredging is therefore 20%. After applying the loss rate to the revised average sedimentation rate, Mardie Minerals anticipates the average volume of maintenance dredge spoil to be approximately 27,200 m^3 annually.

It is not expected that maintenance dredging will need to be undertaken every year due to annual variability in the sedimentation rate at the dredge site depending on a range of environmental factors (e.g., wave action, tidal currents and severe weather events (cyclones) in close proximity). Mardie Minerals will manage the maintenance dredging effectively through implementation of a monitoring program to confirm available volume at DMPA4 after capital dredging, which includes regular survey and sediment sampling to characterise the sediment (i.e., silt and sand percentages).

The dimensions of DMPA4 are 702 x 431 m (30.3 ha), and the water depths at surveyed sites ranged between -18 - 21 mAHD. Disposing dredge spoil to a depth of 2 m at DMPA4 yields a total volume of 605,124 m^3, with each additional 1 m of spoil mounding height adding an additional 302,562 m^3. After disposal of the estimated capital dredging volume of 355,000 m^3, the estimated available volume within DMPA4 at 2 m depth for maintenance dredging spoil is 250,124 m^3. Given the annual maintenance dredge volume was estimated as approximately 27,200 m^3, disposal of dredge spoil to a depth of 2 m at DMPA4 provides for approximately nine years of maintenance dredging if disposal frequency (events) are required annually and the sediment depth is up to 4 m, with each additional 1 m of spoil disposal at DMPA4 providing for an extra 11 years of maintenance dredge disposal. A full breakdown of the estimated volume of maintenance dredging disposal at DMPA4 across three scenarios (annually (as discussed above), 2 yearly, and 5 yearly events) is provided in Table 6.

The sizes of the ZoHI and ZoMI for the disposal of maintenance dredging material are directly related to the sediment composition (i.e., silt and sand percentages) and the rate of disposal of maintenance dredging spoil. As noted above, the sediment composition of maintenance dredging spoil is predicted to have a lower fines content than from capital dredging, and this will be

monitored regularly. The rate of disposal of maintenance dredging spoil will also be equal or less than the disposal during capital dredging, with much lower total volumes. Mardie Minerals therefore reasonably expects that the boundaries of the ZoHI and ZoMI for the disposal of maintenance dredging material will not extend beyond the boundary of the ZoHI and ZoMI established for capital dredging for DMPA4 (i.e., no new areas will be impacted).

Table 6: Estimated volume of maintenance dredging disposal at DMPA4

Maintenance dredging at DMPA4	Scenario 1				Scenario 2				Scenario 3			
Frequency of event	Annually				2-yearly				5-yearly			
Estimated average volume per event	27,200 m^3				54,400 m^3				136,000 m^3			
Average sediment depth (m)(1)	**Estimated Capacity (m^3) (1)**	**Year**	**Number of events**	**Volume (m^3)**	**Estimated Capacity (m^3) (1)**	**Year**	**Number of events**	**Volume (m^3)**	**Estimated Capacity (m^3) (1)**	**Year**	**Number of events**	**Volume (m^3)**
Up to 2	250,164(2)	1 to 9	9	244,800	250,164(2)	2 to 9	4	217,600	250,164(2)	5 to 9	1	136,000
Up to 2 2 – 3	5,364 + 302,562	10 to 20	11	299,200	32,654 + 302,562	10 to 21	6	326,400	114,164 + 302,562	10 to 24	3	408,000
2 – 3 3 – 4	8,726 + 302,562	21 to 31	11	299,200	8,726 + 302,562	22 to 31	5	272,200	8,726 + 302,562	25 to 34	2	272,000
3 – 4 4 – 5	12,088 + 302,562	32 to 42	11	299,200	39,288 + 302,562	32 to 43	6	326,400	39,288 + 302,562	35 to 44	2	272,000
4 – 5 5 – 6	15,450 + 302,562	43 to 53	11	299,200	15,450 + 302,562	44 to 53	5	272,200	302,562	45 to 54	2	272,000
5 – 6 6 – 6.3	18,812 + 100,884	54 to 57	4	108,800	46,012 + 100,884	54 to 57	3	136,000	100,412 + 100,884	55 to 57	2	190,400
Total			**57**	**1,550,400**			**29**	**1,550,400**			**12**	**1,550,400**

Notes:

(1) Subject to site survey of dredging and disposal sites after dredging event/s.

(2) Available capacity after disposal of capital dredging spoil.

Due to the planned over dredging during capital dredging, it is predicted that maintenance dredging year 1 will be in 2028; maintenance dredging year 57 is in 2084.

From review of the nautical charts for the surrounding area to DMPA4, there appears to be no limiting bathymetry to maintain an under keel clearance (UKC) of 1 m on a vessel with a draft of 4.5 m or less, to ensure sufficient navigable water is available for ships at sea.

An estimated average sediment depth of up to 6.3 m at DMPA4 would provide an UKC of 11.7 m given the water depths at surveyed sites range between 18 to 21 mAHD mean sea level.

DMPA4

Sediment sampling was undertaken by O2 Marine as part of a broader investigation into the bathymetry, BCH and sediment at DMPA4 (O2 Marine, 2024a; Attachment 2). The field survey for this investigation was conducted over a period of seven days from 20 September – 26 September 2024. The results of the sediment assessment of DMPA4 is included as Appendix A of the BCH Report (provided as Attachment 2 (O2 Marine, 2024a)), and is summarised below.

Sediments were sampled at four random locations within DMPA4 (Figure 16) and analysed for various analytes to characterise the sediments within the area.

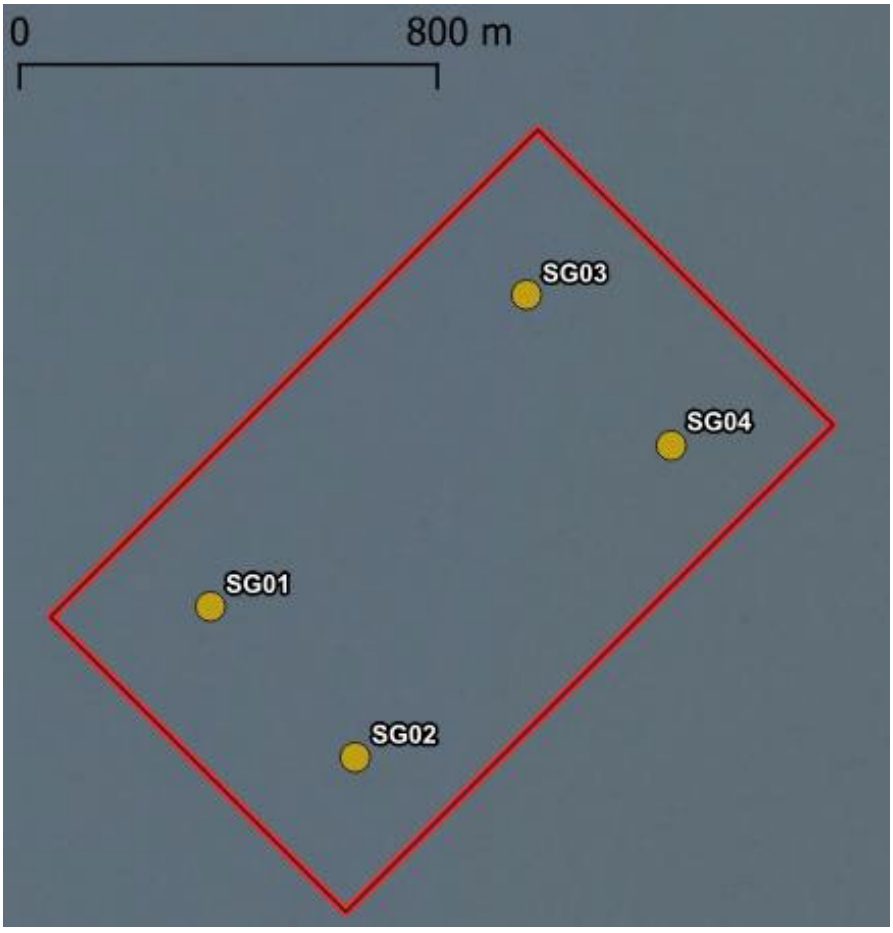

Figure 16: Sediment sample locations within DMPA4 (O2 Marine, 2024a)

The results generally reflected sediment characteristics expected from an offshore greenfield site in the Pilbara. The majority of the contaminants (metals, hydrocarbons, Tributyltin (TBT) and Benzene, Toluene, Ethylbenzene, Xylenes and Naphthalene (BTEXN)) were either below the laboratory limits of reporting, below the NAGD (2009) ISQG-low screening levels, or comparable to concentrations along the Pilbara coast as documented in DEC (2006). These results are also comparable to the six dredge channel sediment samples collected in 2023 (O2 Marine, 2023b).

Sample SG01 recorded comparatively higher concentrations of metals and hydrocarbons to the other three sites (SG02, SG03 and SG04), with arsenic marginally above the NAGD (2009) screening level of 20 mg/kg (21 mg/kg), and total recoverable hydrocarbons (TRH) C10-C40 (total) was above the screening level of 550 mg/kg (670 mg/kg). Arsenic concentrations within

the Pilbara are known to be naturally elevated, and likely related to the geology of the region (DEC, 2006). All laboratory quality assurance/quality control calculations indicate that analysis results are accurate and reliable, and as such, it is possible that the comparatively elevated concentrations of hydrocarbons at SG01 may be a result of field contamination during the sampling process.

Particle size distribution (PSD) results indicate that all four sites are largely comprised of coarse sand (approximately 55% of each sample), with smaller proportions of fine sand and gravel. These results are comparable to five northern most sediment samples (SS1, SS2, SS3, SS4, and SS5) collected within the dredge channel in 2022 (O2 Marine, 2022a).

Potential key environmental factor (yes/no)

Yes

Policy & Guidance

EPA Objective:
To maintain the quality of water, sediment and biota so that environmental values are protected.

Key EPA Documents:

- Statement of Environmental Principles, Factors, Objectives and aims of EIA (EPA, 2023a);
- Statutory Guidelines for Mine Closure Plans (DMIRS, 2023);
- EIA (Part IV Divisions 1 and 2) Administrative Procedures (EPA, 2024a);
- EIA (Part IV Divisions 1 and 2) Procedures Manual (EPA, 2024b); and
- Instructions on how to prepare EP Act Part IV Environmental Management Plans (EPA, 2024c).

Relevant EPA Factor Guidelines:

- Environmental Factor Guideline – Marine Environmental Quality (EPA, 2016c);
- Technical Guidance – Protecting the Quality of WA's Marine Environment (EPA, 2016d); and
- Technical Guidance – EIA of marine dredging proposals (EPA, 2021a).

Application of Policies and Guidance:
This Referral document has been prepared by utilising the advice contained within the 'Key EPA Documents' listed above.

Surveys, studies and consultation for this factor are conducted in accordance with the guidance identified above.

Environmental Impacts

The Revised Proposal includes the disposal of up to 355,000 m^3 (including 10% over dredge) of capital dredge material, and disposal of maintenance dredge material, into DMPA4.

Potential direct and indirect impacts to MEQ due to offshore dredge spoil disposal are summarised below:

- Additional temporary zones of impact associated with dredge spoil disposal, including a ZoMI of 720 ha and a ZoHI of 355 ha; and

- Impacts associated with the potential spillages of dredge spoil or hydrocarbon spills from vessels travelling between the dredge channel and DMPA4.

Based on both the contaminant and PSD results during the sediment assessment by O2 Marine (2024a; Attachment 2), sediment characteristics between the dredge channel and DMPA4 were found to be similar. As such, it is unlikely that biological impacts or changes will result from placing dredge spoil material at DMPA4.

Assessment of Offsets

N/A

Application of Mitigation Hierarchy

Mardie Minerals has mitigated the potential impacts to MEQ according to the mitigation hierarchy; avoid, minimise, rehabilitate, offset. Avoidance and mitigation measures are detailed within the DSDMP (O2 Marine, 2025; Attachment 3). The DSDMP will be implemented to ensure residual impacts to MEQ as a result of the Revised Proposal are not significant. Avoidance and mitigation measures within the DSDMP relevant to MEQ include:

- Marine water quality monitoring;
- Monitoring and management zones;
- Chemical/oil spill controls:
    - All vessel equipment to be designed and operated to prevent spills and leaks through the provision of in-built safeguards such as, but not limited to, relief valves, overflow protection, and automatic and manual shut-down systems; and
- Recording and reporting requirements.

Assessment and Significance of Residual Impacts

Temporary impacts to MEQ will occur within and surrounding DMPA4 during the spoil dumping activities.

The mitigation actions required to minimise impacts to MEQ from dredge material disposal activities are detailed within the DSDMP (O2 Marine, 2025; Attachment 3). The DSDMP implements a precautionary approach and includes the measures summarised in the section above.

The residual impacts after mitigation are therefore predicted to be limited to a temporary reduction in marine water quality within the ZoHI, ZoMI and ZoI.

Environmental Outcomes

Potential impacts from the Revised Proposal on MEQ will be managed through the implementation of the DSDMP (O2 Marine, 2025; Attachment 3) and through achieving the environmental outcomes listed for MEQ in MS1211.

The Revised Proposal can be implemented while being consistent with the EP Act principles and achieving the EPA's objective for MEQ to maintain the quality of water, sediment and biota so that environmental values are protected.

