Offshore Dredge Spoil Disposal
Mardie Project

EPBC 2024/10054 – Preliminary Documentation

DOCUMENT CONTROL

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1. INTRODUCTION

In January 2022, Mardie Minerals Pty Ltd (Mardie Minerals), a wholly owned subsidiary of BCI Minerals Limited (BCI), was granted approval for the Mardie Project via EPBC 2018/8236 under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth; EPBC Act). The Mardie Project is a greenfields high quality salt and sulphate of potash (SoP) project and associated export facility at Mardie, approximately 80 kilometres (km) southwest of Karratha, in the Pilbara region of Western Australia (WA). Mardie Minerals subsequently referred the Optimised Mardie Project to the Department of Climate Change, Energy, the Environment and Water (DCCEEW) as a significant amendment to the Mardie Project, with the purpose of accommodating increased salt and SoP production, facilitated by additional *Mining Act 1978* (WA; Mining Act) tenure secured by Mardie Minerals. In September 2024, the Optimised Mardie Project was granted approval via 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.

Mardie Minerals is seeking under EPBC 2024/10054 to transport and dispose of dredge spoil from capital and maintenance dredging activities for the Approved Proposal (EPBC 2018/8236 and EPBC 2022/9169) within a new defined dredge material placement area (DMPA) referred to as 'DMPA4' (Proposed Action). DMPA4 is approximately 25 km (13.5 Nautical Miles (NM)) offshore from the Approved Proposal, 10.5 km (5.7 NM) northwest of Sholl Island and 116 km (63 NM) northeast of Onslow, WA (Figure 1). The Proposed Action is located in WA State marine waters.

The Proposed Action Project Area, including DMPA4 and the zones of impact, comprises an area of 1,105 hectares (ha). DMPA4 is where the material will be placed directly on top of the sea bed. It comprises an area of 30.3 ha (Disturbance Footprint - Direct). The Disturbance Footprint – Indirect is defined as the outer boundary of the area defined by the model as the Zone of Moderate Impact (ZoMI) and includes the 355 ha portion of the Zone of High Impact (ZoHI) that lies outside DMPA4. The combined ZoHI and ZoMI (without DMPA4) cover an area of 1,075 ha (Disturbance Footprint – Indirect). The Project Area and Disturbance Footprints are shown in Figure 2.

1.1 Overview of the Proposed Action

The Proposed Action is to dispose capital dredge spoil material (up to an estimated 355,000 cubic metres (m^3) – including 10% over dredge) and maintenance dredge spoil material (up to an estimated 2,850,000 m^3 over the life of the Proposed Action) produced from the Approved Proposal within an area defined as DMPA4, including the transport of the dredge spoil material via barges from the Approved Proposal dredge areas to DMPA4.

1.1.1 Offshore Dredge Spoil Disposal

In order to construct the export facility approved for the Approved Proposal, dredging is required to develop a transhipment berth pocket and approximately 4.9 km navigation channel. Mardie Minerals has approval under Condition 36(c) of EPBC 2018/8236 and EPBC 2022/9169 to dredge up to 800,000 m^3 within the Approved Proposal 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. The design refinements to the Approved Proposal dredge area include reductions to the depth of the berth pocket, manoeuvring area and navigation channel as well as reductions to the width of the navigation channel and the manoeuvring area. Maintenance dredging will be required to ensure safe navigational requirements are maintained in the area, consistent with other navigational hazards.

The disposal method approved under Condition 36(g) of EPBC 2018/8236 and EPBC 2022/9169 is onshore disposal. However, following a formal tendering process with dredging contractors in 2022 and 2023, it was found that onshore disposal would not be practicable due to the shallow water depths inshore, the rocky substrate identified within certain sections of the dredge area through the geophysical survey, 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 the technical concerns, were the likely environmental impacts of land disposal identified through the tendering process, These included the need to pump dredge spoil over long distances in a very shallow nearshore environment, which requires slurry pipeline transport involving multiple booster pumps on water. This mechanism poses risks such as seabed disturbance, slurry leakage, pollution from fuel emissions, and potential underwater noise impacts on marine fauna. The rocky substrate in certain sections of the dredge area further complicates onshore transport, necessitating additional on-water rock crushing and processing.

In addition, were the likely impacts to a species previously identified as *Minuria tridens* (Vulnerable) that occupy portions of the land-based dredge disposal area. No impacts to *Minuria tridens* are permitted under Condition 10 of EPBC 2018/8236 and EPBC 2022/9169. 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. On land, managing spoil dewatering near sensitive ecological zones - such as mangroves - and preventing the dispersal of spoil during extreme weather events (cyclones) or wind-blown dust from the spoil stockpile across salt stockyard remain ongoing concerns.

Several offshore disposal sites were considered, and DMPA4 was chosen as the preferred disposal location as it is close to the Approved Proposal and surveys have identified that 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 (Att1_DMPA4 BCH Report 2024, Section 6, Page 31).

Details of the proposed monitoring programs at DMPA4 are provided within the Dredge and Spoil Disposal Management Plan (DSDMP), which include:

- Marine Water Quality Monitoring Program (Att2_DSDMP 2025, Section 8.1, Pages 65-76);
- Benthic Habitat Monitoring Program (Att2_DSDMP 2025, Section 8.2, Pages 76-86); and
- Marine Fauna Monitoring (Att2_DSDMP 2025, Section 8.3, Pages 86-97).

The total maximum estimated capital and maintenance dredging disposal requirements for the life of the Approved Proposal (until 24 November 2084) is 3,205,000 m^3. Details for the calculation of this amount can be found in the sections below.

a. Capital Dredging

The modelled scenario assumes that capital dredge spoil would be disposed at DMPA4 by barges across three hopper loads per day of approximately 1,200 m^3 each (on average), for a total of approximately 3,600 m^3 being disposed per day (Att3_DMPA4 Disposal Plume Modelling 2024, Page 5). Based on the geotechnical surveys conducted of the dredge areas for the Approved Proposal, the capital dredge spoil is expected to primarily contain portions of clay mixed with sands and gravels (approximately 90% of total volume) and a small portion of rock (approximately 10% of total volume). The modelled schedule has been broken into four separate sequences that in total, cover a duration of up to 98 days (Att3_DMPA4 Disposal Plume Modelling 2024, Table 3, Page 4). It should be noted that the maximum (of three) runs may not be possible on some days,

and/or the dredging activities may take more or less than 98 days to get the expected 355,000 m^3 design dredge volume to be disposed of at DMPA4; this is because the modelled scenario does not account for on-site delays or interruptions due to marine fauna avoidance/management actions during dredging that may extend the time required to complete the works.

b. Maintenance Dredging

Mardie Minerals engaged Baird Australia Pty Ltd (Baird) to estimate the annual maintenance dredging volumes for the Approved Proposal (Att4_Maintenance Dredging Estimate 2020). 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 range from 39,000 - 65,500 m^3 annually (Att4_Maintenance Dredging Estimate 2020, Page 19). This estimate was made for the Approved Proposal dredge area approved under State and Commonwealth conditions (Ministerial Statement (MS) 1211, EPBC 2018/8236 (as varied) and EPBC 2022/9169). This dredge channel 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 much more of the offshore area is at design depth where no capital (and maintenance) dredging will be required.

WSP Australia Pty Limited (WSP) provided an updated estimate of maintenance dredging volumes for the dredging proposed as part of the Approved Proposal (WSP 2025 [Draft]). Based on consultation with Pilbara Ports and taking into consideration the volume and frequency of dredging undertaken at the much larger (29 million (M) m^3 capital dredging volume) nearby Port of Ashburton facility, an upper limit annual maintenance dredging volume of 50,000 m^3 was estimated for the Approved Proposal. Mardie Minerals considers this to be a very conservative (high) upper limit estimate.

The most efficient maintenance dredging method, traditionally used for most ports, is a trailer suction hopper dredger (TSHD). A TSHD drags an arm along the seabed and extracts the sediments as a slurry into the vessel's hopper, prior to transport for disposal at the spoil ground. There will be limitations on the size of TSHD that can be utilised for maintenance dredging for the Approved Proposal due to the shallow water depths. It is therefore assumed that maintenance dredging would likely be undertaken with a small sized TSHD with a hopper capacity of 1,400 m^3.

The time spent actively dredging to fill the TSHD with dredged spoil will be dependent on the material being dredged and the thickness of sediments. The sediments requiring maintenance dredging are expected to be predominantly finer silts and in relatively thin layers, therefore, loading times are expected to be relatively slow. While this may vary over the maintenance dredging duration, the loading time on average has been assumed to be three hours per load.

DMPA4 is approximately 14.85 NM from the dredge area, assuming an average sailing speed of the barge of 6 knots, the sailing duration would be 2.5 hours one way. It has been conservatively assumed that the time spent at DMPA4 would be one hour. An overall cycle time (i.e., dredging, sailing loaded with dredge spoil, disposal, sailing empty back to dredge area) can be expected to be on average 9.5 hours, which would allow for on average 2.5 barge hopper loads per day to be disposed over a 24-hour period, with approximately 1,778 m^3 dredged per day (WSP 2025 [Draft]).

Maintenance dredging is not expected to be needed 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). 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 and - 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.

Given the (conservative) annual maintenance dredge upper limit volume is estimated to be approximately 50,000 m^3, disposal of dredge spoil to a depth of 2 m at DMPA4 provides for approximately five years of maintenance dredging if disposal frequency (events) are required annually and the sediment depth is up to 2 m, with each additional 1 m of spoil disposal at DMPA4 providing for an extra six years of maintenance dredge disposal. A breakdown of the estimated volume of maintenance dredging disposal at DMPA4 across three scenarios (annually, 2-yearly, and 5-yearly events) is provided in Table 1; note that the estimates are indicative only and will be subject to change following the award of the maintenance dredging contract and pending the contractor's dredging equipment selection. Over the life of the Approved Proposal (until 24 November 2084), a total of 2,850,000 m^3 of maintenance dredge spoil is to be dumped at DMPA4. Each dredging program will include 71 (annual), 143 (2-yearly) or 357 (5-yearly) events (i.e. one event is one load being disposed by the TSHD). Based on sediment composition, the maintenance dredge spoil is conservatively anticipated to contain a lower proportion of fines - predominantly comprising sand - compared to capital dredge spoil. By applying an average density factor of 1.5 to the annual upper limit volume of 50,000 m^3, the estimated mass of the maintenance dredge spoil is therefore approximately 75,000 tonnes.

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).

Attachment 22 provides clarifications on the increase to the estimate of the maintenance dredging volumes.

Table 1: Estimated volume of maintenance dredging disposal at DMPA4

	Unit	Amount		
Maintenance dredging cycle time				
Dredging	hr	3		
Sailing loaded (15 NM @ 6 knots)	hr	2.5		
Disposal at DMPA4	hr	1		
Sailing empty (15 NM @ 6 knots)	hr	2.5		
Allowance for delays (5%)	hr	0.45		
Cycle time	hr	9.45		
Average number of loads per day (24-hour operations)	no	2.5		
Maintenance dredging capacity				
TSHD capacity	m^3	1,400		
Loading efficiency	%	50		
Net TSHD volume per load	m^3	700		
Average volume dredged per day	m^3/day	1,778		
Maintenance dredging disposal scenario (1)		1-yearly	2-yearly	5-yearly
Upper volume of disposal (2)	m^3	50,000	100,000	250,000
Total number of TSHD loads	no	71	143	357
Total duration	days	28	56	141
Average volume disposed per day	m^3/day	1,778	1,778	1,778
	Tonnes/day	2,667	2,667	2,667
Total volume disposed by 2084	m^3	2,850,000	2,850,000	2,850,000
	tonnes	4,275,000	4,275,000	4,275,000

Notes:

1. Due to the planned over dredging during capital dredging, it is predicted that maintenance dredging year one will be in 2028.
2. Subject to site survey of dredging and disposal sites after dredging event/s.
3. 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.