8.5.5 MARINE FAUNA

Description of receiving environment

Significant Species

Offshore Pilbara waters support a variety of marine fauna, a large number of which are protected (listed) under State and Commonwealth legislation. As discussed in the BCH assessment by O2 Marine (O2 Marine, 2024a; Attachment 2) and the DSDMP (O2 Marine, 2025; Attachment 3), the BCH within DMPA4 and the predicted zones of impact are unlikely to represent permanent or important habitat for any listed marine fauna species. However, it is still considered likely that marine fauna (including listed species) would occasionally pass through the predicted zones of impact and cross the vessel route.

The following key marine fauna species were identified during assessments of the Approved Proposal (O2 Marine, 2020b) and during the development of the DSDMP (O2 Marine, 2025; Attachment 3):

- Marine mammals:
  - Humpback Whale (*Megaptera novaeangliae*) - Migratory (EPBC Act), Conservation Dependent and Migratory (*Biodiversity Conservation Act 2016* (WA; BC Act)).
  - Dugong (*Dugong dugon*) – Migratory (EPBC Act and BC Act).
  - Indo-pacific/Spotted Bottlenose Dolphin (*Tursiops aduncus*) - Migratory (EPBC Act and BC Act).
  - Australian Humpback Dolphin (*Sousa sahulensis*) –Migratory (EPBC Act), Migratory (BC Act) and Priority 4 (DBCA).
- Marine reptiles:
  - Loggerhead Turtle (*Caretta caretta*) – Endangered and Migratory (EPBC Act), Endangered (BC Act).
  - Green Turtle (*Chelonia mydas*) – Vulnerable and Migratory (EPBC Act), Vulnerable (BC Act).
  - Flatback Turtle (*Natator depressus*) – Vulnerable and Migratory (EPBC Act), Vulnerable (BC Act).
  - Hawksbill Turtle (*Eretmochelys imbricate*) – Vulnerable and Migratory (EPBC Act), Vulnerable (BC Act).
  - Leatherback Turtle (*Dermochelys coriacea*) - Endangered and Migratory (EPBC Act), Vulnerable (BC Act).
  - Leaf-scaled Sea Snake (*Aipysurus foliosquama*) - Critically Endangered (EPBC Act and BC Act).
  - Short-nosed Sea Snake (*Aipysurus apraefrontalis*) - Critically Endangered (EPBC Act and BC Act).
- Elasmobranchs
  - Green Sawfish (*Pristis zijsron*) - Vulnerable (EPBC Act and BC Act).
  - Narrow Sawfish (*Anoxypristis cuspidate*) - Migratory (EPBC Act and BC Act).
  - Dwarf Sawfish (*Pristis clavata*) –Vulnerable and Migratory (EPBC Act), Migratory (BC Act) and Priority 1 (DBCA).
  - Reef Manta Ray (*Mobula alfredi*) – Migratory (EPBC Act and BC Act).

Many of the species listed above are discussed in detail within the DSDMP (O2 Marine, 2025; Attachment 3), the Marine Fauna Review (O2 Marine, 2020b) and the Marine Turtle Monitoring Program (Pendoley Environmental, 2023).

Of the species listed above, several species are of particular interest for this Revised Proposal, as DMPA4 lies within an area of broad habitat for some species. These species are discussed further below.

Humpback Whale

DMPA4 is located approximately 41 km to the east of Barrow Island, 37 km west of Cape Preston. The northward migration period is from June to August. The southward migration takes place from July to November, with the peak calve duration being August to September.

Jenner and Jenner (2010) completed aerial surveys offshore of Onslow for the Wheatstone Project. These surveys found that Humpback whales were present in this area from mid-June through to mid-December (only one pod sighted in December surveys), with peak sightings from mid-June to late August. The surveys identified a relatively high proportion of Humpback whales milling/resting, with an increasing number resting or milling during the southern migration. During the northern migration whales were predominantly found 50 km offshore, and 35 km offshore during the southern migration. Humpback whale mother-calf pairs are the most vulnerable group, and they are known to rest offshore, with the highest number of resting pairs observed within the 50 m depth contour (within 35 km of the coast).

Turtles

Marine turtle surveys are required to be undertaken annually for the Approved Proposal, as detailed in the Marine Turtle Monitoring Program (Pendoley Environmental, 2023). Baseline surveys were undertaken for the Approved Proposal in 2018/19, 2021/22 and 2022/23, as reported within the Marine Turtle Monitoring Program (Pendoley Environmental, 2023). The annual marine turtle monitoring program officially commenced in the 2023/24 season, as summarised in the survey report (Pendoley Environmental, 2024). The results of each annual marine turtle monitoring program survey will be compared to the results of previous surveys and the baseline surveys.

Surveys undertaken to-date show that marine turtle nesting activity is greatest on Sholl and Long Islands, with the majority of nesting turtles on these islands being Flatback turtles (Pendoley Environmental, 2023; Pendoley Environmental, 2024). With the exception of the single Hawksbill nest recorded on the mainland in December during the 2018/19 survey (albeit past the peak of the Hawksbill nesting season), turtles nested most successfully on the offshore islands during all surveys (Pendoley Environmental, 2023; Pendoley Environmental, 2024).

The main species recorded on the offshore islands are Flatback turtles, with relatively less nesting effort seen for Hawksbill turtles and Green turtles at the same locations (Pendoley Environmental, 2023; Pendoley Environmental, 2024). The snapshot monitoring data from Round, Middle Passage, and Angle Islands confirmed similar species composition and abundance at these sites. These results are consistent with turtle activity throughout the Pilbara, where Flatback turtle and Hawksbill turtle nesting is dominant on nearshore island habitat, and Flatback turtles are the most common mainland nesting species (Pendoley et al., 2016).

DMPA4 does not contain preferred foraging habitat for marine turtles, as it is dominated by bare sand and filter feeders (O2 Marine, 2024a; Attachment 2), and turtle foraging studies completed in the region have found higher densities of foraging turtles over reef habitats (Jenner and Jenner, 2010). The nesting islands such as Sholl Island will be near the dredge vessel transport route to DMPA4, however, this will occur outside of turtle nesting and hatching seasons to prevent impacts to nesting activities.

Commercial Fisheries Species

Commercial fisheries species that occur within the region include:

- Bluespotted Emperor (*Lethrinus punctulatus*);
- Western king prawns (*Penaeus latisculcatus*); and
- Brown tiger prawns (*Penaeus esculentus*).

The Commercial fisheries species listed above are discussed in detail within the DSDMP (O2 Marine, 2025; Attachment 3). Impacts to commercial fisheries, in particular the Bluespotted Emperor, were raised during the public consultation period for the Approved Proposal, and therefore were assessed within the EPA Reports 1704 and 1740 (EPA, 2021b; EPA, 2023b). A summary of the Bluespotted Emperor and its distribution in the area is outlined below.

Bluespotted Emperor

Bluespotted Emperor is endemic to north-western Australia and found in the waters off WA from Geraldton to the Kimberley region, with some occurrences in the Northern Territory. The Pilbara region has the highest relative abundance of the Bluespotted Emperor, with commercial catch of this species concentrated across the continental shelf from 115°E to 120°E, being a major component of the catch of the Pilbara Fish Trawl Fishery (Newman, Young and Potter, 2004).

Bluespotted Emperor is one of the indicator species in the Pilbara management unit of the North Coast Bioregion of WA (Newman et al., 2018) and as such the stock status of Bluespotted Emperor contributes to determining the risk-level for the biological sustainability of the demersal scalefish resources in the Pilbara management unit. The DPIRD *State of the fisheries* report (Newman, Santoro and Gaughan, 2023) determined that the stock status for the Pilbara region is Sustainable-Adequate, described below:

> *"reflects levels and structure of parental biomass for a stock where annual variability in recruitment of new individuals (recruits) to the stock is considered to be mostly a function of environmental effects on recruit survival, not the level of the egg production."*

Spawning and nursery areas of the species are thought to be restricted to the west Pilbara, being the area from which the species disperse more widely from (Newman et al., 2020). The juvenile phase for the Bluespotted Emperor is directly associated with inshore macroalgae beds, often in water depths less than 10 m (DPIRD Draft Report, *unpublished*). Two cohorts per year are recruited in the inshore macroalgae beds in the Dampier Archipelago, with the biannual recruitment corresponding with the biannual peaks in spawning (DPIRD Draft Report, *unpublished*). Adult Bluespotted Emperor in the western Pilbara have high abundance in the continental shelf waters adjacent to large expanses of inshore macroalgae beds. The adults are also found in coral reef or lagoon habitats, over hard coral, gravel, or rubble substrates (DPIRD Draft Report, *unpublished*; Harvey et al., 2021). This evidence suggests that juveniles may be

present within the dredge channel, though are less likely to be in the deeper waters of DMPA4, which is more likely to be visited by the adult individuals.

Potential key environmental factor (yes/no)

Yes

Policy & Guidance

EPA Objective:
To protect marine fauna so that biological diversity and ecological integrity are maintained.

Key EPA Documents:

- Statement of Environmental Principles, Factors, Objectives and aims of EIA (EPA, 2023a);
- Statutory Guidelines for Mine Closure Plans (DMIRS, 2023);
- EIA (Part IV Divisions 1 and 2) Administrative Procedures (EPA, 2024a);
- EIA (Part IV Divisions 1 and 2) Procedures Manual (EPA, 2024b); and
- Instructions on how to prepare EP Act Part IV Environmental Management Plans (EPA, 2024c).

Relevant EPA Factor Guidelines:

- Environmental Factor Guideline – Marine Fauna (EPA, 2016e); and
- Technical Guidance – EIA of marine dredging proposals (EPA, 2021a).

Application of Policies and Guidance:
This Referral has been prepared by utilising the advice contained within the 'Key EPA Documents' listed above.

Surveys, studies and consultation for this factor are conducted in accordance with the guidance identified above.

Environmental Impacts

The Revised Proposal is to dispose of up to an estimated 355,000 m^3 (including 10% over dredge) of capital dredge material, and maintenance dredge material, into DMPA4. This includes transport of the material between the dredge channel and DMPA4.

Potential direct and indirect impacts to Marine Fauna associated with offshore dredge spoil disposal are summarised below.

Direct Impacts:

- Disturbance, injury or death of marine fauna as a result of dredge spoil disposal operations;
- Loss of marine fauna habitat as a result of dredge spoil disposal;
- Injury or death of marine fauna due to vessel movement (strike);
- Injury or alteration of behaviour from underwater noise from vessel movements or dredge spoil disposal activities; and
- Alteration of behaviour from artificial light from dredge vessel movements and disposal at night.

Indirect Impacts:

- Permanent or temporary loss of marine fauna habitat through sedimentation and decreased water quality; and
- IMP translocation from dredge vessels.

Assessment of Offsets

N/A

Application of Mitigation Hierarchy

Mardie Minerals has mitigated the potential impacts to Marine Fauna according to the mitigation hierarchy; avoid, minimise, rehabilitate, offset. Avoidance and mitigation measures are detailed within a DSDMP (O2 Marine, 2025; Attachment 3). The DSDMP will be implemented to ensure residual impacts to Marine Fauna as a result of the Revised Proposal are not significant. Avoidance and mitigation measures within the DSDMP relevant to Marine Fauna include:

- Scheduling to avoid key ecological windows (1 October - 31 March);
- Monitoring and management zones;
- Noise management protocols and procedures:
    - When in transit, all dredge vessels will be operated in accordance with EPBC Regulations 2000 - Part 8, Division 8.1 (Interacting with Cetaceans);
    - Minimise the duration of run-time for vessel engines, thrusters and dredging vessels by avoiding stand-by or running mode to the degree practical and consistent with safe operations;
- Dredge spoil or vessel strike avoidance strategies:
    - Dedicated MFOs on all dredge vessels during humpback whale season (June to November) including transit to Spoil Ground DMPA4 and at DMPA4 for the disposal operations;
    - Report any injured or deceased marine fauna (whale, dugong, turtle, manta ray or dolphin, fish) or indications of coral mass spawning;
    - Vessels to operate at a safe speed to minimise interaction with marine fauna at all times. Vessels of at least 20 m in length will not exceed the maximum speed of 8 knots within port operational waters and 12 knots outside port operational waters. All vessels operated for the Revised Proposal will not exceed 8 knots within 500 m of any identified cetacean, dugong, or marine turtle;
- Chemical/oil spill controls:
    - All vessel equipment to be designed and operated to prevent spills and leaks through the provision of in-built safeguards such as, but not limited to, relief valves, overflow protection, and automatic and manual shut-down systems;
- Recording and reporting requirements;
- IMP control measures:
    - All relevant vessels should comply with Commonwealth *Australian Ballast Water Management Requirements* (DAWE, 2020) and the *National Biofouling Management Guidelines for commercial vessels* (MPSC, 2018); and
    - All vessels that mobilise to DMPA4 are required to complete the WA 'Vessel Check' risk assessment (DPIRD, 2021).

Assessment and Significance of Residual Impacts

There are limited marine fauna habitat values within DMPA4 and the ZoMI/ZoHI, and as such, it is unlikely that these areas provide important habitat for the marine fauna species identified. Marine fauna species are therefore likely to be traversing the site rather than residing within it.

There are also industry best-practice mitigation measures proposed to minimise the direct and indirect impacts, particularly for vessel movements between the loading facilities and DMPA4, and dumping within DMPA4 (discussed in the section above). These monitoring and management measures will minimise the likelihood of impacts such that they are no longer considered significant.