1.1.2 Vessel Route

The proposed vessel route from the dredge channel to DMPA4 is shown in Figure 3. 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 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* (Cth), the *Shipping Act 1981* (Cth), and the International Maritime Organization (IMO) regulations.

1.1.3 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 capital dredging campaign is expected to occur over a period of four to six months, followed by monitoring activities after capital 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 MS 1211 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 maintenance 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).

370000 380000 390000 400000

7710000 7700000 7690000 7680000 7670000

KARRATHA

BARROW ISLAND

MARDIE PROJECT

ONSLOW

Legend

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

Steamboat Island

Stewart Island

Fortescue Island

Sholl Island

Mardie Island

Round Island

Long Island

Middle Passage Island

Angle Island

Passage Island

Solitary Island

South Passage Island

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GDA2020 MGA Zone 50

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Offshore Dredge Spoil Disposal - Mardie Project Regional Location

Figure: 1

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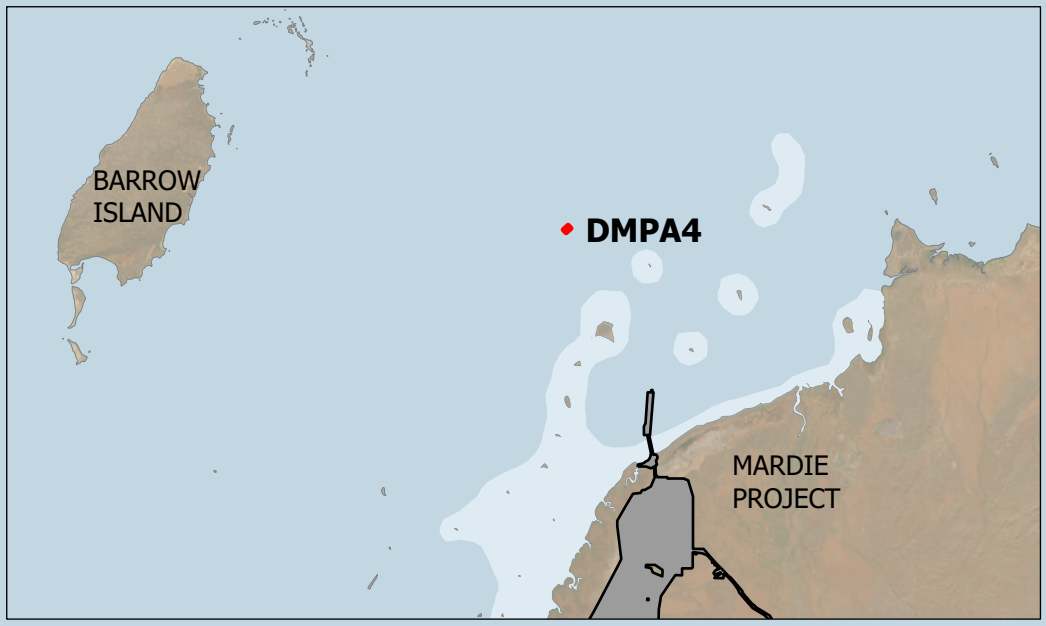
7697500 7697500



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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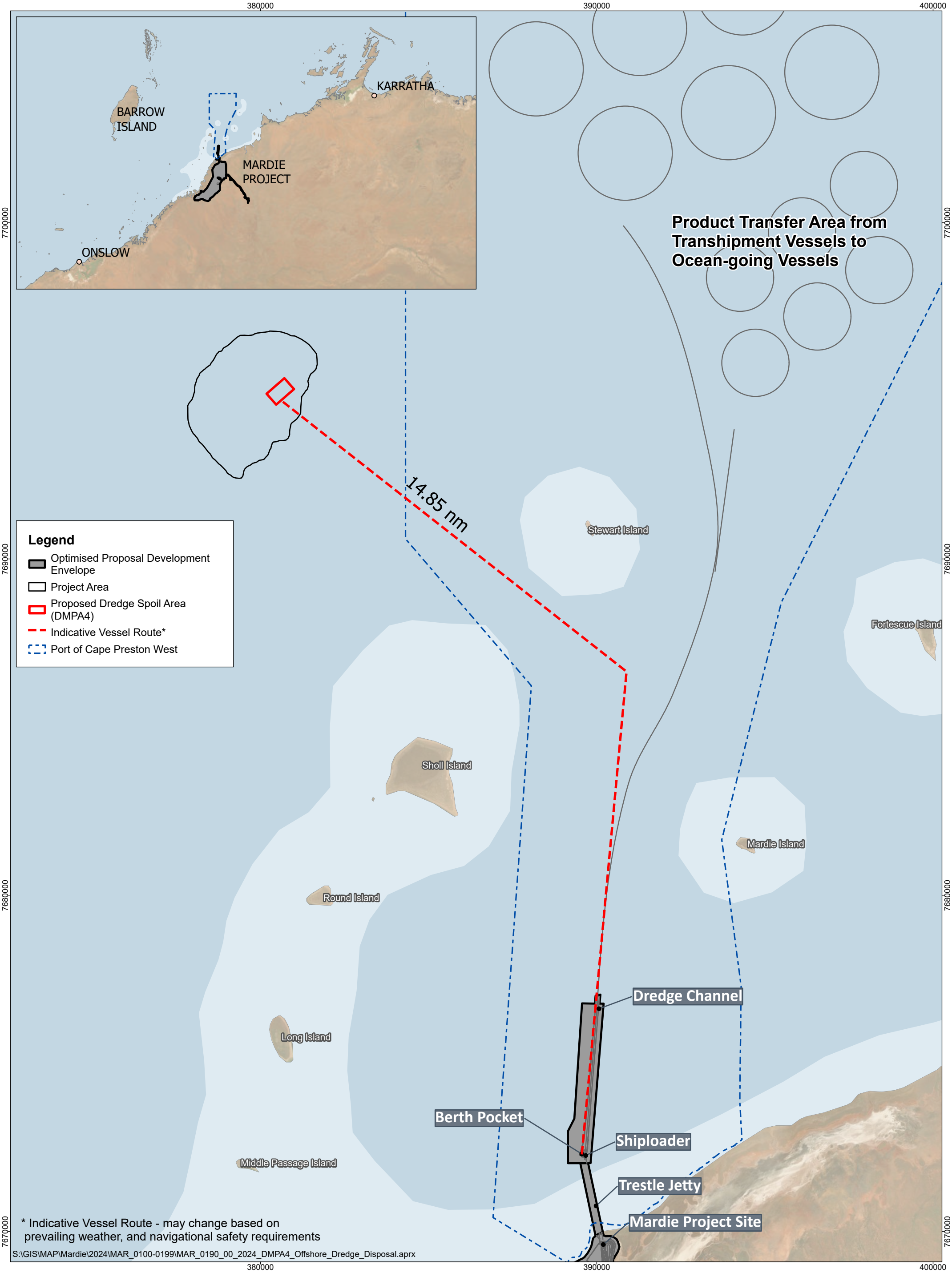
Offshore Dredge Spoil Disposal - Mardie Project
Project Area and Disturbance Footprints

Figure: 2



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Offshore Dredge Spoil Disposal - Mardie Project Indicative Vessel Route from the Dredge Channel to DMPA4

Figure: 3

1.2 Relevant Information about Associated Proposed Action

A summary of referrals that are related to the Proposed Action has been provided in Table 2.

Table 2: Related Referrals

EPBC Number	Project Title
EPBC 2018/8236	Mardie Project, 80 km south west of Karratha, WA
EPBC 2022/9169	Optimised Mardie Solar Salt Project
EPBC 2024/10094	Optimised Mardie Project – Additional Triodia Grassland Habitat Clearing

In January 2022, Mardie Minerals was granted approval for the Mardie Project via EPBC 2018/8236 under the EPBC Act. The Mardie Project is a greenfields high-quality salt and SoP project and associated export facility at Mardie, approximately 80 km southwest of Karratha, in the Pilbara region of WA. Mardie Minerals subsequently referred the Optimised Mardie Project to DCCEEW as a significant amendment to the Mardie Project, with the purpose of accommodating increased salt and SoP production, facilitated by additional Mining Act tenure secured by Mardie Minerals. In September 2024, the Optimised Mardie Project was granted approval via 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.

An EPBC referral was submitted to DCCEEW on 12 December 2024 to increase the clearing limit for *Triodia* grassland habitat within the Optimised Mardie Project development envelope approved under EPBC 2022/9169 (EPBC 2024/10094). It was open for public comments in February 2025, and is currently pending the Delegate's referral decision. The activities proposed in EPBC 2024/10094 are not directly related to the Proposed Action as they occur solely in the terrestrial environment.

1.3 Commonwealth and State Legislation, Planning, Frameworks or Policy Documents Relevant to the Proposed Action

A summary of the Approved Proposal, relevant tenure and other related approvals are detailed in Table 3 and Figure 4. Further information is provided in the following sections.

Table 3: Project Approval Overview

EPBC Approval	Other Approvals	Tenure	Activity Summary
EPBC 2018/8236	***Environmental Protection Act 1986* (WA; EP Act):** MS 1175 (superseded) and MS 1211	Tenure issued under the Mining Act and *Port Authorities Act 1999* (WA; PA Act)	To construct and operate the Mardie salt and sulphate of potash project, 80 km southwest of Karratha, Pilbara region, Western Australia [See EPBC Act referral 2018/8236 and variation request dated 24 January 2020].
EPBC 2022/9169	**EP Act:** MS 1211	Tenure issued under the Mining Act and PA Act.	To construct and operate the Optimised Mardie Solar Salt including seawater intake, brine discharge, dredging, clearing and flooding of vegetation and mudflats, a purpose-built quarry and associated activities located in the Pilbara region of Western Australia (WA), approximately 80

EPBC Approval	Other Approvals	Tenure	Activity Summary
			kilometres (km) southwest of Karratha [See EPBC Act referral 2022/9169).
EPBC 2024/10054 (Proposed Action)	**EP Act:** MS 1211 amendment application submitted under Section 40AA (S40AA) of the EP Act.	-	To transport and dispose of dredge spoil from capital and maintenance dredging activities for the Mardie Project (EPBC 2018/8236 and EPBC 2022/9169) within a defined offshore spoil ground 'DMPA4'.