The mitigation actions required to protect marine fauna from dredge material disposal activities are detailed within the DSDMP (O2 Marine, 2025; Attachment 3). The DSDMP implements a precautionary approach and includes the measures summarised in the section above.

Up to 121 ha of subtidal BCH is to be disturbed for the Approved Proposal, and indirect impacts are likely to occur within the ZoI (Preston Consulting, 2022). In addition, the Approved Proposal includes risks of death or injury to marine fauna as a result of vessel strike, and potential indirect impacts.

The Revised Proposal will impact up to an additional 385 ha (30.3 ha DMPA4 and 355 ha ZoHI) of subtidal BCH, and result in additional recoverable indirect impacts within the DMPA4 ZoMI. Risks of vessel strike and potential indirect impacts would extend into a new area (DMPA4 and vessel route) as a result of the Revised Proposal. This equates to a total increase in cumulative impacts to marine fauna habitat, for a total of up to 506 ha, comprising:

- 8 ha of filter feeder/macroalgae/seagrass BCH (no change);
- 8.3 ha of coral/macroalgae BCH (no change);
- 48.6 ha of bare 'unvegetated' substrate (no change); and
- 385 ha of sparse to moderate filter feeders (additional).

No additional disturbance to significant BCH (coral, etc.) will occur as a result of the Revised Proposal. The BCH within DMPA4 and the predicted zones of impact are unlikely to be considered important habitat for marine fauna, but marine fauna could occasionally be present.

The residual impacts after mitigation are therefore predicted to be limited to:
Direct Impacts:

- Unlikely event that marine fauna would be disturbed, injured or killed as a result of dredge spoil disposal activities or vessel strike;
- Temporary alteration of marine fauna behaviour from underwater noise from dredge vessel movements or spoil disposal activities; and
- Temporary alteration of marine fauna behaviour from artificial light from vessels during dredge vessel movements and disposal at night.

Indirect Impacts:

- Temporary indirect impacts on marine fauna habitat through decreased water quality.

Environmental Outcomes

Potential impacts from the Revised Proposal on marine fauna will be managed through the implementation of the DSDMP (O2 Marine, 2025; Attachment 3) and through achieving the environmental outcomes listed for marine fauna in MS1211.

The Revised Proposal can be implemented while being consistent with the EP Act principles and achieving the EPA's objective to protect marine fauna so that biological diversity and ecological integrity are maintained.

8.5.6 Social Surroundings

Description of receiving environment

The information in this section relates to the airstrip, and has been sourced from Horizon Heritage (2024; Attachment 11) unless stated otherwise.

Horizon Heritage was engaged by WAC on behalf of the Yaburara and Mardudhunera People to undertake a Site Avoidance Aboriginal heritage survey at L08/325 for the airstrip with representatives of the Yaburara and Mardudhunera native title holders. The survey was undertaken on the 7 May 2024, with the aim to determine whether the airstrip upgrade will impact upon Aboriginal sites or heritage values.

No new Aboriginal sites or places were identified during the heritage survey within L08/325.

Horizon Heritage and the Yaburara and Mardudhunera People made the following conclusions:

1. Aboriginal heritage sites and places represent Australian history, and it is important for current and future generations that they are conserved and protected;
2. Mardie Minerals are fulfilling their obligations under the land access agreement with the Yaburara and Mardudhunera People and the AH Act to assess the land for Aboriginal cultural heritage values;
3. The Yaburara and Mardudhunera Traditional Owners have no heritage concerns with L08/325 and a proposed new airstrip; and
4. One registered site (DPLH 10351 Wiruwandi Plain) is immediately adjacent to the L08/325 survey area. This site is protected under the AH Act, and any disturbance will require Section 18 consent under the AH Act. Mardie Minerals must avoid the registered site DPLH 10351 Wiruwandi Plain to prevent any breaches of Section 17 of the AH Act.

Horizon Heritage and the Yaburara and Mardudhunera People made the following recommendations, which have been accepted by Mardie Minerals:

1. Mardie Minerals can proceed with development activities (proposed new airstrip) within L08/325, the Yaburara and Mardudhunera Traditional Owners have given heritage consent for this activity to be undertaken;
2. In the instance of any previously unrecorded heritage places being identified during the course of infrastructure development activities, Mardie Minerals should avoid the area and must contact the Yaburara and Mardudhunera People through WAC and/or Horizon Heritage;
3. If human remains, skeletal materials that may be human or materials that may be a human grave, are uncovered within the cleared work program areas, Mardie Minerals and its contractors must stop work immediately and the materials and the area must be left

undisturbed. The Yaburara and Mardudhunera People through WAC and/or Horizon Heritage must be informed immediately;

4. Mardie Minerals keeps the Yaburara and Mardudhunera People, through WAC, informed of any further developments on their native title determined traditional country; and
5. All Mardie Minerals staff and contracting personnel are made fully aware of their obligations under the AH Act.

Potential key environmental factor

No

Justification

The heritage survey undertaken by Horizon Heritage and Yaburara and Mardudhunera Representatives of the airstrip tenement (L08/325) did not identify any Aboriginal site or places (Horizon Heritage, 2024; Attachment 11). Furthermore, the Yaburara and Mardudhunera People provided conclusions and recommendations (outlined in the section above), which provide consent for Mardie Minerals to undertake the airstrip upgrade, provided that Mardie Minerals apply the recommendations made.

8.5.7 TERRESTRIAL FAUNA

Description of receiving environment

The information in this section relates to the airstrip, and has been sourced from Phoenix (2024; Attachment 12) unless stated otherwise. Details on survey methodology (incorporating desktop and field surveys) and general results are detailed in the Phoenix report (2024; Attachment 12), with the key findings detailed below.

Fauna Habitats

Two terrestrial fauna habitats were recorded within the airstrip study area; shrubland over spinifex grassland and spinifex grassland (Figure 17).

Habitat types directly adjacent to the current airstrip are also predominately spinifex grassland and shrubland over spinifex grassland. These habitat types have previously been found to support the largest number of species overall in the Mardie area, but few significant terrestrial fauna species (Phoenix, 2020). Habitat assessments in close proximity to the airstrip did not identify any potential bird attractants, and the habitat directly around the airstrip has minimal value for birds.

Significant Species

No threatened or priority vertebrate fauna were recorded during the field airstrip survey, which predominantly focussed on habitat assessments and bird attractants in the vicinity of the airstrip.

Previous surveys carried out by Phoenix recorded 20 significant vertebrate fauna from the surrounding area (Figure 18). Fifteen of these are migratory shorebird species, which are particularly likely to occur in intertidal samphire mudflats, tidal channels and mangal community habitat along the coast (Phoenix, 2020; Phoenix, 2022).

Only two significant ground-dwelling species have records from within the 13 km buffer zone - Lined Soil-crevice Skink (Dampier) (*Notoscincus butleri*) (Priority 4 - DBCA) and Northern Quoll (*Dasyurus hallucatus*) (Endangered – EPBC Act and BC Act). No suitable habitat for either of these species is present within the expanded TDE.

Three species of insectivorous bat were identified in the airstrip desktop review; Ghost Bat (*Macroderma gigas*) (Vulnerable - EPBC Act and BC Act), Pilbara Leaf-nosed Bat (*Rhinonicteris aurantia (Pilbara)*) (Vulnerable - EPBC Act and BC Act) and North-Western Free-tailed Bat (*Ozimops Cobourgianus*) (Priority 1 – DBCA). Pilbara Leaf-nosed Bat and North-Western Free-tailed Bat have been previously recorded in the surrounding area. These bats forage whilst flying and may be attracted to any new artificial lights around the airstrip due to the increased density of flying insect prey.

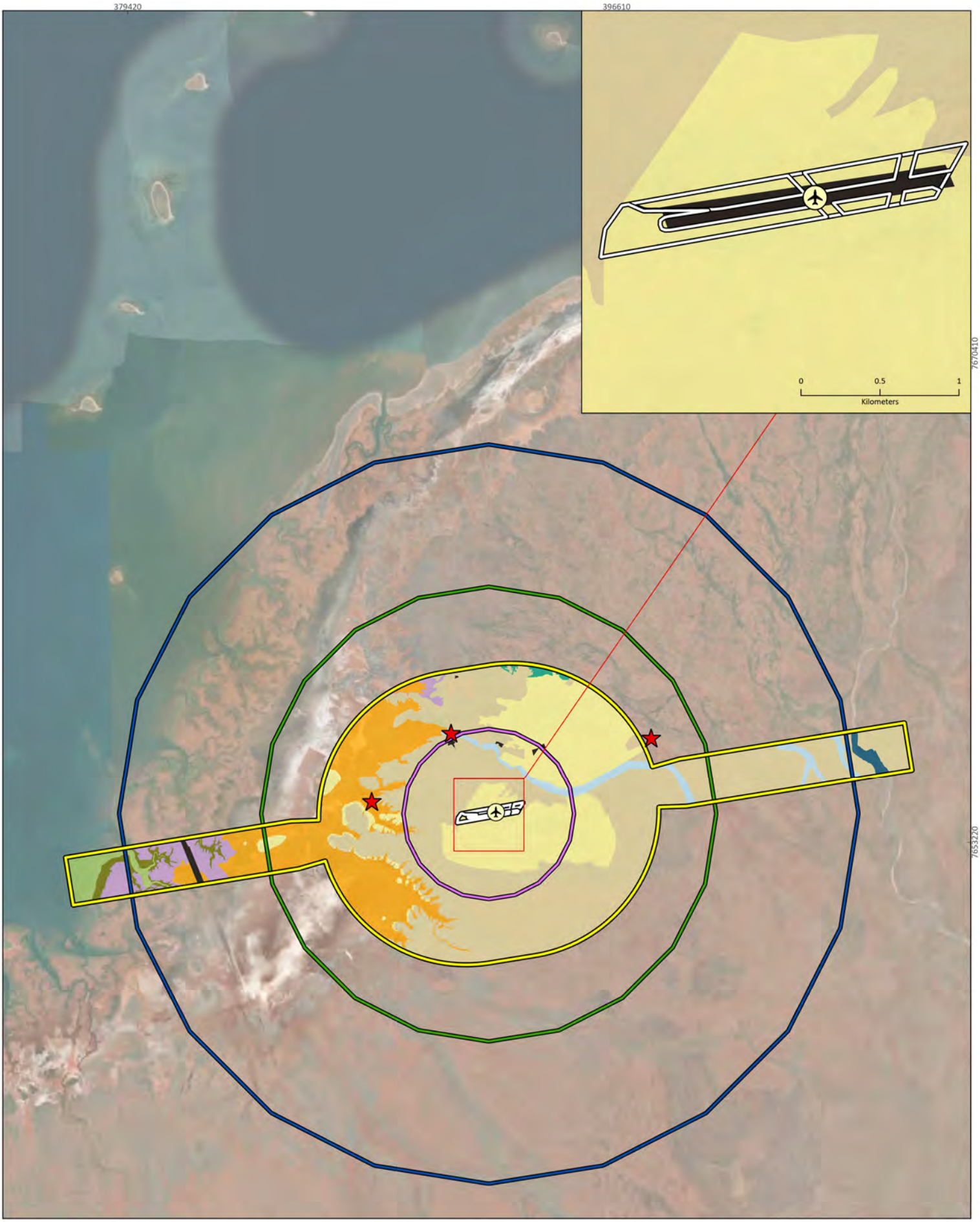

Figure 17: Fauna habitat in the airstrip study area and buffer zone (Phoenix, 2024)

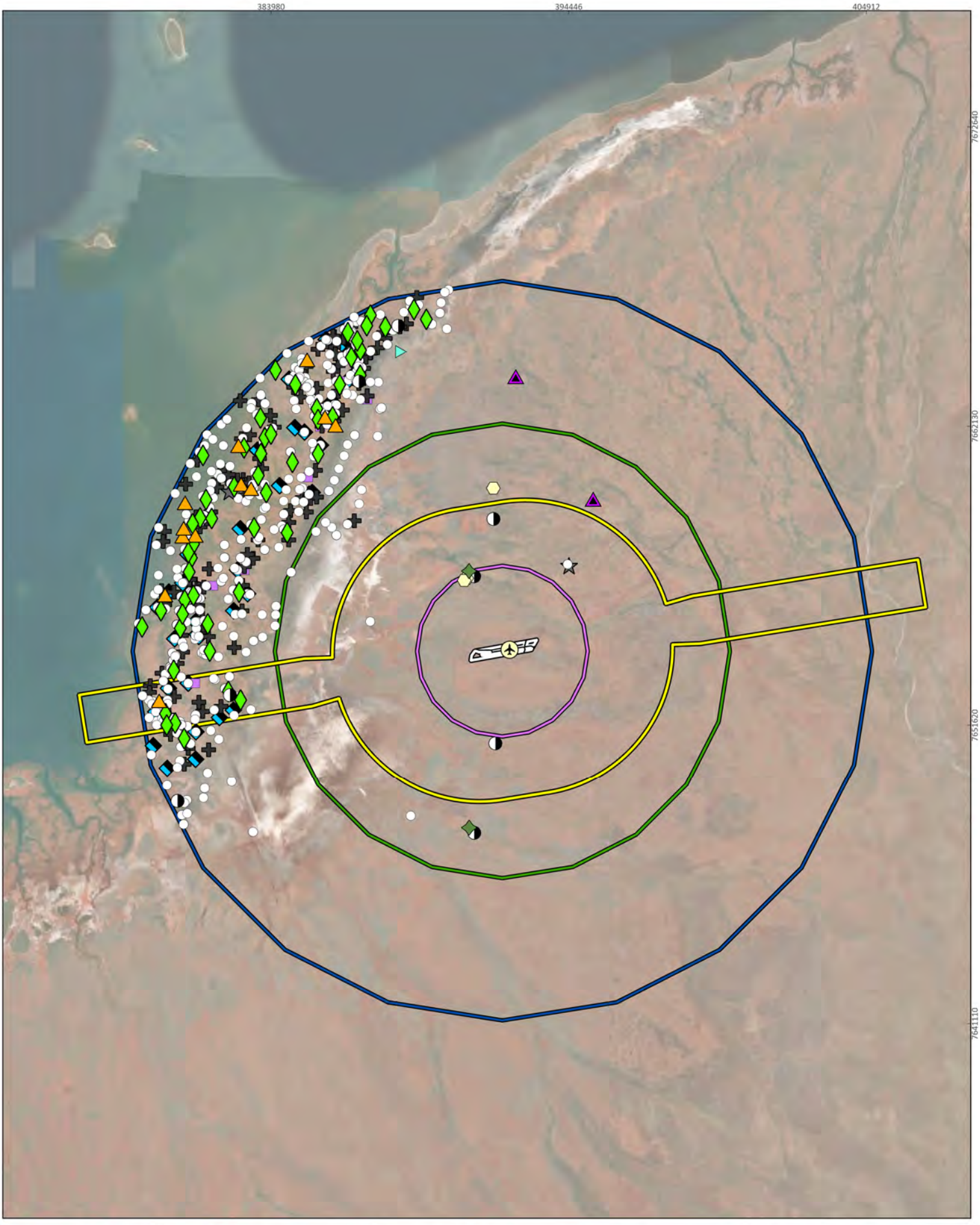

Figure 18: Desktop significant fauna records in the airstrip study area and buffer zone (Phoenix, 2024)

Potential key environmental factor

No

Justification

No additional habitat clearing is proposed within the expanded TDE above what is currently approved in MS1211. Potential impacts to fauna are therefore limited to interactions with emergency aircraft.

Avifauna that pose a notable risk of bird strikes include Galahs, Corellas, raptors, waterbirds and migratory shorebirds. These birds are larger than most birds, inhabiting the shrublands and grasslands nearby the airstrip and are often attracted to open bodies of water. Galahs, Corellas and migratory shorebirds may pose a particular risk as they can be present in large flocks that disperse quickly when disturbed. Large flocks of Oriental Pratincole, similar to that observed in 2023, would pose additional risk for the operation of the airstrip.

Bats forage whilst flying and may be attracted to artificial lights around the airstrip due to the increased density of flying insect prey. As such, strike risk is highest in the immediate vicinity of the airstrip or any other nearby infrastructure with artificial lights. Bats may also be present in higher densities around drainage lines or open bodies of water. Given they are nocturnal, interaction of bats with aircraft is unlikely for daytime flights, but any nighttime flights will be under increased risk of a bat strike. Given the airstrip will only be used for emergencies these interactions are likely to be extremely rare.

Without appropriate infrastructure preventing fauna from accessing the airstrip , strikes with ground-dwelling fauna (e.g., mammals, reptiles) are possible during aircraft take-off and landing. Strikes with larger mammals and reptiles pose a particular risk for the safe operation of the airstrip. These strikes will only occur on the runway itself, and preventing access to the airstrip will alleviate strike risk.

Potential direct and indirect impacts to Terrestrial Fauna due to the airstrip upgrade are summarised below.

Direct Impacts:

- Disturbance, Injury or death of terrestrial fauna due to vehicle and aircraft movement (strike).

Indirect Impacts:

- Alteration of behaviour from the airstrip becoming a short-term attractant (during emergency use), such as noise and/or artificial light emissions.

The mitigation measures recommended by Phoenix (2024; Attachment 12) will be applied (where possible) to reduce the potential impacts on Terrestrial Fauna due to the airstrip upgrade construction and operation, listed below:

- Avoid installation of any artificial large open freshwater pools on the eastern side of the airstrip. Given the presence of bird-attractant habitat on the western coastline, restricting fresh water on the eastern side will decrease the likelihood of birds crossing the runway when flying between fresh water sources;
- Introduction of restrictions around dumping organic waste/rubbish in close proximity to the airstrip runway;

- Installation of bird spikes on infrastructure at the airstrip and any other infrastructure nearby;
- Construction and maintenance of a fence around the airstrip to prevent strikes with terrestrial non-avian fauna during take-off and landing;
- Where possible, restricting arrival and departure of aircraft to eastern side of the airstrip to avoid flying over the migratory shorebird habitat to the west; and
- Where possible, restricting arrival and departure of aircraft to daytime to minimise the possibility of interaction with bats.

The airstrip upgrade area contains no significant terrestrial fauna, with the surrounding habitat showing no potential bird attractants. The airstrip upgrade is to allow it to be used by RFDS, for use in emergency situations only. Therefore, the operation of the airstrip will only facilitate occasional aircraft use when required in emergency situations, rather than regular use.

Mardie Minerals will implement industry best-practice mitigation measures to minimise the direct and indirect impacts to terrestrial fauna, which are discussed in the section above. These monitoring and management measures will minimise the likelihood of impacts such that they are no longer considered significant.

The residual impacts after mitigation are therefore predicted to be limited to the unlikely event that terrestrial fauna would be disturbed, injured or killed as a result of the construction and operation of the airstrip, and the temporary alteration of fauna behaviour from the airstrip during the occasional aircraft flight. Based on the above, the Revised Proposal can be implemented while being consistent with the EP Act principles and achieving the EPA's objective to protect terrestrial fauna so that biological diversity and ecological integrity are maintained.

9 OBJECTIVES AND PRINCIPLES OF THE EP ACT

9.1 OBJECTIVES

The EP Act provides for "*the prevention, control and abatement of pollution and environmental harm, for the conservation, preservation, protection, enhancement and management of the environment and for matters incidental to or connected with the foregoing*".

Mardie Minerals operates under its Environment Policy (Attachment 13), published in 2022, that details how Mardie Minerals is committed to the protection of the environment and the conservation of natural resources. Mardie Minerals will also implement its Environmental and Social Management Plan (ESMP) (internal document prepared by Preston Consulting in 2022). The ESMP has been developed to identify the environmental and social management framework for the development and operation of the Revised Proposal.

Principle	How it will be addressed by the Revised Proposal
The precautionary principle *Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, decision should be guided by:* *a. careful evaluation to avoid, where practicable, serious or irreversible damage to the environment; and* *b. an assessment of the risk-weighted consequences of various options.*	Mardie Minerals has commissioned multiple environmental studies to inform the design and location of the activities presented in the Revised Proposal. Examples where a precautionary approach has been taken by Mardie Minerals include: • Choosing the location of the DMPA4 over other identified disposal areas as it was close to the Approved Proposal (reduced vessel transport), situated further from offshore islands, and was considered unlikely to contain BCH of particular regional or conservation significance compared to other areas within the Mardie and Pilbara region, where higher covers and diversities are observed; and • Relevant stakeholder consultations were organised to address issues concerning offshore spoil disposal.
The principle of intergenerational equity *The present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations.*	The DMPA4 location was specifically identified to avoid significantly important BCH and offshore islands, resulting in negligible long-term impacts (BCH is likely to recolonise DMPA4 and the ZoI over time).
Principles relating to improved valuation, pricing, and incentive mechanisms *Conservation of biological diversity and ecological integrity should be a fundamental consideration.*	To maintain the biological diversity and ecological integrity, key environmental factors impacted by the Revised Proposal were identified, investigated and will be managed as per the DSDMP (O2 Marine, 2025; Attachment 3).
The principle of the conservation of biological diversity and ecological integrity *a. Environmental factors should be included in the valuation of assets and services.* *b. The polluter pays principle – those who generate pollution and waste should bear the cost of containment, avoidance or abatement.* *c. 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.*	Survey work has been used to confirm the range and status of environmental values within the vicinity of DMPA4. Disturbance within areas of higher biological diversity (i.e., offshore islands, etc) have been avoided by choosing DMPA4, which is situated further from the islands than other options that were explored. To conserve the biological diversity and ecological integrity of the surrounding environment, key environmental factors impacted by the Revised Proposal were identified, investigated and will be managed as per the DSDMP (O2 Marine, 2025; Attachment 3).

Principle	How it will be addressed by the Revised Proposal
d. 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.	
The principle of waste minimisation *All reasonable and practicable measures should be taken to minimise the generation of waste and its discharge into the environment.*	There are no practical uses for the dredge spoil material, as its use as fill material onshore is not necessary for the development of the Approved Proposal.

10 ENVIRONMENTAL CONCLUSION

10.1 HOLISTIC IMPACT ASSESSMENT

During EPA's assessment of the Approved Proposal, the connection and interactions between relevant key factors were considered to inform a holistic view of impacts to the whole environment. This was illustrated visually in Figure 19. The key factors relevant to this Revised Proposal have been considered holistically against other key environmental factors, discussed in more detail below.

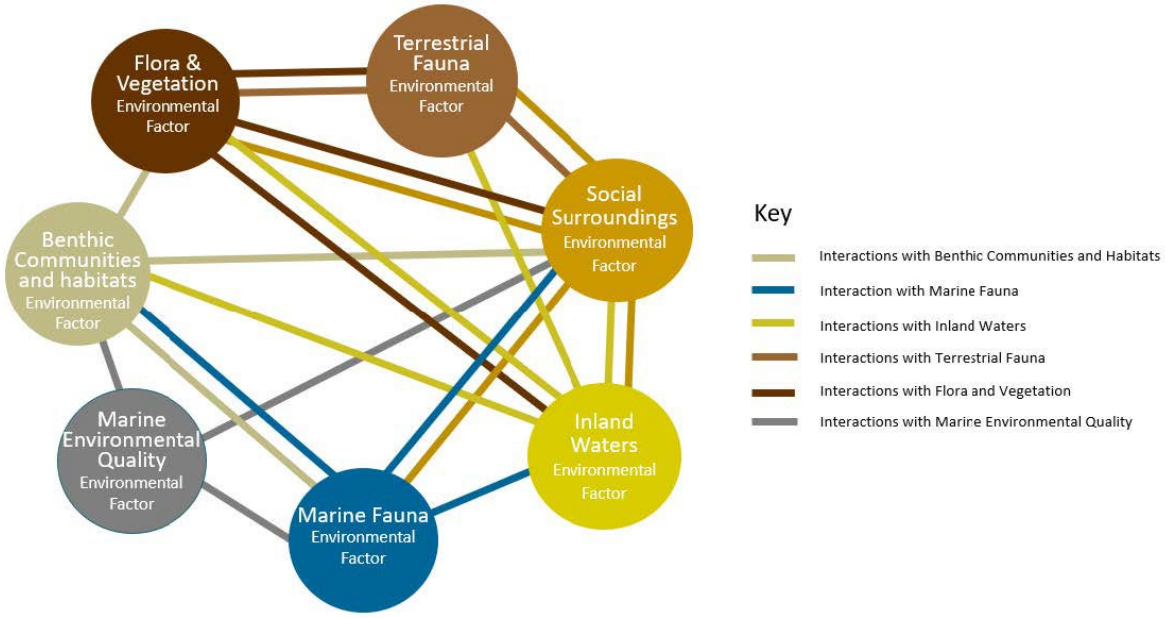

Figure 19: Intrinsic interactions between environmental factors associated with the Approved Proposal (EPA, 2023b)

As described within EPA Report 1740 (EPA, 2023b), there is a high level of connectivity between BCH, MEQ and Marine Fauna. The maintenance of MEQ supports healthy BCH. Healthy BCH and a high MEQ subsequently provides important habitat and resources for significant Marine Fauna.

As is evident throughout the assessment in Section 8, the disposal of dredge spoil into DMPA4 has the potential to directly impact MEQ, and both directly and indirectly impact BCH and Marine Fauna. These linkages already exist for the Approved Proposal, however, the Revised Proposal will introduce these impacts to a new area of the marine environment.

Through the application of appropriate avoidance and minimisation measures, and with the implementation MS1211 conditions and the DSDMP (O2 Marine, 2025; Attachment 3), it is expected that potential impacts to these factors can be managed such that their key environmental values are maintained.

The small groundwater abstraction volumes proposed in the Revised Proposal is unlikely to have any significant holistic impacts that need consideration.

10.2 CUMULATIVE IMPACT ASSESSMENT

Mardie Minerals has conducted an assessment of the potential and residual environmental impacts for each Key Environmental Factor relevant to the Revised Proposal. A cumulative EIA was included to assess the successive, incremental and interactive impacts of the Revised Proposal on the environment in addition to impacts from past, present and reasonably foreseeable future activities. The results of this assessment are summarised below.

10.2.1 BENTHIC COMMUNITIES AND HABITAT

The EPA considered the cumulative impacts of the Approved Proposal in the context of regional pressures. The EPA considered that potential cumulative impacts could be managed by requiring specific environmental outcomes to be achieved.

Given the lack of important BCH within both DMPA4 and the predicted zones of impact, the loss of BCH is unlikely to present any significant cumulative impacts on a regional scale. The loss of subtidal BCH was not considered to be a significant cumulative impact for the Approved Proposal, and this is not considered to change with the inclusion of the Revised Proposal.