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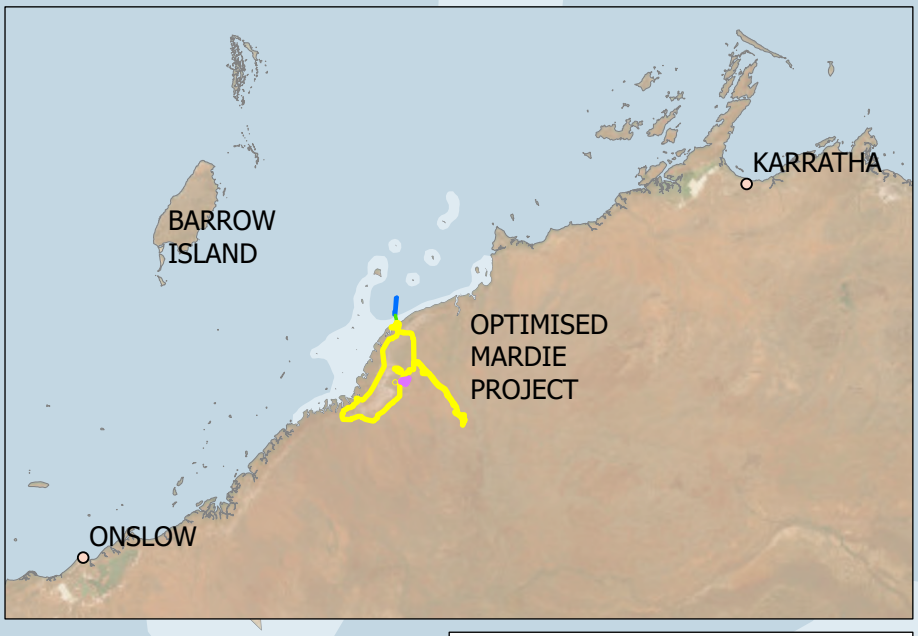

LEGEND

- EPBC 2022/9169 DEVELOPMENT ENVELOPE
- EPBC 2018/8236 DEVELOPMENT ENVELOPE
- PROPOSAL AREA
- PROPOSED DREDGE SPOIL AREA (DMPA4)
- EXPLORATION LICENCE
- GENERAL PURPOSE LEASE
- MISCELLANEOUS LICENCE
- MINING LEASE

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

E 08/3516
G 08/101
G 08/93
M 08/539-B
M 08/527-B
L 08/233
E 08/1849-I
M 08/526-B
L 08/325
L 08/188
G 08/102
E 08/2740-I
L 08/193
M 08/525-B
G 08/103
M 08/538
E 08/2647

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Offshore Dredge Spoil Disposal - Mardie Project
Project Development Envelopes and Tenure

Figure: 4

1.3.1 *Environment Protection and Biodiversity Conservation Act 1999* (Cth)

The Approved Proposal has been referred in two primary stages; the Mardie Project and the Optimised Mardie Project. The Mardie Project was assessed and approved in January 2022 (EPBC 2018/8236). The Optimised Mardie 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 (Department of the Environment (DotE), 2013a), this Proposed Action has the potential to impact listed Matters of National Environmental Significance (MNES), which includes listed Threatened and Migratory species and therefore requires referral under the EPBC Act.

An EPBC referral was submitted to DCCEEW on 12 December 2024 to increase the clearing limit for *Triodia* grassland habitat within the Optimised Mardie Project development envelope approved under EPBC 2022/9169 (EPBC 2024/10094). It was open for public comments in February 2025 and is currently pending the Delegate's referral decision. The activities proposed in EPBC 2024/10094 are not directly related to the Proposed Action as they occur solely in the terrestrial environment.

An EPBC referral was submitted to DCCEEW on 15 November 2024 for the Proposed Action (EPBC 2024/10054). It was determined on 14 May 2025 to be a 'Controlled Action' and the assessment approach 'Assessment on Preliminary Documentation – Further Information Required'.

1.3.2 *Environmental Protection Act 1986* (WA)

The key piece of legislation for a project with the potential to impact the environment in WA is the State's EP Act. This is supported by the Environmental Impact Assessment (Part IV Divisions 1 and 2) Procedures Manual (EPA, 2021a). The EP Act specifies the objectives and requisite procedures of environmental impact assessment (EIA) that proponents and stakeholders must comply with. Further guidance documents are provided by the WA Environmental Protection Authority (EPA) to define the environmental considerations expected as part of a project's EIA and environmental management. The Statement of environmental principals, factors, objectives and aims of EIA (EPA, 2021b) overarches the EIA environmental considerations, outlining the guiding principles and defining the specific factors to be considered and their objectives. Of particular relevance for dredging and disposal are those under the 'Sea' theme.

This Proposed Action was referred to the WA EPA under Part IV of the EP Act via a S40AA Application on 30 April 2025. The EPA Chair's determined level of assessment was published on 9 June 2025 as 'Assessment on Referral Information', with the preliminary key environmental factors identified as BCH, Marine Environmental Quality, and Marine Fauna.

1.3.3 *Environment Protection (Sea Dumping) Act 1981* (Cth)

The Proposed Action is set to take place in WA State coastal waters. A permit under the *Environment Protection (Sea Dumping) Act 1981* (Cth; Sea Dumping Act) is required to undertake sea dumping activities in the marine environment. Mardie Minerals has applied for a permit under the Sea Dumping Act to use DMPA4 as a spoil disposal area. This application is currently under assessment by DCCEEW.

1.3.4 *Biosecurity Act 2015* (Cth)

The *Biosecurity Act 2015* (Cth; Biosecurity Act) provides guidance and standards to be considered and implemented when a proposal could potentially spread introduced marine pests (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.

1.3.5 *Underwater Cultural Heritage Act 2018* (Cth)

Remains of vessels (including associated articles such as anchors or other artefacts) that have been in Australian waters for 75 years of more are automatically protected under the *Underwater Cultural Heritage Act 2018* (Cth; UCH Act), whether or not their location is currently known.

Protected underwater cultural heritage (UCH) cannot be adversely impacted without a permit. This includes any indirect adverse impacts. In accordance with section 40 of the UCH Act, discovery of UCH must be reported to the Minister for the Environment and Water within 21 days of discovery. The WA Museum's Maritime Archaeology Department assists with the day-to-day administration of the UCH Act and also advise on any requirements of the *Maritime Archaeology Act 1973* (WA).

Mardie Minerals will comply with the UCH Act and associated guidelines (DCCEEW 2024a) in the event that something is uncovered during spoil disposal (or dredging).

1.3.6 Other Relevant Standards, Policies and Guidance Materials

In addition to the legislation referenced in the sections above, Mardie Minerals will adhere to relevant standards, policies and guidance materials, which may include (but is not limited to) those summarised in Table 4.

Table 4: Other Relevant Standards, Policies and Guidance Materials

Topic	Document Title	Reference
Formatting	Guide for providing maps and boundary data for EPBC Act projects	Department of Agriculture, Water and the Environment (DAWE) (2021)
	Criteria for Determining ESD Relevance	DotE (2013b)
	Environmental Management Plan Guidelines	DCCEEW (2024b)
	Instructions on how to prepare EP Act Part IV Environmental Management Plans	EPA (2024a)
Offsets	*Environment Protection and Biodiversity Conservation Act 1999* Environmental Offsets Policy	Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) (2012a)
Guidelines	EPBC Act Policy Statement – Significant Impact Guidelines 1.1 – Matters of National Environmental Significance	DotE (2013a)
	Survey guidelines for Australia's threatened fish	DSEWPaC (2011a)

Topic	Document Title	Reference
	National Guidelines for the Survey of Cetaceans, Marine Turtles and the Dugong	DCCEEW (2024c)
	Australian National Guidelines for Whale and Dolphin Watching 2017	Department of the Environment and Energy (DotEE) (2017a)
	Interaction between offshore seismic exploration and whales: Industry guidelines	Department of the Environment, Water, Heritage and the Arts (DEWHA) (2008a)
	National Light Pollution Guidelines for Wildlife	DCCEEW (2023a)
	Environmental Factor Guideline – Benthic Communities and Habitats	EPA (2016a)
	Technical Guidance – Protection of Benthic Communities and Habitats	EPA (2016b)
	Environmental Factor Guideline – Marine Environmental Quality	EPA (2016c)
	Technical Guidance – Protecting the Quality of WA's Marine Environment	EPA (2016d)
	Environmental Factor Guideline – Marine Fauna	EPA (2016e)
	Technical Guidance – EIA of marine dredging proposals	EPA (2021c)
	Technical Guidance – Environmental impact assessment of Social Surroundings – Aboriginal cultural heritage	EPA (2023a)
	Engaging with First Nations People and Communities on Assessments and Approvals under *Environment Protection and Biodiversity Conservation Act 1999* (interim guidance)	DCCEEW (2023b)
	National Biofouling Management Guidelines for commercial vessels	Marine Pest Sectoral Committee (MPSC) (2018)
	Australian and New Zealand Guidelines for Fresh and Marine Water Quality	Australia and New Zealand Governments (ANZG) (2018)
	National Assessment Guideline for Dredging	DEWHA (2009a)
Mammals	Species group report card - cetaceans	DSEWPaC (2012b)
	Conservation Management Plan for the Blue Whale - A Recovery Plan under the *Environment Protection and Biodiversity Conservation Act 1999*	DotE (2015a)
	Listing Advice - *Megaptera novaeangliae* (Humpback Whale)	Threatened Species Scientific

Topic	Document Title	Reference
		Committee (TSSC) (2022)
	Conservation Advice for *Sousa sahulensis* (Australian humpback dolphin)	DCCEEW (2025a)
	Conservation Advice for *Orcaella heinsohni* (Australian snubfin dolphin)	DCCEEW (2025b)
Reptiles	Recovery Plan for Marine Turtles in Australia	DotEE (2017b)
	Species group report card - marine reptiles	DSEWPaC (2012c)
	Approved Conservation Advice for *Dermochelys coriacea* (Leatherback Turtle).	DEWHA (2008b)
	Listing Advice – *Dermochelys coriacea* (Leatherback Turtle)	TSSC (2009a)
	Approved Conservation Advice for *Aipysurus apraefrontalis* (Short-nosed Sea Snake)	DSEWPaC (2011b)
	Commonwealth Listing Advice on *Aipysurus apraefrontalis* (Short-nosed Seasnake).	TSSC (2011a)
	Approved Conservation Advice for *Aipysurus foliosquama* (Leaf-scaled Sea Snake)	DSEWPaC (2011c)
	Commonwealth Listing Advice on *Aipysurus foliosquama* (Leaf-scaled Seasnake).	TSSC (2011b)
Elasmobranchs	Recovery Plan for the White Shark (*Carcharodon carcharias*)	DSEWPaC (2013)
	Recovery Plan for the Grey Nurse Shark (*Carcharias taurus*)	DotE (2014a)
	Issues paper for the Grey Nurse shark (*Carcharias taurus*)	DotE (2014b)
	Conservation Advice Whale Shark (*Rhincodon typus*)	TSSC (2015)
	Listing Advice – *Rhincodon typus* (Whale shark)	TSSC (2001)
	Sawfish and River Sharks multispecies recovery plan	DotE (2015b)
	Approved Conservation Advice for *Pristis clavata* (Dwarf Sawfish)	DEWHA (2009b)
	Listing Advice – *Pristis clavata* (Dwarf Sawfish)	TSSC (2009b)
	Approved Conservation Advice for Green Sawfish (*Pristis zijsron*)	DEWHA (2008c)
	Listing Advice – *Pristis zijsron* (Green Sawfish)	TSSC (2008)
Threat Abatement Plans	Threat Abatement Plan for the impacts of marine debris on the vertebrate wildlife of Australia's coasts and oceans	DotEE (2018)
	Threat abatement plan for predation by feral cats 2024	DCCEEW (2024d)
	Threat Abatement Plan for predation, habitat degradation, competition and disease transmission by feral pigs (*Sus scrofa*) (2017)	DotEE (2017c)

Topic	Document Title	Reference
	Threat abatement plan for predation by the European red fox	DEWHA (2008d)
Other	Marine bioregional plan for the North-west Marine Region North-west Marine Region.	DSEWPaC (2012d)
	EIA (Part IV Divisions 1 and 2) Administrative Procedures	EPA (2024b)
	EIA (Part IV Divisions 1 and 2) Procedures Manual	EPA (2024c)
	Australian Ballast Water Management Requirements	DAWE (2020)
	National Strategy for Reducing Vessel Strike on Cetaceans and other Marine Megafauna	DotEE (2017d)

1.4 Public Consultation undertaken regarding the Proposed Action

Mardie Minerals commenced consultation with stakeholders for the Proposed Action in 2023. Stakeholders have been identified based on their interest and regulatory involvement with the activities outlined for the Proposed Action. The following stakeholders have been consulted to-date or will be consulted with regarding the Proposed Action.

Commonwealth Government:

- DCCEEW (EPBC Assessments, Post Approvals, and Sea Dumping Branch).

State Government:

- EPA Services/Department of Water and Environmental Regulation (DWER).
- Department of Biodiversity, Conservation and Attractions (DBCA).
- Department of Jobs, Tourism, Science and Innovation (DJTSI).
- Department of Planning, Lands and Heritage (DPLH).
- Department of Primary Industries and Regional Development (DPIRD).