10.2.2 MARINE ENVIRONMENTAL QUALITY

The cumulative impacts of the Revised Proposal remain generally consistent with those associated with the Approved Proposal, which include increased SSC, resulting in increased turbidity, a reduction in available benthic light and localised increase in sedimentation. The Revised Proposal includes a new area of impacted MEQ, however, the MEQ impacts are temporary and located in deeper water with no important BCH/marine fauna habitat.

10.2.3 MARINE FAUNA

The Revised Proposal will result in activities and an additional disturbed area within the migration/movement pathways of numerous significant marine fauna species. Unlike ongoing port operations and areas of wastewater discharges, the spoil disposal activities are temporary in nature and will avoid the key ecological windows of significant marine fauna species. As a result, there will be a small incremental increase in cumulative impact for several months during the dredging activities (including dredge spoil disposal), then for a short period while SSC returns to normal levels. The loss of low-value marine fauna habitat within the predicted zones of impact is unlikely to present any significant impact at a regional scale.

10.3 ENVIRONMENTAL OUTCOMES AND CONCLUSION

10.3.1 ASSESSMENT OF IMPACTS IN RELATION TO CONDITIONS

Mardie Minerals is requesting a change to Conditions A1-1, B1-1(1)-(3), and B5-7(4) – (5) of MS1211 to include the Revised Proposal under S40AA. The purpose of this change to these conditions is to ensure the Revised Proposal is appropriately regulated by the conditions of MS1211.

The amended conditions proposed as part of this Revised Proposal have been included in Table 7, identified in blue and bold font. MS1211 is expected to be amended as part of this Revised Proposal to update Figure 1 of Schedule 1 to show the location of DMPA4 and the expanded TDE (provided as Figure 1 of this Referral), and to add a new Figure 6 showing DMPA4 and the associated ZoHI/ZoMI (provided as Figure 3 of this Referral). In addition, any figures that show the Approved Proposal TDE within MS1211 will be updated to reflect the proposed expanded TDE.

Likely effects of the Revised Proposal on the environment have been assessed in the context of the MS1211 conditions. The impacts from the Revised Proposal following implementation of existing MS1211 conditions have been detailed in Table 7.

Table 7: Proposed changes to MS1211 Conditions and Revised Proposal Impacts following implementation of MS1211 Conditions

<table>
<tr><th>Key Factor / Condition No.</th><th>Condition (proposed amendments in blue and bold font)</th><th>Revised Proposal Impacts</th></tr>
<tr><td>All
A1-1</td><td>The proponent must ensure that the proposal is implemented in such a manner that the following limitation or maximum extents / capacities / ranges are not exceeded:
<table>
<tr><th>Proposal Element</th><th>Location</th><th>Maximum extent</th></tr>
<tr><td colspan="3">Physical Elements</td></tr>
<tr><td>Development Envelope</td><td>Figure 1
Figure 4</td><td>Terrestrial development envelope not to exceed 19,763 ha.
Marine development envelope not to exceed 53 ha.
Dredge development envelope not to exceed 307.5 ha.
Combined area of concentrator ponds and crystalliser ponds not to exceed 11,368 ha.</td></tr>
<tr><td>Disturbance footprint</td><td>Figure 1</td><td>Terrestrial disturbance not to exceed 13,476 ha within 19,763 ha development envelope.</td></tr>
<tr><td>Offshore Dredge Spoil Disposal</td><td>Figure 6</td><td>Capital dredging of no more than 355,000 cubic metres, and maintenance dredging as required, directly disturbing no more than 30.3 ha at Dredge Material Placement Area (DMPA) 4.</td></tr>
<tr><td>Zone of High Impact (e.g. marine)</td><td>Figure 3
Figure 6</td><td>Marine zone of high impact to be limited to 121 ha at the dredge area and 355 ha at the offshore dredge spoil disposal area.</td></tr>
<tr><td colspan="3">Operational Elements</td></tr>
<tr><td>Groundwater abstraction</td><td>Figure 7</td><td>Groundwater abstraction not to exceed 0.7 GL per annum.</td></tr>
</table></td><td rowspan="2">Amendments will allow additional disturbance and sedimentation impacts at DMPA4 from dredge spoil disposal. These impacts are however temporary and will occur within low-value BCH that is unlikely to provide significant habitat to marine fauna.
Increased TDE to allow for airstrip and groundwater infrastructure.
The introduction of a groundwater abstraction limit will ensure that associated impacts are negligible and able to be regulated under the RIWI Act.</td></tr>
<tr><td>BCH
B1-1</td><td>The proponent must ensure the implementation of the proposal achieves the following environmental outcomes:
1. No direct loss of benthic communities and habitats outside of the dredge disturbance footprint defined in Figure 3, and the boundary of DMPA4 defined in Figure 6;
2. No irreversible loss of benthic communities and habitats outside of the authorised Zones of High Impact as spatially defined in Figure 3 and Figure 6;
3. No detectable change from the baseline state of benthic communities and habitats outside of the Zones of High Impact and authorised Zone of Moderate Impact as spatially defined in Figure 3 and Figure 6;
4. No change in the health, extent of coverage, or species diversity of intertidal benthic communities more than 100 m seaward of the pond walls as shown in Figure 2; and
5. Adverse impacts to intertidal benthic communities are limited to an area within 100 m of the pond wall defined in Figure 2.</td></tr>
<tr><td>BCH
B1-2</td><td>The proponent shall ensure the implementation of the proposal achieves the following environmental outcomes:
1. No development that would have an adverse impact on the ecological function of the RRDMMA or the maintenance of ecological processes which sustain mangrove habitats within the RRDMMA (shown in figure 2).</td><td>Condition B1-2(2), (4) and (5) are relevant to the Revised Proposal.</td></tr>
</table>

Key Factor / Condition No.	Condition (proposed amendments in blue and bold font)	Revised Proposal Impacts
	2. No development that would have an adverse impact on the ecological function of intertidal and subtidal benthic communities and habitats. 3. No long-term (greater than five (5) years) net detectable loss of algal mat outside of the proposal footprint. 4. No loss of subtidal benthic communities and habitat (including subtidal algae) outside the Zones of impact authorised in condition A1-1. 5. No development that would have an adverse impact on the ecological processes or habitats that sustain the Bluespotted Emperor (*Lethrinus punctulatus*) fishery.	Condition B1-2(2) requires the Revised Proposal to be undertaken in such a way that does not have an adverse impact on the ecological function of the BCH. Given the low-value BCH found within the predicted zones of impact, and the large amount of similar habitat in the local and regional area, this outcome is expected to be able to be achieved. Condition B1-2(4) relates to the changes made to Condition A1-1, which is discussed above. Condition B1-2(5) requires the Revised Proposal to be undertaken in such a way that does not have an adverse impact on the ecological processes or habitat that sustain the Bluespotted Emperor (*Lethrinus punctulatus*) fishery. Given the temporary nature of the Revised Proposal, the low-value BCH found within the predicted zones of impact, and the large amount of similar habitat in the local and regional area, this outcome is expected to be able to be achieved.
BCH B1-3	The proponent must implement the proposal to meet the following environmental objectives: 1. minimise impacts to subtidal habitats; 2. changes to the health, diversity, and extent of benthic communities and habitat (including subtidal macroalgae) as a result of changes to surface water, groundwater quality, groundwater regimes, and marine environmental quality associated with the proposal are detected as early as possible; and 3. adverse impacts to benthic communities and habitat (including subtidal macroalgae) are addressed using best-practice available management mitigation and contingency measures.	The DSDMP (O2 Marine, 2025; Attachment 3) provides detailed information about the mitigation measures proposed during the dredge spoil disposal activities. These objectives are predicted to be able to be met with the implementation of the DSDMP.

Key Factor / Condition No.	Condition (proposed amendments in blue and bold font)	Revised Proposal Impacts
BCH B1-4	The proponent must: 1. implement the Benthic Communities and Habitat Monitoring and Management Plan environmental management plan (BCHMMP Rev C, O2 Marine March 2023), with the purpose of ensuring the benthic communities and habitat environmental outcomes in condition B1-1 (1) to (5), B1-2 (1) to (5), the objectives in B1-3 (1) to (3) and the requirements of B3-4 is achieved, monitored and substantiated; 2. review the BCHMMP environmental management plan (Rev C, O2 Marine March 2023), within one (1) year of the date of this statement to include: a. specific measures to monitor the health and biodiversity of benthic communities, in addition to monitoring of extent; b. specific measures to monitor, whether there are adverse impacts on ecological process or habitats that sustain the Bluespotted Emperor (Lethrinus punctulatus) fishery and prawn fishery; c. proven contingency measures and remediation actions, including commitments to amend and reduce operations to ensure environmental outcomes are achieved; and d. the relationship between the BCHMMP environmental management plan and the Groundwater Monitoring Management Plan and how these plans work together to ensure overlapping and holistic impacts are managed and monitored, to ensure the environmental outcomes and objectives relevant to both plans are achieved; 3. commission an independent expert peer review of the BCHMMP environmental management plan (Rev C, O2 Marine, March 2023) within three years or once preliminary results from the Mardie Project Marine Intertidal Research Offset Program have been released, whichever occurs sooner, for the purpose of reviewing whether the plan remains fit for purpose for achieving, monitoring and substantiating outcomes specified in condition B1-3(2) to (5) and B1-4 and objectives in B1-3 (1) to (3); and 4. Update the BCHMMP environmental management plan in accordance with the recommendations of the peer review.	No changes to the BCHMMP (O2 Marine, 2023c) are required for the Revised Proposal.
Marine Pests B2-1	No introduction or establishment of marine pests in the State Waters as a result of the proposal.	This outcome condition will apply to the Revised Proposal also, to ensure impacts from IMPs are prevented.
Marine Pests B2-2	The proponent must implement the Marine Pest Management Procedure (Rev 1, dated 1 September 2022) environmental management plan, with the purpose of ensuring the environmental outcomes in condition B1-1 (the benthic community and habitat) and B2-1 are achieved, monitored and substantiated.	The Marine Pest Management Procedure (O2 Marine, 2022b) will apply to the Revised Proposal also, to ensure impacts from IMPs are prevented.
Inland Waters B3-1	The proponent must ensure the implementation of the proposal achieves the following environmental outcomes: 1. no adverse impact to water levels or water quality in Mardie Pool as a result of changes to groundwater regimes or groundwater quality; 2. no adverse impact to water levels or water quality in Mardie Pool as a result of surface water flows associated with the proposal;	No changes are required to allow for the abstraction of 0.7 GL/yr of groundwater. These outcomes will still be met.

Key Factor / Condition No.	Condition (proposed amendments in blue and bold font)	Revised Proposal Impacts
	3. no changes to the extent of surface water flooding during a one (1)-year ARI or changes to tidal inundation as a result of the construction of the intertidal causeway that are greater than predicted in Causeway Tidal Inundation Assessment – technical memorandum (Advisian 2022); 4. no changes to the health, extent or diversity of intertidal benthic communities and habitat, including mangrove, coastal samphire and algal mat as a result of changes to groundwater regimes or groundwater quality associated with the proposal; 5. decreased freshwater inundation attributable to the project to no more than 40.2 ha of coastal samphire; 6. decreased freshwater inundation attributable to the project to more than 1.8 ha mangroves within the RRDMMA; 7. decreased freshwater inundation attributable to the project to more than 4.8 ha mangroves outside of the RRDMMA, subject to the requirements of condition A1-1; 8. decreased freshwater inundation attributable to the project of no more than 195.2 ha algal mat; and 9. no changes to the health, extent or diversity of intertidal benthic communities and habitat, including mangrove, coastal samphire and algal mat as a result of erosion.	
Inland Waters B3-2	The proponent must: 1. implement the Groundwater Monitoring and Management Plan (GMMP; Rev F, submitted March 2023), once updated and approved in accordance with condition B3-3, and subject to the requirements of condition C1-1(3), with the purpose of ensuring the benthic communities and habitat environmental outcomes in condition B3-1 (1) and (4) and condition B1-2 are achieved, monitored, substantiated and satisfy the requirements of conditions C4 and condition C5; and 2. review the GMMP environmental management plan (Rev F, submitted March 2023); within one (1) year of the date of this statement to include: a. the relationship between the GMMP environmental management plan and the BCHMMP environmental management plan, and how these plans work together to ensure overlapping and holistic impacts are managed and monitored, to ensure the environmental outcomes and objectives relevant to both plans are achieved.	N/A – the groundwater abstraction will not be managed under the GMMP.
Inland Waters B3-3	The GMMP (Rev F, submitted March 2023) environmental management plan required by condition B3-2 is to be updated with project specific trigger values at the completion of baseline data collection.	N/A – the groundwater abstraction will not be managed under the GMMP.
MEQ B4-1	The proponent must ensure the implementation of the proposal achieves the following environment objective: 1. no impacts on the environmental values of Ecosystem Health, Fishing and Aquaculture, Recreation and Aesthetics, Industrial Water Supply, Cultural and Spiritual.	No changes required for the Revised Proposal.
MEQ B4-2	The proponent must ensure the implementation of the proposal achieves the following environmental outcome: 1. The levels of ecological protection to be achieved inside of the: a. Low Ecological Protection Area shown in Figure 4 and described in the spatial data in schedule 1; b. Moderate Ecological Protection Area shown in Figure 4 and described in the spatial data in schedule 1; c. High Ecological Protection Area described in the spatial data in schedule 1; and d. Maximum Ecological Protection Area described in the spatial data in schedule 1, is consistent with the method for deriving Environmental Quality Guidelines and Environmental Quality Standards for the corresponding level of	Not relevant to the Revised Proposal.

Key Factor / Condition No.	Condition (proposed amendments in blue and bold font)	Revised Proposal Impacts
	ecological protection described in Appendix 1, Table 1 EPA Technical Guidance - Protecting the Quality of Western Australia's Marine Environment (EPA, 2016).	
MEQ B4-3	The proponent must: 1. implement the Marine Environmental Quality Monitoring Management Plan environmental management plan (Rev 8 O2 Marine, submitted March 2023), with the purpose of ensuring the Marine Environmental Quality and Benthic Community and Habitat environmental objectives in conditions B4-1 and B1-3, and outcomes in B4-2 and B1-1 are achieved, monitored and substantiated and satisfies the requirements of conditions C4 and condition C5; and 2. if directed by the CEO, in consultation with DWER, revise the trigger and threshold values, EQG and EQS within the MEQMMP environmental management plan required under condition B4-3(1) to ensure they are defined in a manner consistent with the EPA Technical Guidance - Protecting the Quality of Western Australia's Marine Environment (EPA 2016).	Not relevant to the Revised Proposal, dredge spoil activities are managed under the DSDMP (O2 Marine, 2025; Attachment 3).
Marine Fauna B5-1	The proponent shall implement the proposal to achieve the following environmental outcomes: 1. No mortality, injury, disturbance or displacement of Humpback whales (Megaptera novaeangliae) within the migration of the biologically important area. 2. No change in marine turtle orientation (i.e. misorientation or disorientation) nesting beach utilisation, nesting success or hatchling survivorship as a result of artificial light emissions at both sandy beach habitat adjacent to the development and Long Island, Sholl Island and the Passage Islands (Angle, Middle and Round). 3. Significant marine fauna are not prevented/deterred from undertaking critical behaviours in biologically important areas.	These outcome conditions all apply to the Revised Proposal, and all will be able to be met. These outcomes will ensure impacts to Humpback whales, marine turtles and other significant marine fauna are not significant.
Marine Fauna B5-2	The proponent shall implement the proposal to achieve the following environmental objectives: 1. minimise the risk of physical injury or mortality from vessel strike on significant marine fauna; and 2. minimise the risk of behavioural changes, health impacts, physical injury or mortality from underwater noise emissions from construction or operations to significant marine fauna (including temporary or permanent hearing loss).	These outcome conditions all apply to the Revised Proposal. The DSDMP (O2 Marine, 2025; Attachment 3) has been prepared to demonstrate how these objectives will be achieved.
Marine Fauna B5-3	The proponent must in consultation with DWER: 1. develop and implement a Mardie Illumination Plan environmental management plan that satisfy the requirements of condition C4 and demonstrates how achievement of the significant marine fauna outcomes in B5-1(2-3) will be monitored and substantiated, and submit it to the CEO; and 2. implement the Marine Turtle Monitoring Program (rev 3, submitted, May 2023) environmental management plan that satisfy the requirements of condition C4 and demonstrates how achievement of the significant marine fauna outcomes in B5-1(2-3) will be monitored and substantiated, and submit it to the CEO.	The Revised Proposal will comply with these existing plans to ensure the outcomes in Condition B5-1(2-3) are met.
Marine Fauna B5-4	The proponent must implement the Dredge Management Plan environmental management plan (Rev 6, O2 Marine March 2023) with the purpose of ensuring that Marine Fauna, Benthic communities and habitats and marine environmental quality environmental outcomes in conditions B5-1(1), B1-1 and B4-1 and objectives in conditions B5-2, and B1-3 are achieved, monitored and substantiated.	The DSDMP (O2 Marine, 2025 ; Attachment 3) has been prepared to supersede the DMP referred to in this condition. The key triggers and targets however remain the

Key Factor / Condition No.	Condition (proposed amendments in blue and bold font)	Revised Proposal Impacts
		same or similar. The DSDMP has been developed to ensure that Marine Fauna, BCH and MEQ environmental outcomes in conditions B5-1(1), B1-1 and B4-1 and objectives in conditions B5-2, and B1-3 are achieved, monitored and substantiated.
Marine Fauna B5-5	The proponent must impose a speed limit of eight (8) knots on all project related vessels and export vessels within a five (5) kilometre radius of the export jetty.	This condition will apply to the dredge vessel when traversing within a 5 km radius of the export jetty to ensure vessel strike risks are minimised.
Marine Fauna B5-7	During dredging, spoil disposal and seabed levelling activities, the proponent shall: 1. implement measures to avoid vessel strikes with significant marine fauna; 2. implement measures to minimise direct entrainment impacts to significant marine fauna, including not operating dredge pumps during transit and dredge cutterhead lowered to surface before commencement of soft start procedure; 3. install overflow screen on dredgers to visually assess for turtles and/or turtle remains that may have been entrained during dredging after each load; 4. implement a significant marine fauna observation zone consisting of a at least three (3) kilometre radius from the dredging activity whereby an observer must undertake significant marine fauna observation for a minimum of thirty (30) minutes prior to the commencement of dredging **and/or offshore spoil disposal** and at all times during dredging activities; 5. implement an exclusion zone consisting of at least 500 metre radius from the dredging activity whereby: a. dredging **and/or offshore spoil disposal** cannot commence should a significant marine fauna be within the exclusion zone; and b. dredging activities to cease should a significant marine fauna enter the exclusion zone during dredging **and/or offshore spoil disposal** and are not to recommence until the significant marine fauna have moved outside the exclusion zone; 6. must engage a suitably qualified and experienced marine fauna observer who has a demonstrated knowledge of significant marine fauna in the North- West region to undertake observations in the observation zone and exclusion zone; 7. maintain a log of recorded sightings, locations and behaviours indicative of stress or disturbance of significant marine fauna and submit these to the National Cetacean Sighting Database; and 8. document and report to relevant regulators: a. any incidents relating to significant marine fauna injury / mortality; and b. where turtles are a consideration the effectiveness of mitigation measures to prevent turtle injury and mortality.	Conditions B5-7(1) and (4) – (8) are applicable to the Revised Proposal. Conditions B5-7 (4) and (5) have been amended to ensure that the observation and exclusion zones for marine fauna also include the dredge spoil disposal activities. While this reflects an additional potential impact location, these measures (and other conditions of B5-7) will minimise the likelihood of impacts from these activities. These measures are detailed in the DSDMP prepared for the Revised Proposal (O2 Marine, 2025; Attachment 3).

Key Factor / Condition No.	Condition (proposed amendments in blue and bold font)	Revised Proposal Impacts
Marine Fauna B5-8	The proponent shall not conduct dredging during the period October–March (inclusive) or pile driving during the period September–January (inclusive) unless the CEO has confirmed otherwise by notice in writing.	This condition will also indirectly limit the timing of the Revised Proposal as well, which will minimise impacts on marine fauna (particularly marine turtles).
Terrestrial Fauna B6-1	The proponent must ensure the implementation of the proposal achieves the following environmental outcomes: 1. no change in the abundance and diversity of migratory shorebirds utilising coastal samphire and mudflat habitats; 2. no change in the nesting density of grey falcons (*Falco hypoleucos*); 3. maintain habitat connectivity, retention of a vegetation corridor between exclusion zone/s and similar habitat outside the impact area fifty (50) m exclusion zone around one (1) record of short range endemic fauna as shown in Figure 5; 4. no direct or indirect disturbance within the fifty (50) m short range endemic exclusion zone as shown in Figure 5; and 5. disturbance within the northern quoll (*Dasyurus hallucatus*) foraging habitat to only occur during daylight hours;	These outcome conditions all apply to the Revised Proposal, and all will be able to be met. These outcomes will ensure impacts to Grey Falcon, Northern Quoll, and other significant fauna are not significant.
Terrestrial Fauna B6-2	The proponent must implement the proposal to meet the following environmental objectives: 1. minimise the risk of physical injury or mortality from construction or operation on native fauna.	This condition will apply to construction or operation in the terrestrial environment to ensure physical injury or mortality of terrestrial fauna is minimised.
Terrestrial Fauna B6-5	The proponent must develop and implement the Mardie Illumination Plan with the purpose of ensuring that Terrestrial Fauna environmental outcomes in condition B6-1(1), B6-1(2) are achieved, monitored and substantiated and that condition B5-3(1) is met.	The Revised Proposal will comply with the Illumination Plan (Mardie Minerals, 2024b) to ensure the outcomes in Condition B6-1 (1-2) are met.
Flora and Vegetation B7-1	The proponent must implement the proposal to meet the following environmental outcomes: 1. no more than 165 ha of cumulative impacts to the Horseflat PEC as a result of the proposal, including direct impacts of no more than 145 ha; 2. no direct or indirect impacts to the known locations of Minnie Daisy (*Minuria tridens*) identified in the Phoenix – Targeted Pre-clearance Survey (2021), unless the CEO has confirmed by notice in writing that further investigations have demonstrated that the specimens represent adequately widespread species such that disturbance of the known specimens would not be inconsistent with the EPAs objective for Flora and Vegetation; 3. no direct impacts or indirect impacts to any known locations of the sterile, potentially rare or novel Tecticornia Taxa, identified within Phoenix – Detailed Flora and Vegetation Survey for the Mardie Project (2020), unless the CEO has confirmed by notice in writing that further investigations have demonstrated that that the specimens represent adequately widespread species such that disturbance of the known specimens would not be inconsistent with EPA's objective for Flora and Vegetation; 4. ensure there are no indirect impacts from the introduction or spread of environmental weeds compare with pre-construction condition;	The Revised Proposal will be implemented to meet these outcomes.

Key Factor / Condition No.	Condition (proposed amendments in blue and bold font)	Revised Proposal Impacts
	5. no disturbance associated with the proposal to more than thirty (30) per cent of the currently mapped extent (256 ha) of the landward samphire vegetation described in Mardie Project – Response to Submissions (March 2021), until the CEO has confirmed by notice in writing that: a. the supplementary surveys have mapped additional vegetation consistent with the description of the landward samphire in Mardie Project – Response to Submissions (March 2021); and b. the additional Tecticornia vegetation mapped in the supplementary surveys is sufficiently widespread in the region that clearing of up to 863 ha of this vegetation would not be inconsistent with the EPA's objectives for Flora and Vegetation.	
Aboriginal Cultural Heritage B8-1	The proponent must implement the proposal to meet the following environmental outcomes: 1. no direct disturbance of the Aboriginal cultural heritage exclusion zones for Peters Creek as shown in Figure 5 and described in the spatial data in schedule 1; and 2. subject to reasonable health and safety requirements, no interruption of ongoing access to land utilised for traditional use or custom by the Yaburara and Mardudhunera People and Robe River Kuruma People.	The Revised Proposal will be implemented to meet these outcomes.
Aboriginal Cultural Heritage B8-2	The proponent must implement the proposal to meet the following environmental objectives: 1. avoid, where practicable, and otherwise minimise direct disturbance to Aboriginal Cultural Heritage sites; 2. avoid, where possible, and otherwise minimise indirect impacts to Aboriginal Cultural Heritage within and surrounding the development envelope; a. visual and amenity impacts to social and cultural places and activities; and 3. ongoing consultation and engagement with Traditional Owners about achievement of the outcomes in condition B8-1 and objectives in condition B8-2 for the life of the proposal.	The Revised Proposal will be implemented to meet these objectives.
Aboriginal Cultural Heritage B8-3	The proponent must, in consultation with DWER, and in collaboration with the Yaburara and Mardudhunera People, and Robe River Kuruma People prepare an environmental management plan that demonstrates how achievement of the Aboriginal Cultural Heritage environmental outcomes in condition B8-1 will be monitored and substantiated, how the Aboriginal Cultural Heritage objectives in condition B8-2 will be achieved, and satisfies the requirements of conditions C4 and C5, and submit it to the CEO.	The Revised Proposal will be implemented to meet this condition.

10.3.2 ENVIRONMENTAL OUTCOMES

Environmental outcomes resulting from the Revised Proposal are expected to align with the environmental outcomes of the Approved Proposal. Conditions B1 to B8 of MS1211 outline the environmental outcomes of the Approved Proposal that are relevant to the environmental factors identified for the Revised Proposal. Mardie Minerals has conducted a review of these conditions to determine if the environmental outcomes are consistent with the Revised Proposal, EP Act principles and the EPA's objectives for environmental factors in Table 8. Any changes to environmental outcomes that are required in order to address the impacts of the Revised Proposal have been indicated in blue and bold font. Figures depicting locations in Table 8 are located within Schedule 1 of MS1211. MS1211 is expected to be amended as part of this Revised Proposal to update Figure 1 of Schedule 1 to show the location of DMPA4 and the expanded TDE (provided as Figure 1 of this Referral), and to add a new Figure 6 showing DMPA4 and the associated ZoHI/ZoMI (provided as Figure 3 of this Referral). In addition, any figures that show the Approved Proposal TDE within MS1211 will be updated to reflect the proposed expanded TDE.