Other:

- Pilbara Ports.
- Mineral Resources Limited.
- Western Australian Fishing Industry Council (WAFIC).
- Recfishwest.
- Port of Ashburton Technical Advisory and Consultative Committee (TACC).
- Wirrawandi Aboriginal Corporation (WAC).

Issues raised and outcomes of consultation that has taken place to-date related to offshore spoil disposal are outlined in the attached Stakeholder Consultation Register (Att5_Stakeholder Consultation Register).

Consultation will be ongoing with most of the stakeholders identified throughout the phases of the Proposed Action.

1.5 Proponent Information

The Proposed designated proponent details are the same as the Person proposing to take the action. Details of the Proposed designated proponent and the organisations representative have been summarised in Table 5.

Table 5:Proponent information adapted from the EPBC Act online referral form

Proposed designated proponent organisation details	
ABN/ACN	50152574457
Organisation name	Mardie Minerals Pty Ltd
Organisation Address	Level 2, 1 Altona Street, West Perth, WA 6005
Organisation Representative	
Name	Snyman Van Straaten
Job Title	Manager Environmental Approvals and Compliance
Phone	(+61) 400 616 790
Email	snyman.vanstraaten@bciminerals.com.au
Address	Level 2, 1 Altona Street, West Perth, WA 6005

1.5.1 History of Responsible Environmental Management

Mardie Minerals' active projects include the Mardie Project (EPBC 2018/8236) and the Optimised Mardie Project (EPBC 2022/9169). To-date, Mardie Minerals' environmental management record has been satisfactory. All exploration activities have been conducted in accordance with relevant legislation. Two infringement notices were issued to Mardie Minerals in 2024, discussed below.

Infringement notice CEB24/116 issued to Mardie Minerals on 6 June 2024. The notice relates to condition 4 of EPBC 2018/8236 (prior to variation):

4. *The approval holder must submit a Groundwater Monitoring and Management Plan (GMMP) to the Minister for approval. The approval holder must not commence operations until the GMMP has been approved by the Minister in writing. The approval holder must implement the approved GMMP.*

Commencement of operations is defined within EPBC 2018/8236 (prior to variation) as 'the first instance of transferring seawater into any evaporation pond as part of the action'. Pond 0 is considered an evaporation pond. It is part of Pond 1 according to all referral and approval documentation. The first instance of transferring seawater into any evaporation pond as part of the action (rather than commissioning of the pumps) was on 28 December 2023. However, the GMMP was not submitted and approved prior to 28 December 2023, resulting in a non-compliance against this condition. The GMMP (Revision M; 31 August 2024) was approved for implementation to facilitate progressive filling of Ponds 1, 2 and 3 with seawater on 9 September 2024. More recently, GMMP Revision P; 21 March 2025, was approved for implementation to facilitate filling of Ponds 4 to 9 and crystallisers.

Infringement notice CEB24/118 issued to Mardie Minerals on 6 June 2024. This notice relates to condition 24(b) of EPBC 2018/8236 (prior to variation), which refers to the Illumination Plan:

24(b) *The plan must be submitted and approved by the Minister prior to the commencement of the operation. The Illumination Plan must be implemented once the Illumination Plan is approved.*

Commencement of operations is defined within EPBC 2018/8236 (prior to variation) as 'the first instance of transferring seawater into any evaporation pond as part of the action'. Pond 0 is considered an evaporation pond. It is part of Pond 1 according to all referral and approval documentation. The first

instance of transferring seawater into any evaporation pond as part of the action (rather than as part of commissioning of the pumps) was on 28 December 2023. The Illumination Plan was not submitted and approved prior to 28 December 2023, resulting in a non-compliance against this condition. The Illumination Plan (Revision 5; BCI-ENV-PLN-001) was approved on 31 January 2024.

Mardie Minerals paid the amounts of the infringement notices by 20 September 2024.

1.5.2 Corporation's Environmental Policy and Planning Framework

Mardie Minerals has an Environmental Policy (Att6_BCI Environmental Policy 2022) and an Environmental and Social Management Plan (ESMP) (Att7_Mardie Project ESMP 2022). The ESMP has been developed to identify the environmental and social management framework for the development and operation of the Approved Proposal.

2. DESCRIPTION OF THE ENVIRONMENT

The information in this section has largely been sourced from the O2 Marine Group (O2 Marine) BCH Survey (Att1_DMPA4 BCH Report 2024) and the DSDMP (Att2_DSDMP 2025).

O2 Marine was engaged to undertake a bathymetric survey, a BCH investigation, and sediment sampling of DMPA4. The purpose of this investigation was to determine the suitability of DMPA4 as a disposal site and to inform the EPBC Referral and related documents/approvals, including this Preliminary Documentation.

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 (Att1_DMPA4 BCH Report 2024, Appendix A, Page 31); and
5. Report on bathymetric and BCH results (Att1_DMPA4 BCH Report 2024).

The field survey was conducted within the Detailed Study Area (encompassing DMPA4) and the predicted zones of impact (Refer to Figure 5). 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 the BCH Survey Report (Att1_DMPA4 BCH Report 2024, Section 3, Pages 6-14). The findings of this investigation are detailed in the results and discussion sections of the BCH Survey Report (Att1_DMPA4 BCH Report 2024, Section 4, Pages 15-30) and summarised in the sections below as applicable.

Figure 5: DMPA4, the Detailed Study Area, and the predicted zones of impact that were surveyed

2.1 Physical Description

2.1.1 Current condition of the Project Area's Environment

SSS data indicates that 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. Water depths at DMPA4 are around 20 m, with MBES data revealing a depth range of less than 2 m across 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 (Att1_DMPA4 BCH Report 2024, Section 4.1, Pages 15-18).

2.1.2 Existing or proposed uses for the Project Area

There are no current or existing uses of the Project Area other than occasional boating and commercial and recreational fishing.

2.1.3 Outstanding natural features and/or any other important or unique values that applies to the Project Area

DMPA4 is located in WA State marine waters. The closest Marine Protected Area is the Great Sandy Island Nature Reserve (Sholl Island), approximately 5.7 NM (10 km) southeast of DMPA4. A search of the Protected Matters Search Tool (PMST) found no identified key ecological features within DMPA4 and the predicted zones of impact (Att8_PMST Report DMPA4_241206, Page 2).

DMPA4 was mapped for BCH distribution and cover, and two BCH categories were reported. BCH types were not distributed consistently throughout the area, however, observed variations were mainly subtle changes in level of cover. DMPA4 can be broadly characterised as a filter feeder dominated habitat with a predominantly sparse to moderate level of cover. It is unlikely that the habitats at this site represent particular regional or conservation significance compared to other areas within Mardie and the Pilbara region, where higher covers and diversities are observed (Att1_DMPA4 BCH Report 2024, Section 6, Page 31).

Further details of BCH categories are provided in the BCH report (Att1_DMPA4 BCH Report 2024, Section 4.3, Pages 28-30).

2.1.4 Depth range relevant to the Project Area

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 (Att1_DMPA4 BCH Report 2024, Section 2, Page 5).

Water depths at DMPA4 are around 20 m, with MBES data revealing a depth range of less than 2 m across the survey area. (Att1_DMPA4 BCH Report 2024, Section 4.1, Pages 15-18). Water depths at surveyed sites ranged between 18-21 m (Att1_DMPA4 BCH Report 2024, Section 3.2.3, Pages 9-10).

2.2 Flora and Fauna

2.2.1 Flora

The Proposed Action is set to take place in WA State marine waters; therefore, flora assessments are not applicable.

2.2.2 Fauna

Offshore Pilbara waters support a variety of marine fauna, a large number of which are protected (listed) under Commonwealth legislation. As discussed in the BCH assessment by O2 Marine (Att1_DMPA4 BCH Report 2024, Section 6 Page 31) and the DSDMP (Att2_DSDMP 2025, Section 2.6, Pages 22-31), 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.

a. Listed Threatened and Migratory Species

The following key marine fauna species were identified during assessments of the Approved Proposal (Att9_Marine Fauna Review 2020) (Att10_Marine Turtle Monitoring Program 2023), during the development of the DSDMP (Att2_DSDMP 2025, Section 2.6, Pages 22-31), and have been requested for consideration within the DCCEEW Request for Information (RFI; EPBC 2024/10054, 2 June 2025):

- Marine mammals:
  - Humpback Whale (*Megaptera novaeangliae*) – Migratory.
  - Dugong (*Dugong dugon*) – Migratory.
  - Australian Humpback Dolphin (*Sousa sahulensis*) – Vulnerable and Migratory.
  - Spotted Bottlenose Dolphin (*Tursiops aduncus* Arafuna/Timor Sea populations) - Migratory.
  - Blue Whale (*Balaenoptera musculus*) – Endangered and Migratory.
  - Australian Snubfin Dolphin (*Orcaella heinsohni*) – Vulnerable and Migratory.
- Marine reptiles:
  - Loggerhead Turtle (*Caretta caretta*) – Endangered and Migratory.
  - Green Turtle (*Chelonia mydas*) – Vulnerable and Migratory.
  - Leatherback Turtle (*Dermochelys coriacea*) – Endangered and Migratory.
  - Hawksbill Turtle (*Eretmochelys imbricata*) – Vulnerable and Migratory.
  - Flatback Turtle (*Natator depressus*) – Vulnerable and Migratory.
  - Short-nosed Sea Snake (*Aipysurus apraefrontalis*) – Critically Endangered.
  - Leaf-scaled Sea Snake (*Aipysurus foliosquama*) – Critically Endangered.
- Elasmobranchs
  - Green Sawfish (*Pristis zijsron*) - Vulnerable.
  - Narrow Sawfish (*Anoxypristis cuspidata*) - Migratory.
  - Dwarf Sawfish (*Pristis clavata*) – Vulnerable and Migratory.
  - White Shark (*Carcharodon carcharias*) – Vulnerable and Migratory.
  - Grey Nurse Shark (*Carcharias taurus* west coast population) – Vulnerable.
  - Whale Shark (*Rhincodon typus*) – Vulnerable and Migratory.
  - Reef Manta Ray (*Mobula alfredi*) – Migratory.
  - Giant Manta Ray (*Mobula birostris*) – Migratory.

Many of the species listed above are discussed in detail within the Marine Fauna Study (Att9_Marine Fauna Review 2020), Marine Turtle Monitoring Program (Att10_Marine Turtle Monitoring Program 2023), annual surveys undertaken for the Marine Turtle Monitoring Program (Att11_Marine Turtle Survey Report 2024) (Att12_Marine Turtle Survey Report 2025), and the DSDMP (Att2_DSDMP 2025,

Section 2.6, Pages 22-31). Information from these documents specific to key species interactions with DMPA4 is outlined below.

i. Humpback Whales

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). A precautionary approach will be implemented for offshore disposal during Humpback Whale migration (Att2_DSDMP 2025, Section 2.6.1, Page 27).

A Biologically Important Area (BIA) for Humpback Whale migration (north and south) was identified within the DMPA4 area and the predicted zones of impact (Att8_PMST Report DMPA4_241206, Pages 16-17).

ii. Dugong

Dugong are known to occur around DMPA4 and have been sighted in close proximity. Surveys of the Pilbara region suggest consistent use of the region by Dugongs (Prince 2001; RPS 2010). DMPA4 is close to critical dugong habitats, particularly seagrass meadows essential for foraging. It is highly likely that Dugong will transit through the area and forage in nearby waters where there are suitable seagrass habitats (Att2_DSDMP 2025, Table 4, Page 24).