This Referral includes the transport of dredge vessels from the Approved Proposal dredge channel to DMPA4 and spoil disposal within DMPA4. The Revised Proposal therefore includes an additional spoil disposal method, an expanded TDE, and the inclusion of groundwater abstraction. Offshore disposal will result in potential direct and indirect impacts to marine fauna, BCH and MEQ within the predicted zones of impact, the expanded TDE will result in potential minor direct and indirect impacts to flora and vegetation, terrestrial fauna and social surroundings, and groundwater abstraction will result in direct impacts to inland waters. These environmental outcomes are able to be managed to meet the environmental objectives within MS1211, through the implementation of environmental management plans, the Sea Dumping Permit (once approved), and approved groundwater licences.

Table 8: Environmental Outcomes of the Revised Proposal

Key Factor / Condition No.	Environmental Outcome (MS1211) (changes in blue and bold font)	Consistent with EP Act principles/EPA objectives?
BCH B1-1(1)	No direct loss of benthic communities and habitats outside of the dredge disturbance footprint defined in Figure 3, **and the boundary of DMPA4 defined in Figure 6**;	Yes. Outcomes align with those listed in MS1211. Requires amendment to include the Revised Proposal.
BCH B1-1(2)	No irreversible loss of benthic communities and habitats outside of the authorised Zone**s** of High Impact as spatially defined in Figure 3 **and Figure 6;**	Yes. Outcomes align with those listed in MS1211. Requires amendment to include the Revised Proposal.
BCH B1-1(3)	No detectable change from the baseline state of benthic communities and habitats outside of the Zone**s** of High Impact and authorised Zone**s** of Moderate Impact as spatially defined in Figure 3 **and Figure 6;**	Yes. Outcomes align with those listed in MS1211. Requires amendment to include the Revised Proposal.
BCH B1-1(4)	No change in the health, extent of coverage, or species diversity of intertidal benthic communities more than 100 m seaward of the pond walls as shown in Figure 2; and	Yes. Outcomes relevant to groundwater abstraction from trenches near the walls.
BCH B1-1(5)	Adverse impacts to intertidal benthic communities are limited to an area within 100 m of the pond wall defined in Figure 2.	Yes. Outcomes relevant to groundwater

Key Factor / Condition No.	Environmental Outcome (MS1211) (changes in blue and bold font)	Consistent with EP Act principles/EPA objectives?
		abstraction from trenches near the walls.
BCH B1-2(1)	No development that would have an adverse impact on the ecological function of the RRDMMA or the maintenance of ecological processes which sustain mangrove habitats within the RRDMMA (shown in Figure 2);	N/A
BCH B1-2(2)	No development that would have an adverse impact on the ecological function of intertidal and subtidal benthic communities and habitats;	Yes. Outcomes align with those listed in MS1211.
BCH B1-2(3)	No long-term (greater than five (5) years) net detectable loss of algal mat outside of the proposal footprint;	N/A
BCH B1-2(4)	No loss of subtidal benthic communities and habitat (including subtidal algae) outside the Zones of impact authorised in condition A1-1; and	Yes. Outcomes align with those listed in MS1211.
BCH B1-2(5)	No development that would have an adverse impact on the ecological processes or habitats that sustain the Bluespotted Emperor (*Lethrinus punctulatus*) fishery.	Yes. Outcomes align with those listed in MS1211.
Marine Pests B2-1(1)	No introduction or establishment of marine pests in the State Waters as a result of the proposal.	Yes. Outcomes align with those listed in MS1211.
Inland Waters B3-1(1)	No adverse impact to water levels or water quality in Mardie Pool as a result of changes to groundwater regimes or groundwater quality;	Yes. Outcomes align with those listed in MS1211. No impacts to Mardie Pool predicted.
Inland Waters B3-1(2)	No adverse impact to water levels or water quality in Mardie Pool as a result of surface water flows associated with the proposal;	Yes. Outcomes align with those listed in MS1211. No impacts to Mardie Pool predicted.
Inland Waters B3-1(4)	No changes to the health, extent or diversity of intertidal benthic communities and habitat, including mangrove, coastal samphire and algal mat as a result of changes to groundwater regimes or groundwater quality associated with the proposal;	Yes. Outcomes align with those listed in MS1211.
MEQ B4-2(1)	The levels of ecological protection to be achieved inside of the: (a) Low Ecological Protection Area shown in Figure 4 and described in the spatial data in schedule 1; (b) Moderate Ecological Protection Area shown in Figure 4 and described in the spatial data in schedule 1; (c) High Ecological Protection Area described in the spatial data in schedule 1; and (d) Maximum Ecological Protection Area described in the spatial data in schedule 1, is consistent with the method for deriving Environmental Quality Guidelines and Environmental Quality Standards for the corresponding level of ecological protection described in Appendix 1, Table 1 EPA Technical Guidance - Protecting the Quality of Western Australia's Marine Environment (EPA, 2016).	Yes. Outcomes align with those listed in MS1211.
Marine Fauna B5-1(1)	No mortality, injury, disturbance or displacement of Humpback whales (*Megaptera novaeangliae*) within the migration of the biologically important area;	Yes. Outcomes align with those listed in MS1211.
Marine Fauna B5-1(2)	No change in marine turtle orientation (i.e. misorientation or disorientation) nesting beach utilisation, nesting success or hatchling survivorship as a result of artificial light emissions at both sandy beach habitat adjacent to the development and Long	Yes. Outcomes align with those listed in MS1211.

Key Factor / Condition No.	Environmental Outcome (MS1211) (changes in blue and bold font)	Consistent with EP Act principles/EPA objectives?
	Island, Sholl Island and the Passage Islands (Angle, Middle and Round); and	
Marine Fauna B5-1(3)	Significant marine fauna are not prevented/deterred from undertaking critical behaviours in biologically important areas.	Yes. Outcomes align with those listed in MS1211.
Terrestrial Fauna B6-1(1)	No change in the abundance and diversity of migratory shorebirds utilising coastal samphire and mudflat habitats;	Yes. Outcomes align with those listed in MS1211.
Terrestrial Fauna B6-1(2)	No change in the nesting density of grey falcons (*Falco hypoleucos*);	Yes. Outcomes align with those listed in MS1211.
Terrestrial Fauna B6-1(3)	Maintain habitat connectivity, retention of a vegetation corridor between exclusion zone/s and similar habitat outside the impact area fifty (50) m exclusion zone around one (1) record of short range endemic fauna as shown in Figure 5;	N/A.
Terrestrial Fauna B6-1(4)	No direct or indirect disturbance within the fifty (50) m short range endemic exclusion zone as shown in Figure 5; and	N/A.
Terrestrial Fauna B6-1(5)	Disturbance within the northern quoll (*Dasyurus hallucatus*) foraging habitat to only occur during daylight hours;	N/A.
Flora and Vegetation B7-1(1)	No more than 165 ha of cumulative impacts to the Horseflat PEC as a result of the proposal, including direct impacts of no more than 145 ha;	Yes. Outcomes align with those listed in MS1211.
Flora and Vegetation B7-1(2)	No direct or indirect impacts to the known locations of Minnie Daisy (*Minuria tridens*) identified in the Phoenix – Targeted Pre-clearance Survey (2021), unless the CEO has confirmed by notice in writing that further investigations have demonstrated that the specimens represent adequately widespread species such that disturbance of the known specimens would not be inconsistent with the EPAs objective for Flora and Vegetation;	N/A.
Flora and Vegetation B7-1(3)	No direct impacts or indirect impacts to any known locations of the sterile, potentially rare or novel Tecticornia Taxa, identified within Phoenix – Detailed Flora and Vegetation Survey for the Mardie Project (2020), unless the CEO has confirmed by notice in writing that further investigations have demonstrated that that the specimens represent adequately widespread species such that disturbance of the known specimens would not be inconsistent with EPA's objective for Flora and Vegetation;	N/A.
Flora and Vegetation B7-1(4)	Ensure there are no indirect impacts from the introduction or spread of environmental weeds compare with pre-construction condition;	Yes. Outcomes align with those listed in MS1211.
Flora and Vegetation B7-1(5)	No disturbance associated with the proposal to more than thirty (30) per cent of the currently mapped extent (256 ha) of the landward samphire vegetation described in Mardie Project – Response to Submissions (March 2021), until the CEO has confirmed by notice in writing that: a. the supplementary surveys have mapped additional vegetation consistent with the description of the landward samphire in Mardie Project – Response to Submissions (March 2021); and b. the additional Tecticornia vegetation mapped in the supplementary surveys is sufficiently widespread in the region that clearing of up to 863 ha of this vegetation	N/A.

Key Factor / Condition No.	Environmental Outcome (MS1211) (changes in blue and bold font)	Consistent with EP Act principles/EPA objectives?
	would not be inconsistent with the EPA's objectives for Flora and Vegetation.	
Aboriginal Cultural Heritage B8-1(1)	No direct disturbance of the Aboriginal cultural heritage exclusion zones for Peters Creek as shown in Figure 5 and described in the spatial data in schedule 1; and	N/A.
Aboriginal Cultural Heritage B8-1(2)	Subject to reasonable health and safety requirements, no interruption of ongoing access to land utilised for traditional use or custom by the Yaburara and Mardudhunera People and Robe River Kuruma People.	Yes. Outcomes align with those listed in MS1211.

10.3.3 SIGNIFICANCE OF THE REVISED PROPOSAL

Mardie Minerals' assessment of the significance of the Revised Proposal on the surrounding environment is detailed in Table 9.

Implementation of the Revised Proposal requested in this S40AA Referral will require minor administrative amendments to several conditions of MS1211 (refer to Section 10.3.1).

It is expected that the Revised Proposal can be appropriately mitigated under the amended and existing implementation conditions. The amended conditions ensure that the Revised Proposal is adequately regulated under MS1211, and therefore the change of conditions are not expected to result in any significant additional impacts.

Table 9: Significance of the Revised Proposal

Statement of Reason	Comment
1) Nature of the proposed change	This Revised Proposal is seeking approval via S40AA of the EP Act for the following: • Inclusion of an offshore dredge spoil disposal method; • Disposal of capital and maintenance dredge spoil within an area defined as DMPA4; • Expansion of the TDE to allow the upgrade of an airstrip and inclusion of groundwater infrastructure; and • Groundwater abstraction. Spoil disposal within DMPA4 will result in the direct permanent loss of up to 4.6 ha sparse to moderate filter feeders on unconsolidated sediment and up to 25.7 ha of sparse to moderate filter feeder on low profile reef with sand veneer. Additionally, an indirect permanent loss of up to 355 ha of sparse to moderate filter feeders will occur within the ZoHI and an indirect recoverable impact of up to 720 ha of sparse to moderate filter feeders within the ZoMI. The expanded TDE will increase the area where clearing could occur, however the total clearing limits will not increase above what was approved under MS1211. Additionally, there may be potential direct and indirect impacts to terrestrial fauna and social surroundings. Groundwater abstraction will be minor volumes with negligible impacts predicted.
2) Values, sensitivity and the quality of the environment which is likely to be impacted	**MEQ** Water quality at DMPA4 is considered likely to almost completely free of contaminants. The sediment samples taken within DMPA4 by O2 Marine (2024a; Attachment 2) were comparable to five northern most sediment samples that were collected within the dredge channel in 2022, and six dredge channel sediment samples collected in 2023. Generally, the sediment samples within DMPA4 reflected characteristics expected from offshore greenfield sites in the Pilbara, with the majority of the contaminants being either below laboratory limits of reporting, below the NAGD (2009) screening levels, or comparable to concentrations along the Pilbara coast as documented in DEC (2006). **BCH** BCH modelling completed by O2 Marine (2024a; Attachment 2) noted that results indicated the potential existence of low-profile reefs (limestone pavement) beneath the sandy substrate. Low-profile reefs are recognised as significant features that support various marine organisms by providing hard substrates for filter feeders like sponges and soft corals. Surveys conducted by UWA (2009) found that sand-inundated reefs generally supported less dense sponge assemblages, aligning with the dominant observation of sparse to low cover assemblages throughout DMPA4. Since only sand was observed in the towed video transects, the presence of low-profile reefs can only be inferred. However, based on the observed terrain and existing knowledge of the prevalence of this type of morphology in this region (Scott et al., 2006; UWA, 2009), this is likely accurate. DMPA4 was characterised as a relatively homogenous habitat, supporting a sparse to moderate cover mixed assemblage, predominantly comprised of sessile filter feeders (including soft corals, gorgonians, sponges, hydroids and ascidians), alongside varying cover of subdominant species such as macroalgae, hard corals, and ephemeral seagrass. Such sessile feeder assemblages are typical of sand veneered and exposed pavements, which are prevalent on the inner North West Shelf and represent one of the most widespread BCH types in the Pilbara region. **Marine Fauna**