Seagrass was not found to present within the spoil ground DMPA4, and therefore it would not represent preferred habitat, indicating that Dugong would likely not reside in the area (though they may travel through) (Att2_DSDMP 2025, Section 2.6.1, Pages 27-28).

iii. Australian Humpback Dolphin

Aerial surveys completed for the Wheatstone Project (offshore of Onslow, east of DMPA4) found that larger dolphin pods (>100 individuals) can be sighted offshore, though the majority of dolphin sightings were recorded in water depths less than 50 m (Jenner and Jenner 2010). Within shallower waters, smaller groups were more common. They are also more likely to be found in relatively shallow and protected coastal habitats such as inlets, estuaries, major tidal rivers, shallow bays, inshore reefs and coastal archipelagos, rather than in open stretches of coastline. (Parra and Cagnazzi 2016) Therefore, Australian Humpback Dolphins are likely to be present within the vicinity of the dredging footprint and the DMPA4 location, but it does not represent important habitat for the species, being more likely to be present closer to protected waters (Att2_DSDMP 2025, Section 2.6.1, Page 28).

iv. Spotted Bottlenose Dolphin

The Spotted Bottlenose Dolphin (also referred to as the Indo-pacific Bottlenose Dolphin) has been recorded throughout the years within the region and share similar behavioural activities with the Australian Humpback Dolphin, with some degree of spatial overlap. At a regional scale, there may be some partitioning between the species, with Spotted Bottlenose Dolphins preferring deeper waters close to sloping bathymetry (Hanf et al. 2022). Finer scale studies support this, with significant

differences in habitat use and fine-scale habitat selection (e.g. Hunt et al. 2017). Therefore, this species is considered a key marine fauna species at DMPA4 (Att2_DSDMP 2025, Section 2.6.1, Page 28).

v. Blue Whale

The Blue Whale is a cosmopolitan species, found in all oceans except the Arctic, but absent from some regional seas such as the Mediterranean, Okhotsk and Bering seas. Blue Whales feed almost exclusively on krill, with a variety of species being taken by different Blue Whale populations. They feed both at the surface and also at depth, following the diurnal vertical migrations of their prey to at least 100 m. The migration patterns of Blue Whales are not well understood, but appear to be highly diverse (Reilly et al. 2008). There have been no Blue Whales recorded within the local area through desktop searches, however, it is known to occur in the region and in similar habitats to the Approved Proposal area (Att9_Marine Fauna Review 2020, Appendix B, Page B). Pygmy Blue Whale (*Balaenoptera musculus brevicauda*) BIAs are further offshore than the Approved Proposal, and the species has not been recorded in the waters around the transit and spoil disposal area. Blue Whales are not expected to be present, with research indicating that the species would be found in deeper waters offshore from DMPA4 (deep waters and >238±13.9 km offshore; Thums et al. 2022). Therefore, it is considered unlikely that the species would be present at DMPA4 (Att2_DSDMP 2025, Table 4, Page 24).

vi. Australian Snubfin Dolphin

Stranding and museum specimen records indicate that Australian Snubfin Dolphins occur only in waters off the northern half of Australia, from approximately Broome (17° 57′ S) on the west coast to the Brisbane River (27° 32′ S) on the east coast (Parra et al. 2002). Aerial and boat-based surveys indicate that Australian Snubfin Dolphins occur mostly in protected shallow waters close to the coast, and close to river and creek mouths (Parra et al. 2002). There has been desktop records of Australian Snubfin Dolphins within the region (2013), however DMPA4 does not represent suitable habitat (Att9_Marine Fauna Review 2020, Appendix B, Page C). The Proposed Action is located outside the species recognised range, however, vagrant individuals may be present in the waters around the Proposed Action from time to time (Att2_DSDMP 2025, Table 4, Page 24).

i. Turtles

Marine turtle nesting in the Pilbara is dominated by Flatback, Green and Hawksbill Turtles (Pendoley et al. 2016; Pendoley 2005). Green Turtles typically use high energy offshore island beaches, while Flatback Turtles generally utilise inshore, lower energy islands and the mainland coast. Hawksbill Turtles nest in lower numbers on island beaches and less frequently on the mainland. These three marine turtle species have been the key species identified during marine turtle surveys for the Approved Proposal, described below.

Marine turtle surveys are required to be undertaken annually for the Approved Proposal, as detailed in the Marine Turtle Monitoring Program (Att10_Marine Turtle Monitoring Program 2023). Pendoley Environmental Pty Ltd (Pendoley Environmental) undertook baseline surveys for the Approved Proposal in the 2018/19, 2021/22 and 2022/23 seasons, as reported within the Marine Turtle Monitoring Program. The annual marine turtle monitoring program has been underway for two years, which officially commenced in the 2023/24 season, as summarised in the survey report (Att11_Marine Turtle Survey Report 2024). For the 2024/25 season, the annual marine turtle monitoring program was undertaken by Worley Consulting Pty Ltd (Worley), as summarised in the survey report (Att12_Marine Turtle Survey Report 2025). The results of each annual marine turtle monitoring program survey completed to-date are summarised below, and 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. With the exception of the single Hawksbill Turtle nest recorded on the mainland in December during the 2018/19 survey (albeit past the peak of the Hawksbill Turtle nesting season), turtles nested most successfully on the offshore islands during all surveys.

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. 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).

Varying patterns in nesting abundance and nesting success during the 2024/25 season relative to the previous season (i.e. 2023/24) and baseline data were apparent for Flatback Turtles (greater than 2023/24, but less than baseline) and Hawksbill Turtles (less than both 2023/24 and baseline). The abundance of nesting marine turtles is known to vary temporally in response to the life history characteristics of the species (e.g., remigration intervals) as well as environmental conditions at their offshore foraging grounds. At present, it is difficult to quantify these patterns for the Mardie region as the 2024/25 season represents only the second year of monitoring post-baseline for the Marine Turtle Monitoring Program. Following the third year of data capture (i.e., 2025/26), closer examination of the significance of these species-specific trends in abundance may be possible (Att12_Marine Turtle Survey Report 2025, Section 1, Page 1). Variations observed in nesting distribution on offshore islands and hatchling success rates between the 2024/25 season and previous surveys were attributed to physical characteristics of the sub-tidal benthos and severe weather events that occurred across the Pilbara during this time, rather than impacts attributable to the Approved Action (Att12_Marine Turtle Survey Report 2025, Section 1, Pages 1-2).

DMPA4 and the predicted zones of impact intersect with a BIA for inter-nesting (buffer) for Flatback Turtles (Att8_PMST Report DMPA4_241206, Page 16).

DMPA4 does not contain preferred foraging habitat for marine turtles, as it is dominated by bare sand and filter feeders (Att1_DMPA4 BCH Report 2024, Section 6, Page 31), 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 indicative dredge vessel transport route to DMPA4, however, this will occur outside of turtle nesting and hatching seasons to prevent impacts to nesting activities. Precautions will be in place for these marine turtle species (Att2_DSDMP 2025, Section 2.6.2, Pages 28-29).

Loggerhead and Leatherback Turtles were not considered during the assessment of the Approved Proposal, noting that they were not identified during the turtle monitoring programs detailed above. O2 Marine updated the DSDMP to include a discussion of these species and their relevant to the Project Area, which has been summarised below.

There are no BIAs or habitat critical for the survival of these species that overlap with the Proposed Action. The islands adjacent to the Proposed Action do not represent important nesting habitat for these species, with no nesting turtles identified during previous marine turtle surveys (Pendoley Environmental 2019). Loggerhead Turtles are infrequently sighted adjacent to DMPA4, and may be infrequently present migrating or foraging in the waters adjacent to the Approved Proposal. Leatherback Turtles are rarely observed in the Pilbara (DSEWPaC 2012d), and no sightings have been recorded within the Approved Proposal. Given the wide geographical range of Leatherback Turtles, they may be infrequently present within the region, but their occurrence in unlikely (Att2_DSDMP 2025, Table 4, Page 25).

Given the species' wide geographical range they may be infrequently present, but their occurrence in unlikely.

Based on this assessment, these species are unlikely to occur within DMPA4 or the surrounding area on a regular basis. However, given their wide geographical range, they may occur within the area of the Proposed Action from time to time.

ii. Sea snakes

The Short-nosed Sea Snake has not been previously recorded in the Approved Proposal area. This species is typically found in coral reef habitats, which in the waters of the Approved Proposal are largely confined to the nearshore islands with fringing coral reefs and/or isolated reef patches. However, recent modelling and surveys undertaken have found that the species may utilise nearshore habitats (Udyawer et al. 2020). Modelling results indicate that DMPA4 represents suitable habitat for the Short-nosed Sea Snake, with a new species distribution extending from Exmouth Gulf and around the Muiron Island to the Montebello Islands Marine Park (Udyawer et al. 2020). Although the spoil ground location represents suitable habitat, no sea snakes have been identified at the location and BCH of the spoil ground does not represent preferred reef habitat. Other species of sea snake that have potential habitat within the vicinity of the offshore DMPA4 include the Leaf-scaled Sea Snake (Udyawer et al. 2020). Therefore, the Proposed Action has the potential to impact the habitat of these species, and the precautionary approach for management has been applied (Att2_DSDMP 2025, Section 2.6.2, Page 29).

iii. Sawfish

The Mardie coastline contains creeks, mangroves and rivers which is suitable habitat for the Green Sawfish. No sawfish recorded during the recent sawfish survey completed for the Approved Proposal by Murdoch University and O2 Marine (Lear and Morgan 2022). The habitats surveyed included mangrove creeks and mudflats, which are known sawfish habitats and are similar to habitats where sawfish are found elsewhere in the region. The lack of sawfish recorded in this study indicates that the area is not likely a major habitat or a pupping ground for any species of sawfish. The occasional sightings of Green Sawfish in the general region and abundance of this species in nearby nursery habitats (e.g., Ashburton River) suggests that the Approved Proposal area is likely an occasional foraging habitat along the migratory corridor for juvenile and sub-adult (Att2_DSDMP 2025, Section 2.6.3, Pages 29-30).

Green Sawfish have been recorded offshore around Barrow Island, and are frequently caught by trawl fisheries in the area (Bateman et al. 2024; Harry et al. 2024). The Approved Proposal is located along the coast from sawfish nursery habitat (Ashburton River ~130 km and Fortescue River – ~30 km), and therefore it is considered likely that the areas around the spoil disposal and transit sites provide foraging and migratory habitat (Att2_DSDMP 2025, Table 4, Page 25).

Narrow Sawfish are found from Onslow up to the Northern Kimberley. They are commonly found offshore in deeper waters and are more likely to be recorded within the offshore spoil ground area than the dredging area, based on recent sawfish capture records from the Pilbara Trawl (Interim) Managed Fishery (PTIMF) (Harry et al. 2024). While DMPA4 and transit areas do not represent pupping or nursery habitat, it is likely that the species is travelling or foraging in the waters of and around the Project in suitable soft sediment habitats present. Therefore, a precautionary approach will be applied for this species (Att2_DSDMP 2025, Table 4, Page 26, Section 2.6.3, Page 30).

Dwarf Sawfish Australian distribution has previously been considered to extend north from Cairns around the Cape York Peninsula in Queensland, across northern Australian waters to the Pilbara coast in WA. The Dwarf Sawfish usually inhabits shallow (2–3 m) coastal waters and estuarine habitats. This species has not been recorded in the region from desktop searches (Att9_Marine Fauna Review 2020,

Appendix B, Page D). DMPA4 and spoil disposal transit areas are located in the northwestern Australia's extensive sawfish habitat, a globally significant stronghold for the species. Adult Dwarf Sawfish are known to seasonally migrate between shallow inshore waters and potentially offshore areas, particularly during the breeding and pupping seasons, typically associated with the wet season. Therefore, it is likely that the species could be present, given that suitable habitat is likely to be present (Att2_DSDMP 2025, Table 4, Page 26).

iv. Manta Rays

Manta ray presence has been recorded within the waters of the Approved Proposal area. As these records are not from targeted studies, the species are unidentified and there is no data to determine occupancy rates or abundance. Based on their general ecology, it is reasonable to assume that the species recorded is more likely to be the Reef Manta Ray, rather than the Giant Manta Ray. In contrast to the pelagic Giant Manta Ray, Reef Manta Rays have a more localised distribution and inhabit shallower waters closer to the coast. Reef Manta Rays are distributed throughout the Pacific and Indian Ocean (Att2_DSDMP 2025, Section 2.6.3, Pages 30-31). Reef Manta Rays are less likely to be present within the waters around DMPA4 and transit area compared to the Giant Manta Ray, given the species preference for shallow water (<20 m). Reef Manta Rays may be infrequently present in the waters around DMPA4, but are more likely present in areas closer to the coast or around islands (Att2_DSDMP 2025, Table 4, Page 26). Therefore, DMPA4 does not present preferred habitat for the Reef Manta Ray, but it is possible that they may be in the area from time to time.

Giant Manta Rays are found throughout the Atlantic, Pacific and Indian Oceans, in tropical, subtropical, and temperate waters (Armstrong et al. 2020). Information on the global distribution of Giant Manta Rays and their population sizes is lacking. Giant Manta Rays were identified offshore of Onslow during aerial surveys for the Wheatstone Project and were predominantly in water depths ranging from 50 to 150 m, they were broadly and sparsely distributed (Jenner and Jenner 2010). Giant Manta Rays may be present within the vicinity of DMPA4 from time to time, though it is unlikely as the spoil ground is less than 50 m depth (approximately 20 m depth) (Att2_DSDMP 2025, Section 2.6.3, Pages 30-31).

Manta rays are filter feeders (Couturier et al. 2012) and therefore are potentially at risk from the Proposed Action if water quality is not adequately managed and therefore potentially impacting the food web which supports them (Att2_DSDMP 2025, Section 2.6.3, Pages 30-31).

v. Sharks

In Australia, Great White Sharks have been recorded from central Queensland around the south coast to north-west WA, but may occur further north on both coasts (Bonfil et al. 2005). They inhabit inshore waters around rocky reefs, surf beaches and shallow coastal bays; waters on the outer continental shelf and slope; and the open ocean. These sharks most commonly live in depths above 100 m. There have been no White Sharks recorded within the region through desktop searches. This species has been found in Muiron Islands, although they are predominantly found in cooler coastal waters further south (Att9_Marine Fauna Review 2020, Appendix B, Page E). White Sharks are not expected to be present around DMPA4, as this does not represent preferred habitat for the species, with the species primarily found in the southern half of Australian waters, from Central Queensland to the North West Cape WA (McAuley et al. 2017) (Att2_DSDMP 2025, Table 4, Page 26)

The Grey Nurse Shark (west coast population) has a broad inshore distribution, primarily in sub-tropical to cool temperate waters. The population of Grey Nurse Shark (west coast population) is predominantly found in the south-west coastal waters of WA and has been recorded as far north as the North West Shelf (Last and Stevens 1994). There have been no Grey Nurse Sharks recorded within the region through desktop searches. This species has been found in Muiron Islands, although they are predominantly found in cooler coastal waters further south (Att9_Marine Fauna Review 2020, Appendix

B, Pages D-E). Based on this, DMPA4 does not represent preferred Grey Nurse Shark habitat, but they may be present within the vicinity from time to time.

Whale Sharks can be found worldwide in tropical and subtropical oceans. In Australia, the Whale Shark is known from New South Wales, Queensland, Northern Territory, WA and occasionally Victoria and South Australia, but it is most commonly seen in waters off northern WA, Northern Territory and Queensland (Compagno and Last 1999). Yearly numbers of Whale Sharks in Ningaloo Marine Park are estimated to vary between 300 and 500 individuals. Research conducted in 2003 on Whale Sharks aggregating at Ningaloo Reef found that this species routinely moved between the sea surface and depth. Sharks spent at least 40% of their time in the upper 15 m of the water column and at least 50% of their time at depths equal to or less than 30 m (Wilson et al. 2006). There have been no Whale Sharks recorded within the region through desktop searches, and are generally found in waters deeper than is present at DMPA4 (Att9_Marine Fauna Review 2020, Appendix B, Page E). Based on this, DMPA4 does not represent preferred Whale Shark habitat, but they may be present within the vicinity from time to time.

b. 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*).

Although these commercial fishery species are not MNES listed species, further discussion is provided below due to commercial interest during stakeholder consultation for the Proposed Action.

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 2021d; EPA 2023b). Concerns of the potential impacts to these commercial fisheries due to the Proposed Action were raised during consultation with stakeholders, with particular focus on the Bluespotted Emperor. Responses that Mardie Minerals has provided to stakeholders regarding concerns of this species is provided in the Stakeholder Consultation Register (Att5_Stakeholder Consultation Register).

The commercial fisheries species listed above are discussed in detail within the DSDMP (Att2_DSDMP 2025, Section 2.6.4, Pages 31-32), where information specific to these species interactions with DMPA4 is outlined below.

i. Bluespotted Emperor

O2 Marine (2025 [Draft]) are currently undertaking a targeted fish survey to evaluate the presence and biomass of Bluespotted Emperor, and fish community composition at DMPA4 and nearshore areas (Approved Proposal) using baited remote underwater video systems (BRUVS) and environmental DNA (eDNA). As part of this study, O2 Marine reviewed overlapping commercial fisheries with DMPA4, habitat availability for indicator species, and additional BCH data opportunistically obtained in May and July 2025 during implementation of the Benthic Communities and Habitat Monitoring and Management Plan (BCHMMP) (O2 Marine 2023a) and the (draft) DSDMP (Att2_DSDMP 2025). This study is still underway, however, a summary of the interim findings has been provided below, with additional interim information provided in Attachment 13 (Att13_Bluespotted Emperor Survey Summary 2025).

The BCH within DMPA4 and the approved nearshore dredge channel footprint do not appear to provide suitable nursery habitat due to depths greater than 10 m, and the sparse distribution of macroalgae (Table 6). Adult Bluespotted Emperor may inhabit these areas in low numbers, as they may be present

in continental shelf waters of at least 80 m deep (Wakefield et al. 2024). The area does not represent their preferred habitat which is ~40 m deep, adjacent to large expanses of inshore macroalgae (Taylor et al. 2016; Wakefield et al. 2024).

As described by DPIRD (2023) and Wakefield et al. (2024), the preferred characteristics of Bluespotted Emperor nursery habitat are *Sargassum* dominated macroalgal habitats in shallow waters (<~8 m depth) around nearshore islands and coastal waters. Sites within the nearshore area are unlikely to provide preferred juvenile Bluespotted Emperor habitat, due to sparse macroalgae presence, and being distant from reefs and patches of other (dense) macroalgae. Results from the BRUVS and eDNA studies will provide greater insight into the occurrence of Bluespotted Emperor at various size classes and their proportion to biomass at each survey site.

Table 6: Summary of Bluespotted Emperor habitat overlap with the approved nearshore dredge channel and DMPA4

Habitat Presence in Approved Dredge Channel	Habitat Presence at DMPA4	Commercial Fisheries Catch in Relation to the Dredge Channel and DMPA4
• Juvenile: suitable bathymetry, macroalgae habitat present suitable nursery habitat may be present. May not be preferred habitat with no in high densities or dominated by *Sargassum* species. The area does not appear to reflect a macroalgae-rich seascapes where the species is known to be most abundant (Moustaka et al. 2024). • Adult: suitable shelf habitat present and suitable BCH is present. Adults likely to be present, however, not an area recognised an area where species is most abundant.	• Juvenile: no suitable habitat present. No macroalgae present in DMPA4 or surrounding environment and water depth >10 m. • Adult: suitable shelf habitat present, not located near large expanses of inshore macroalgae habitats. Adults likely to be present, however, not an area recognised an area where species is most abundant and the species is not restricted to the area.	No commercial catch within the PTIMF. The Pilbara Trap Managed Fishery (PTMF) and the Pilbara Line Fishery (PLF) do not publish location of catch due to confidentiality issues, however, are both not likely to be operational in the waters around DMPA4 given that the PLF primarily targets offshore demersal scalefish species, generally in water depths >250 m (Wellington et al. 2021) and DMPA4 is located within the Inshore Closed Waters (Trap), meaning no commercial fishing would occur in this area.

ii. Western King Prawn

Western King Prawns are distributed throughout the temperate, subtropical, and tropical waters of Australia, including the Approved Proposal area. Spawning occurs in offshore waters, with post-larval and juvenile Western King Prawns occupying shallow waters, often in shallow tidal flats with sand or mud substrate. They are often associated with mangrove habitats and seagrass beds. Juveniles can inhabit areas with higher salinity like those of the Approved Proposal dredge channel area. Juvenile Western King Prawns spend about three to six months in the nursery grounds before they reach maturity and migrate offshore, entering the trawl fishing grounds (Penn and Stalker 1979). This migration takes place in April/May of each year and spawning occurs from August to May, with juveniles present in shallow embayments from September to April, with peak abundance in January. Therefore, spawning may occur within the area of DMPA4 during summer when dredging and disposal activities will not be occurring (Att2_DSDMP 2025, Section 2.6.4, Pages 31-32).

iii. Brown Tiger Prawn

Brown Tiger Prawns are generally regarded as endemic to Australia and are distributed around the northern coast, from central New South Wales in the east to Shark Bay in WA. They are found in tropical and subtropical waters (Ward et al. 2006). Brown Tiger Prawns spawn in offshore waters, and post-larval Brown Tiger Prawns occupy shallow seagrass and algal communities, generally in water less than 2 m deep (Ovenden et al. 2007). Juvenile Brown Tiger Prawns are generally found in dense patches of seagrass, with higher densities of juveniles found in seagrass beds that are in close proximity to mangroves. Brown Tiger Prawn recruitment and landings are significantly correlated with macroalgae and seagrass bed cover (Loneragan et al. 2013). Larger juveniles and adult Brown Tiger Prawns are less dependent on seagrass and macroalgal beds, with larger juveniles moving further offshore into deeper waters, and adults often being found over mud or sand substrates in waters less than 30 m depth. Most spawning females are found in water 13 - 20 m deep (Kangas et al. 2015). In the context of the Proposed Action, spawning females may be present within DMPA4, though the low coverage of seagrass within and near the dredge channel footprint means it is less likely that post-larval Brown Tiger Prawns will be present in the shallow areas (Att2_DSDMP 2025, Section 2.6.4, Page 32).

2.2.3 Sediment

a. DMPA4

Sediment sampling was undertaken by O2 Marine as part of a broader investigation into the bathymetry, BCH and sediment at DMPA4 (Att1_DMPA4 BCH Report 2024, Section 1.2.1, Page 3). 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 and is summarised below (Att1_DMPA4 BCH Report 2024, Appendix A, Page 31).

Sediments were sampled at four random locations within DMPA4 (Figure 6) and analysed for various analytes to characterise the sediments within the area.