Statement of Reason	Comment
	The Revised Proposal has specifically been located in an area with BCH that is not unique or important to any significant Marine Fauna species. Marine fauna species are therefore likely to be traversing the site rather than residing within it, however it does intersect with important movement pathways for the Humpback Whale and marine turtles. **Flora and Vegetation** No significant flora or vegetation values were identified within the expanded TDE areas by Phoenix (2025; Attachment 8). Three vegetation types were mapped, which were noted to be abundant outside of the airstrip study area. Vegetation condition within the airstrip study area ranged from 'completely degraded' to 'excellent'. **Terrestrial Fauna** No threatened of priority vertebrate fauna were identified within the expanded TDE areas by Phoenix (2024; Attachment 12). In addition, a habitat assessment in close proximity to the airstrip did not identify any potential bird attractants, and the habitat directly around the airstrip has minimal value for birds. **Social Surroundings** There were no Aboriginal sites or places identified within the airstrip study area portion of the TDE during the site avoidance Aboriginal Heritage survey undertaken with the Yaburara and Mardudhunera Traditional Owners (Horizon Heritage, 2024; Attachment 11). There is one registered heritage site (Wiruwandi Plain (DPLH 10351)) immediately adjacent to the airstrip tenement L08/325. However, this site will not be impacted with the proposed minor upgrade works to the airstrip. **Inland Waters** Groundwater abstraction will occur in an area with limited ecological uses.
3) Stages and components of the proposal (such as any infrastructure required for the proposal to be practicably implemented, or a proposal life cycle)	Offshore disposal of capital dredge spoil for the Revised Proposal represents a temporary activity to be undertaken over several months. Offshore disposal of maintenance dredge spoil will occur throughout the life of the Approved Proposal as needed, and will not exceed the disturbance undertaken during the initial disposal of capital dredge spoil. The airstrip direct impacts related to clearing will occur during the construction phase, which will be available for use by RDFS for emergencies during operations. Groundwater abstraction will occur primarily during the construction phase, with desalinated water providing the primary fresh water source during operations.
4) Extent (intensity, duration, magnitude and geographic footprint) of the likely impacts	The disposal of dredge spoil within DMPA4 will increase the Approved Proposal's direct disturbance by up to 30.3 ha, equating to the direct permanent loss of up to 4.6 ha sparse to moderate filter feeders on unconsolidated sediment and up to 25.7 ha of sparse to moderate filter feeder on low profile reef with sand veneer. In addition to this, an indirect permanent loss of up to 355 ha of sparse to moderate filter feeders will occur within the ZoHI and an indirect recoverable impact of up to 720 ha of sparse to moderate filter feeders within the ZoMI. Other associated impacts such as those associated with vessel strike, marine noise, light and IMPs are also temporary, and the implementation of mitigation measures such as MFOs, speed limits and IMP management is predicted to reduce the risk of these impacts such that they are not significant. Groundwater abstraction is likely to result in a limited extent of drawdown around each bore or trench, given the low volumes abstracted from each source.

Statement of Reason	Comment
5) Resilience of the environment to cope with the impacts or change	The Revised Proposal is not predicted to impact any highly sensitive ecosystems, with only low-value BCH recorded within the impacted areas, with these BCH and marine fauna habitats typically widespread through the region. These habitats will be impacted within the 30.3 ha DMPA4 area and the surrounding ZoHI, but within the ZoMI they are likely to be resilient to the changes and are unlikely to be permanently affected. The airstrip upgrade will occur within an area that has partly been disturbed, within vegetation types that are well represented throughout the region. Groundwater abstraction will occur in a resilient area with limited ecological uses.
6) Consequence of the application of the mitigation hierarchy to the proposal	A key reason for the Revised Proposal relates to the implementation of the mitigation hierarchy. Offshore disposal allows for avoided impacts to *Minuria tridens* (now *Minuria* sp. Onslow (A.J. Perkins & M. Henson AJP-WA167)) through onshore disposal. Mardie Minerals will implement the DSDMP (and associated control measure detailed within) to mitigate potential impacts of the Revised Proposal (O2 Marine, 2025; Attachment 3). Contingency measures will be developed to address any impacts if they occur. Existing management plans will be updated as required to include the Revised Proposal.
7) Consequence of the likely impacts (or changes) including off-site impacts and indirect impacts	The Revised Proposal does not change the intensity, duration or magnitude of the Approved Proposal's likely impacts. Offshore disposal of capital dredge spoil material is a short-term activity (several months) and has been specifically located in an area with BCH that is not unique or important to any significant marine fauna species. Disposal of maintenance dredge spoil material will occur as needed for the life of the Approved Proposal, and will not exceed the impacts from the initial disturbance due to disposal of capital dredge spoil material. The consequences of the likely impacts of the Revised Proposal are predicted to be minor, provided the measures proposed in the DSDMP (O2 Marine, 2025; Attachment 3) are implemented. The loss of BCH within the ZoHI is unavoidable, however, this BCH is of low-value and is widespread throughout the surrounding area. In the longer-term it is likely that BCH recolonisation could occur. Strict management measures are proposed to ensure that any impacts to significant marine fauna that may be occasionally present are minimised, including ensuring that no works take place within the 1 October – 31 March ecological window. These measures are predicted to result in no long-term decreases in the size of any significant marine fauna populations. No significant terrestrial environmental consequences are predicted from the expansion of the TDE. No groundwater-related environmental consequences are predicted.
8) Likely environmental outcomes, and whether these are consistent with EPA environmental factor objectives	The Revised Proposal has been determined to not have a significant residual impact on key environmental factors, given that mitigation measures are implemented alongside the DSDMP (O2 Marine, 2025; Attachment 3). The implementation of the Revised Proposal will be managed using the DSDMP and other Proposal environmental management plans, which will be updated as required to include the proposed amendments. Mardie Minerals considers that the environmental outcomes of the Revised Proposal will therefore remain consistent with those listed within MS1211 and the EPA's objective for the relevant Key Environmental Factors.
9) Cumulative impacts with other projects	Given the mitigation measures proposed, temporary nature of the Revised Proposal, the low-value of the BCH impacted, the lack of additional clearing and the low groundwater abstraction volumes, there are no significant cumulative impacts that are predicted to occur.

Statement of Reason	Comment
10) Connections and interactions between parts of the environment to inform holistic view of impacts of the whole environment	The Revised Proposal detailed within this S40AA Referral does not introduce any new connections or interactions that were not part of the Approved Proposal. Existing connections and interactions between parts of the surrounding environment are not expected to change significantly.
11) Level of confidence in the prediction of impacts and the success of proposed mitigation	The Revised Proposal is unlikely to alter Mardie Minerals' level of confidence in the predicted impacts and/or the success of proposed mitigation compared to the Approved Proposal.
12) Public interest about the likely effect of the proposal, if implemented, on the environment, and public information that informs the EPA's assessment	In the EPA's assessment of the Approved Proposal (EPA, 2021b; EPA, 2023b), the consultation process was considered appropriate, and reasonable steps were taken to inform the community and stakeholders on the proposed development. Impacts to commercial fisheries were raised as concerns during the 10-week public review of the Approved Proposal. The EPA's assessment concluded that the Approved Proposal was unlikely to have a significant impact to subtidal BCH and marine fauna. Mardie Minerals discussed the Revised Proposal with WAFIC, DPIRD and Recfishwest who expressed concerns regarding impacts to Bluespotted Emperor, which is endemic to WA and an indicator species of the Pilbara demersal scalefish resources. One such concern was related to the potential disturbance during the vulnerable early life stages of the Bluespotted Emperor, which has pelagic eggs and larvae that settle and recruit exclusively in the nearshore sargassum. Additionally, concerns were raised regarding impacts to commercial and recreational fishery use. The Revised Proposal has been designed to be situated away from important marine fauna habitat and islands. The habitat present within DMPA4 and the surrounding zones of impacts are widely represented throughout the Pilbara region. There is no likely public interest in the airstrip upgrade and groundwater abstraction.

ATTACHMENTS

Attachment 1: Revised Proposal Content Document

Attachment 2: DMPA4 Benthic Communities and Habitats Report (O2 Marine, 2024a)

Attachment 3: Dredge and Spoil Disposal Management Plan (O2 Marine, 2025)

Attachment 4: Mining Tenement Summary Reports

Attachment 5: Stakeholder Consultation Outcomes Register

Attachment 6: DMPA4 Dredge Plume Modelling (Baird, 2024a)

Attachment 7: DMPA1 Dredge Plume Modelling (Baird, 2024b)

Attachment 8: Airstrip Detailed Flora and Vegetation Survey (Phoenix, 2025)

Attachment 9: Groundwater Licence Amendment Supporting Document (EMM, 2025)

Attachment 10: Maintenance Dredging Estimate (Baird, 2020)

Attachment 11: Airstrip WAC Aboriginal Heritage Survey (Horizon Heritage, 2024)

Attachment 12: Airstrip Basic Fauna Survey (Phoenix, 2024)

Attachment 13: Mardie Minerals Environment Policy

GLOSSARY

Term	Definition
AH Act	*Aboriginal Heritage Act 1972* (WA)
ANZG	Australia and New Zealand Governments
Approved Proposal	Optimised Mardie Project approved under MS1211, EPBC 2018/8236 and EPBC 2022/9169
AQ2	AQ2 Pty Ltd
Baird	Baird Australia Pty Ltd
BAM Act	*Biosecurity and Agriculture Management Act 2007* (WA)
BC Act	*Biodiversity Conservation Act 2016* (WA)
BCH	Benthic Communities and Habitat
BCHMMP	Benthic Communities and Habitat Monitoring and Management Plan
Biosecurity Act	*Biosecurity Act 2015* (Cth)
BTEXN	Benzene, Toluene, Ethylbenzene, Xylenes and Naphthalene
CEMP	Construction Environmental Management Plan
CEO	Chief Executive Officer
cm	centimetre
CoPC	Contaminants of Potential Concern
Cth	Commonwealth
DAWE	Department of Agriculture, Water and the Environment
DBCA	Department of Biodiversity, Conservation and Attractions
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DEC	Department of Environment and Conservation
DEMIRS	Department of Energy, Mining, Industry Regulation and Safety
DLI	Daily Light Integral
DMA	Decision-Making Authority
DMIRS	Department of Mining, Industry Regulation and Safety (now DEMIRS)
DMP	Dredge Management Plan
DMPA	Dredge Material Placement Area
DotE	Department of the Environment
DPIRD	Department of Primary Industries and Regional Development
DPLH	Department of Planning, Lands and Heritage
DSDMP	Dredge and Spoil Disposal Management Plan
DWER	Department of Water and Environmental Regulation
EIA	Environmental Impact Assessment
EMM	EMM Consulting
EP Act	*Environmental Protection Act 1986* (WA)
EPA	Environmental Protection Authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cth)
EQC	Environmental Quality Criteria

Term	Definition
ESMP	Environmental and Social Management Plan
GHG	Greenhouse Gas
GIS	Geographic Information System
GL	Gigalitre
GL/yr	Gigalitre per year
GMMP	Groundwater Monitoring and Management Plan
ha	Hectare
Horizon Heritage	Horizon Heritage Management
IMO	International Maritime Organisation
IMP	Introduced Marine Pests
ISQG	Interim Sediment Quality Guideline
km	Kilometre
Km/h	Kilometres per hour
Km^2	Squared kilometres
LGA	Local Government Area
m	Metre
m^3	Cubic Metre
mAHD	Metres Australian Height Datum
Mardie Minerals	Mardie Minerals Pty Ltd (A wholly owned subsidiary of BCI Minerals Limited)
Mardie Project	Original Mardie Project - approved under MS1175 (superseded by MS1211) and EPBC 2018/8236
MBES	Multibeam Eco Sounder
MEQ	Marine Environmental Quality
MFO	Marine Fauna Observer
mg/kg	Milligrams per kilogram
Mg/L	Milligrams per litre
Mining Act	*Mining Act 1978* (WA)
MNES	Matters of National Environmental Significance
MPSC	Marine Pest Sectoral Committee
MS	Ministerial Statement
NAGD	National Australian Guidelines for Dredging
NM	Nautical Mile
O2 Marine	O2 Marine Group (incorporating O2 Environment, O2 Metocean, O2 Inflight and O2 Sea Country)
Optimised Mardie Project	Optimised Mardie Project - approved under MS1211 and EPBC 2022/9169
P80	80^{th} Percentile
PCD	Proposal Content Document
PEC	Priority Ecological Community
Pendoley Environmental	Pendoley Environmental Pty Ltd
Phoenix	Phoenix Environmental Sciences
PMPL	Pastoral Management Pty Ltd

Term	Definition
PP	Pilbara Ports
ppt	Parts per thousand
Preston Consulting	Preston Consulting Pty Ltd
PSD	Particle Size Distribution
Revised Proposal	Amendment to the Optimised Mardie Project approved under MS1211 via S40AA of the EP Act to allow for: • Offshore disposal of up to 355,000 cubic metres of capital dredge spoil, and offshore disposal of maintenance dredging, within an area defined as DMPA4; • 118 ha expansion of the TDE to allow upgrades to an existing Airstrip and access to groundwater bores; and • Abstraction of up to 0.7 gigalitres per year of groundwater.
RFDS	Royal Flying Doctor Service
RIWI Act	*Rights in Water and Irrigation Act 1914* (WA)
RRDMMA	Robe River Delta Mangrove Management Area
S40AA	Section 40AA of the EP Act
Sea Dumping Act	*Environment Protection (Sea Dumping) Act 1981* (Cth)
SSC	Suspended Sediment Concentration
SSS	Side Scan Sonar
SSWI	Secondary Seawater Intake
TACC	Port of Ashburton Technical Advisory and Consultative Committee
TDE	Terrestrial Development Envelope
UKC	Under Keel Clearance
UWA	University of Western Australia
WA	Western Australia
WAC	Wirrawandi Aboriginal Corporation
WAFIC	Western Australian Fishing Industry Council
WAMSI	Western Australian Marine Science Institute
WoNS	Weed of National Significance
ZoHI	Zone of High Impact
ZoI	Zones of Influence
ZoMI	Zone of Moderate Impact

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