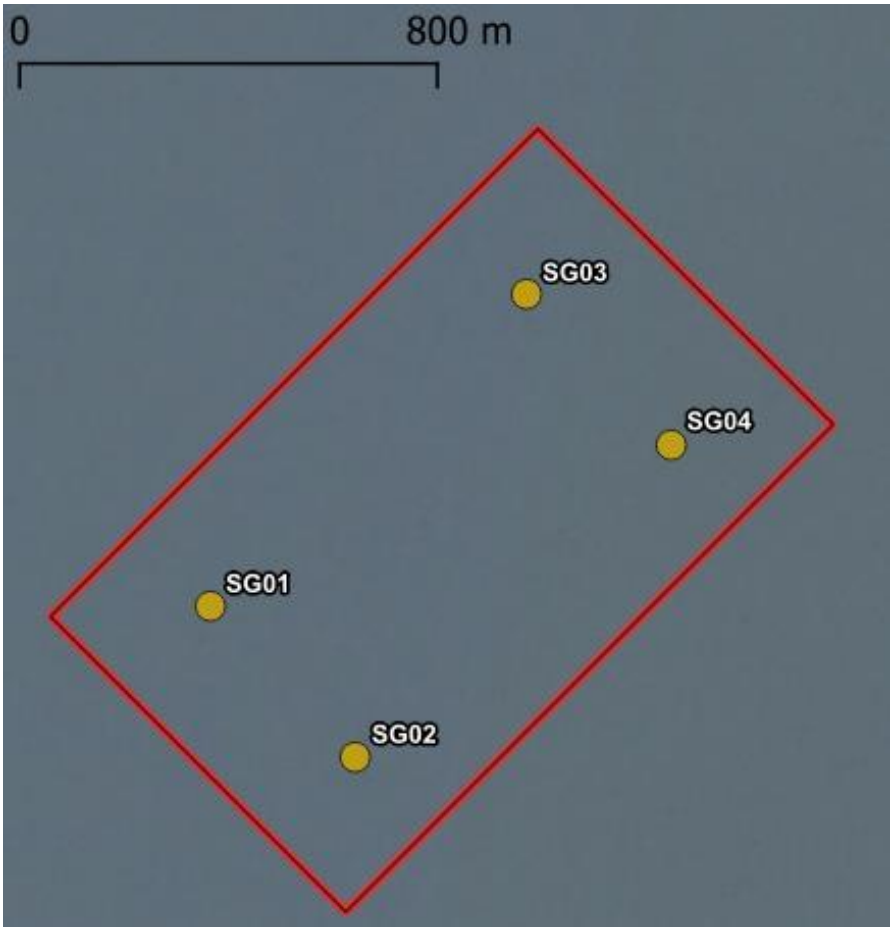

Figure 6: Sediment sample locations within DMPA4

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 (DEWHA 2009a) ISQG-low screening levels, or comparable to concentrations along the Pilbara coast as documented by the Department of Environment and Conservation (DEC) (2006). These results are also comparable to the six dredge channel sediment samples collected in 2023 (Refer to Section 2.2.3b).

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 (DEWHA 2009a) 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).

b. Dredge Channel and surrounds

A baseline sediment assessment of the Approved Proposal dredging footprint and surrounding sediments (Att14_Baseline Marine Sediment Assessment 2019, Section 6.2, Page 55) 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 NAGD screening levels (ISQG-Low) (DEWHA 2009a). 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 (Att14_Baseline Marine Sediment Assessment 2019, Section 6.2, Page 55). However, sediment is still deemed suitable for offshore disposal (Att2_DSDMP 2025, Section 2.4.1, Page 21).

As per the recommendations of O2 Marine, revised site-specific environmental quality criteria (EQC) were developed for the Approved Proposal (refer Table 18 of Attachment 14 (Att14_Baseline Marine Sediment Assessment 2019, Section 6.7, Page 58)).

Further sediment sampling within the revised dredge footprint was undertaken in 2023 (Att15_Marine Sediment Quality Assessment 2023). 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 (Att15_Marine Sediment Quality Assessment 2023, Section 5, Page 20).

2.2.4 Benthic Communities and Habitats

a. Assemblage

Ground truthing revealed a diversity of benthic assemblage types inhabiting sandy sediments across DMPA4 and predicted zones of impact (refer to Table 7 and Figure 7). 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%), and 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 (Att1_DMPA4 BCH Report 2024, Section 4.2, Pages 19-27).

Table 7: Towed video BCH classifications in DMPA4

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

BCH Classification	Description	Points classified	Percentage (%)
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**

b. Distribution

Two mapping classifications were assigned to DMPA4, as shown in Figure 8 and Table 8.

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 characterized 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 8) (Att1_DMPA4 BCH Report 2024, Section 4.3.1, Pages 28-30).

Table 8: BCH Classifications within DMPA4

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 zones of impact (Table 9) (Att1_DMPA4 BCH Report 2024, Section 4.3.2, Pages 28-30).

Table 9: BCH classification assigned to predicted zones of impact

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.

c. Discussion

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 (Att1_DMPA4 BCH Report 2024, Section 5, Page 31). Low-profile reefs are recognized 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 Western Australia (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 the prevalence of this type of morphology in this region (Scott et al. 2006; UWA 2009), this is likely accurate (Att1_DMPA4 BCH Report 2024, Section 5, Page 31).

At a fine scale (meters), 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 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 (Att1_DMPA4 BCH Report 2024, Section 5, Page 31).

Figure 7: Towed video data across DMPA4 and the predicted zones of impact

Figure 8: BCH Map of DMPA4 and predicted zones of impact

2.3 Heritage

2.3.1 Commonwealth heritage places that apply to the Project Area

There are no Commonwealth Heritage places, or other places recognised as having heritage values relevant to the Proposed Action (Att8_PMST Report DMPA4_241206, Page 2).

2.3.2 Indigenous heritage values that apply to the Project Area

The Project Area is situated in WA State marine waters, approximately 13.5 NM from the mainland. Review of the Aboriginal Cultural Heritage Inquiry System (ACHIS) indicates there are no registered or other Aboriginal Cultural Heritage sites in the vicinity of the DMPA4, including the vessel route (DPLH 2024).

The Native Title Holders for the Approved Proposal are the Yaburara and Mardudhunera People (YM People), represented by WAC. DMPA4 falls within the Native Title Determination Area of the YM People (WCD2018/006) (NNTT 2018), however, item 2(b) in Attachment A of the determination judgment explicitly concluded that Native Title does not exist seaward of the low tide mark (Federal Court of Australia 2018), as shown in the maps in Schedule 2 of the Determination, which have been attached (Att16_WCD2018-006 S2 Maps). Notwithstanding this, the YM People and their representative Registered Native Title Body Corporate, WAC, have been consulted on multiple occasions regarding this Proposed Action, as detailed within the Stakeholder Consultation Register (Att5_Stakeholder Consultation Register).

2.4 Hydrology

2.4.1 Water Quality

The following information has been obtained from the DSDMP (Att2_DSDMP 2025, Section 2.5, Pages 21-22)

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 increase suspended sediment concentration (SSC)) due to coastal runoff and wind/wave driven sediment resuspension. In summary, waters in the vicinity of the Project Area 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 (2020) identified the following from marine water quality baseline studies conducted at the Approved Proposal study area (noting this is located further inshore from DMPA4):

- Salinity levels recorded a median value of 37.5 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., dredging area). Factors influencing benthic light levels are different between the islands and dredging area. 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.
- 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 of the Approved Proposal area.

2.4.2 Waves

The following information has been obtained from the DSDMP (Att2_DSDMP 2025, Section 2.2.3, Pages 12-13).

The northwest shelf of WA experiences waves generated from three primary sources: Indian Ocean swell, locally generated wind-waves and tropical cyclone waves. Along the shoreline the ambient (non-cyclonic) wave climate is generally mild. In dry season months low amplitude swell originating in the Indian Ocean propagates to the site and occurs in conjunction with locally generated sea waves of short period (<5 s). In the wet season the wave climate is locally generated sea waves from the south to southwest. In general, the significant wave height is dominated by locally generated sea conditions within the range of 0.5 m to 1 m at short wave periods (Tp <5 s). Measured data from an Acoustic Doppler Current Profiler (ADCP) instrument deployed approximately 15 km offshore for the Approved Proposal has been analysed to characterise the wave conditions in the wet and dry seasons.

Whilst the non-cyclonic ambient wave conditions are generally mild, in contrast the strong winds in a tropical cyclone can generate extreme wave conditions. It is noted that the offshore island features would provide some natural protection form extreme wave conditions depending on the direction of propagation. Extreme cyclonic waves contribute to the total water level through wave run-up which is the maximum vertical extent of wave uprush on a beach and is comprised both wave set-up and swash. The impact of cyclonic waves on the study site is dependent on the prevailing water level conditions and direction of cyclone approach.

3. RELEVANT MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

Table 10 provides a summary of potential MNES relevant to the Proposed Action. Where likely direct or indirect impacts have been identified, further detail has been provided in sections below, including proposed avoidance and mitigation measures.

Table 10: Relevant MNES to the Proposed Action

EPBC Act Section	Controlling Provision	Is the Proposed Action like to have any direct and/or indirect impact?	Brief Description
S12	World Heritage	No	No World Heritage sites occur within or in proximity to the Proposed Action.
S15B	National Heritage	No	No National Heritage sites occur within or in proximity to the Proposed Action.
S16	Ramsar Wetland	No	No Ramsar Wetlands occur within or in proximity to the Proposed Action.
S18	Threatened Species and Ecological Communities	Yes	See Sections 3.1 and 4.1.
S20	Migratory Species	Yes	See Sections 3.2 and 4.1.
S21	Nuclear	No	The Proposed Action does not include any actions that would involve nuclear impacts.
S23	Commonwealth Marine Area	No	The Proposed Action is located entirely within WA State Marine Waters and is not within any Commonwealth Marine Areas.
S24B	Great Barrier Reef	No	The Proposed Action is in WA.
S24D	Water resource in relation to large coal mining development or coal seam gas	No	The Proposed Action is not a coal mining or coal seam gas development.
S26	Commonwealth Land	No	The Proposed Action will not occur within Commonwealth Land. The Proposed Action is entirely within WA State marine waters.
S27B	Commonwealth Heritage Places Overseas	No	The Proposed Action is located in WA. No activity is being proposed in any places overseas.
S28	Commonwealth or Commonwealth Agency	No	N/A

3.1 Threatened Species and Ecological Communities

DMPA4 is situated offshore, and 23 listed Threatened species were identified in the PMST Report as potentially occurring within DMPA4 and the predicted zones of impact (Att8_PMST Report DMPA4_241206, Pages 3-5). No Threatened ecological communities occur within or in proximity to the Proposed Action, and as such are not discussed further in this Preliminary Documentation. Threatened species that are predominantly associated with coastal areas (such as shorebirds) are unlikely to be impacted by the Proposed Action and are not assessed further in this document.

Key Threatened species identified in the PMST Report (Att8_PMST Report DMPA4_241206, Pages 3-5) and Section 2.2.2 that may be directly and/or indirectly impacted by the Proposed Action are listed below.

- Marine mammals:
  - Blue Whale (*Balaenoptera musculus*) – Endangered and Migratory.
  - Australian Snubfin Dolphin (*Orcaella heinsohni*) – Vulnerable and Migratory.
  - Australian Humpback Dolphin (*Sousa sahulensis*) – Vulnerable and Migratory.
- Marine reptiles:
  - Loggerhead Turtle (*Caretta caretta*) – Endangered and Migratory.
  - Green Turtle (*Chelonia mydas*) – Vulnerable and Migratory.
  - Leatherback Turtle (*Dermochelys coriacea*) – Endangered and Migratory.
  - Hawksbill Turtle (*Eretmochelys imbricata*) – Vulnerable and Migratory.
  - Flatback Turtle (*Natator depressus*) – Vulnerable and Migratory.
  - Short-nosed Sea Snake (*Aipysurus apraefrontalis*) – Critically Endangered.
  - Leaf-scaled Sea Snake (*Aipysurus foliosquama*) – Critically Endangered.
- Elasmobranchs
  - Green Sawfish (*Pristis zijsron*) - Vulnerable.
  - Dwarf Sawfish (*Pristis clavata*) – Vulnerable and Migratory.
  - White Shark (*Carcharodon carcharias*) – Vulnerable and Migratory.
  - Grey Nurse Shark (*Carcharias taurus* west coast population) – Vulnerable.
  - Whale Shark (*Rhincodon typus*) – Vulnerable and Migratory.

Detailed descriptions of the Threatened species listed above have been provided in Section 2.2.2.

3.2 Migratory Species

Within DMPA4 and the predicted zones of impact, 36 listed Migratory species were identified in the PMST Report (Att8_PMST Report DMPA4_241206, Pages 5-8). Migratory species that are also listed as Threatened species have not been discussed further in this section, as they have already been discussed under Section 3.1. Migratory species that are predominantly associated with coastal areas (such as shorebirds) have not been assessed in this document due to the lack of impacts in those areas.

Key Migratory species identified in the PMST Report (Att8_PMST Report DMPA4_241206, Pages 5-8).and Section 2.2.2 that may be directly and/or indirectly impacted by the Proposed Action are listed below.

- Marine mammals:
  - Humpback Whale (*Megaptera novaeangliae*) – Migratory.

- Dugong (*Dugong dugon*) – Migratory.
- Spotted Bottlenose Dolphin (*Tursiops aduncus* Arafuna/Timor Sea populations) - Migratory.

- Elasmobranchs
  - Narrow Sawfish (*Anoxypristis cuspidata*) - Migratory.
  - Reef Manta Ray (*Mobula alfredi*) – Migratory.
  - Giant Manta Ray (*Mobula birostris*) – Migratory.

Detailed descriptions of the Migratory species listed above have been provided in Section 2.2.2.

4. POTENTIAL IMPACTS

The potential impacts described in this section apply to the Threatened and Migratory Species listed in the section above.

4.1 Direct or Indirect Impacts and Significance of Potential Impacts

The Proposed Action 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 (up to 50,000 m^3 per annum, or a maximum of 250,000 m^3 per 5-year program), 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.

Potential direct and indirect impacts to environmental values, including Threatened and Migratory species, as a result of the transporting and disposal of dredge material in DMPA4 are summarised below.

Direct Impacts:

- BCH: Direct permanent loss of 4.61 ha sparse to moderate filter feeders on unconsolidated sediment and 25.65 ha of sparse to moderate filter feeder on low profile reef with sand veneer within DMPA4;
- Loss of marine MNES fauna habitat as a result of dredge spoil disposal;
- Disturbance, injury or death of marine MNES fauna as a result of dredge spoil disposal operations;
- Injury or death of marine MNES fauna due to vessel movement (strike);
- Injury or alteration of marine MNES fauna behaviour from underwater noise from vessel movements or dredge spoil disposal activities; and
- Alteration of marine MNES fauna behaviour from artificial light from dredge vessel movements and disposal at night.

Indirect Impacts:

- BCH: Indirect permanent loss of 355 ha of sparse to moderate filter feeders within the ZoHI, and indirect recoverable impact of 720 ha of sparse to moderate filter feeders within the ZoMI;
- Permanent or temporary loss of marine MNES fauna habitat through sedimentation and decreased water quality;
- Impacts to marine MNES fauna habitat associated with the potential spillages of dredge spoil or hydrocarbon spills from vessels travelling between the dredge channel and DMPA4; and
- IMP translocation from dredge vessels.

These potential direct and indirect impacts and how they related to the Threatened and Migratory species listed in Section 3 are discussed further in the sections below.

4.1.1 Zones of Impact

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 (Att3_DMPA4 Disposal Plume Modelling 2024, Page 10).

The overall map of the dredge spoil plume impact area for DMPA4 that exceeds the Western Australian Marine Science Institution (WAMSI) thresholds was determined using 80th percentile (P80) background SSC and is shown in Figure 7 of the spoil disposal plume model report (Att3_DMPA4 Disposal Plume Modelling 2024, Figure 7, Page 10). 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.

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 MNES fauna species identified. Marine MNES fauna species are therefore likely to be traversing the site rather than residing within it.

Up to 121 ha of subtidal BCH is to be disturbed for the Approved Proposal, and indirect impacts are likely to occur within the Approved Proposal Zone of Influence (Preston Consulting 2022).

The Proposed Action 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 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 Proposed Action. The BCH within DMPA4 and the predicted zones of impact are unlikely to be considered important habitat for marine MNES fauna, but these species could occasionally be present.

DMPA4 contains suitable habitat for the Short-nosed Sea Snake, Leaf-scaled Sea Snake, and Narrow Sawfish, however similar habitat is widespread throughout the region and is not considered to be preferred habitat for these species (refer to Section 2.2.2).

4.1.2 Underwater Noise

Offshore dredge spoil disposal will produce underwater noise through vessel movements from the dredge channel and DMPA4, as well as the disposal of dredge spoil. This could result in the temporary alteration of marine fauna behaviour due to underwater noise from dredge vessel movements or spoil disposal activities.

MScience Marine Research (MScience) undertook an assessment of the risk of underwater noise impacts to marine MNES fauna from the disposal of dredge spoil at DMPA4 (Att17_Underwater Noise Risk Assessment 2025). This technical memorandum provided advice on the RFI provided by DCCEEW (EPBC 2024/10054, 2 June 2025), based on a desktop review of relevant existing data and published information about underwater noise associated with the transport and disposal of dredge

spoil at DMPA4. The findings of this technical memorandum are provided in Attachment 17 (Att17_Underwater Noise Risk Assessment 2025) and have been summarised in the sections below.

a. Impacts of sound to Marine Fauna

When assessing potential impacts of anthropogenic sound on marine life, sound sources and their resulting sounds are commonly divided into two main categories: impulsive and non-impulsive (NMFS 2024). Impulsive sounds are typically brief and intermittent; they rapidly rise and decay. Non-impulsive sounds can be brief or prolonged, continuous or intermittent, and do not generally have the high peak pressure and rapid rise time of impulsive sounds. The placement of dredge spoil (noises associated with splash, tumble and grinding sounds) may be considered impulsive or non-impulsive depending on the material to be placed (dropping of large rock/boulders = impulsive, dumping of fine unconsolidated material = non-impulsive). Noise generated by vessel propulsion may be considered non-impulsive.

Sound is important for most marine animals. Sound production and detection serve key biological functions including communication, foraging, reproduction, navigation and predator avoidance (OSPAR 2009). The potential impacts to marine fauna from underwater noise have been reviewed in detail (Erbe et al. 2019; ERM 2018; Finneran 2016; Hawkins and Popper 2017; OSPAR 2009; Popper and Hawkins 2019; Southall et al. 2019). The potential effects of noise can be broadly categorised into:

- Behavioural Impacts:
  - Behavioural response (displacement, attraction or avoidance); and
  - Masking or interfering with biologically important sounds (communication and echolocation).•
- Physiological Impacts:
  - Stress, concussive effect and physical damage to tissues; and
  - Hearing damage and/or impairment;
    - Temporary – termed temporary threshold shift (TTS); or
    - Permanent – termed permanent threshold shift (PTS) (Att17_Underwater Noise Risk Assessment 2025, Section 1.2, Pages 5-6).

b. Noise generating activities

MScience's assessment considered impacts to relevant marine MNES fauna from the following sound-producing activities expected to be generated by disposal of dredge spoil from a split hopper barge:

- Activity 1 – Radiated vessel noise from the spilt hopper barge during transit between the dredge area and disposal area.
- Activity 2 – Placement of dredged material at the disposal area (i.e. emptying of the split hopper barge) (Att17_Underwater Noise Risk Assessment 2025, Section 1.3, Page 6).

Based on the sound level of the Skandi Feistein (Esso Australia 2021), a similar vessel used as a proxy source for this estimation, the maximum broadband (10 Hz to 25 kHz) source level of the split hopper barge transiting was estimated to be 166.2 dB re 1 μPa^2m^2. This is similar to levels reported in the existing literature for other non-impulsive sound sources generated by commercial activities (refer to Figure 1 of Attachment 17 (Att17_Underwater Noise Risk Assessment 2025, Section 1.3.1, Pages 6-7)).

Only two publications were noted by MScience as reporting on acoustic sound levels of offshore dredge spoil disposal. The maximum source level measured from the release of unconsolidated dredged material from a split-hopper barge and TSHD was 108.7 dB re 1 μPa^2m^2 (Dickerson et al. 2001) and 155 dB re 1 μPa^2m^2 (De Jong et al. 2010), respectively. The average of these two source levels (131.9

dB re 1 μPa^{2}m^2) was used as the basis to infer zones of impact for the placement of dredge spoil at DMPA4 (Att17_Underwater Noise Risk Assessment 2025, Section 1.5.1, Page 14).

c. Noise Effect Criteria

To assess the potential effects of a sound–producing activity, exposure criteria (thresholds) were established for which sound levels may be expected to have a negative effect on animals. The thresholds presented in Attachment 17 (Att17_Underwater Noise Risk Assessment, Section 1.4, Pages 8-13) represent current best available science and have been accepted by regulatory agencies.

The study with most relevance to the Proposed Action was completed as part of the nearby Eramurra Solar Salt Project (EPBC 2021/9027). JASCO (2025) performed a modelling study of underwater sound levels associated with proposed vessel activities in shallow water (up to ~15 m depth). The distances to behavioural response and auditory injury (TTS or PTS) due to vessel radiated noise predicted by JASCO (2025) were used to inform the risk assessment of the Proposed Action. That study predicted the propagation of vessel radiated noise (during vessel transit and berthing), based on a maximum broadband (10 Hz to 25 kHz) source level of 172.9 dB re 1 μPa^{2}m^2 (which is slightly more than the estimated source level for the proposed split hopper barge of 166.2 dB re 1 μPa^{2}m^2). The study showed vessel radiated noise did not reach any of the noise effect criteria for the high frequency (HF) cetacean group, sirenian (Dugong) group, marine reptiles or fish within the model resolution (10 m). The modelling indicated the onset of TTS in the low frequency (LF) cetacean group did not extend beyond 170 m from a vessel in transit. A marine mammal behavioural response zone was estimated to extend for 3.17 km from the vessel noise source (Att17_Underwater Noise Risk Assessment, Section 1.5.2, Pages 15-16).

d. Risk Assessment Summary

On the basis of the qualitative review of available information relevant to MScience's assessment, the following conclusions were drawn regarding the risk of underwater noise impacts to marine MNES fauna from the Proposed Action. Noting the distance estimates for SEL*24h* criteria (continuous, non-impulsive, noise over a 24 hour period) reported by the existing studies do not mean that marine fauna travelling within this radius of the source will be injured, but rather that an animal could be exposed to the sound level associated with either PTS or TTS if it remained in that location for 24 hours.

- The inherent risk to the marine fauna of interest from the Proposed Action, with the exception of the LF cetacean group, was considered low.
  - Noise criteria thresholds from estimated sound source levels for the Proposed Action were considered unlikely to be reached.
- The inherent risk to LF cetaceans, including Humpback Whales, was considered moderate.
  - A previous modelling study (JASCO 2025) has shown the onset of TTS in LF cetaceans may extend for 170 m from a vessel noise source with a similar level (172.9 dB re 1 μPa^{2}m^2) to that estimated for the Proposed Action (166.2 dB re 1 μPa^{2}m^2).

Disposal activity will be frequent but brief. It will generally be three periods of 15 minutes for spoil disposal and three periods of ~3.5 hours for vessel transit per day.

The probability of marine megafauna being within the vicinity of the Proposed Action for sufficient time periods to accumulate the requisite length of exposure to noise at damaging levels and the mitigating potential of the recommended management measures, further reduce risk profile (Att17_Underwater Noise Risk Assessment, Section 2, Pages 18-22).

4.1.3 Marine Environmental Quality

The Proposed Action involves activities that may lead to a reduction in marine environmental quality, including direct sedimentation, smothering, increased turbidity, hydrocarbon/dredge spoil spills and increased pollution incidents associated with offshore dredge spoil disposal.

Potential direct and indirect impacts to marine environmental quality due to offshore dredge spoil disposal are summarised below:

- Additional temporary zones of impact associated with increased suspended sediment due to 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 from vessels travelling between the dredge channel and DMPA4.

Dredge spoil disposal activities have the potential to increase suspended sediment and sedimentation in marine waters. This change in water quality has the potential to indirectly impact BCH by reducing light penetration through the water column and smothering of biota due to sedimentation (Att2_DSDMP 2025, Section 8.1.1, Page 65).

Based on both the contaminant and PSD results during the sediment assessment by O2 Marine (Att1_DMPA4 BCH Report 2024, Appendix A, Page 31), sediment characteristics between the dredge channel and DMPA4 were found to be similar. As such, it is unlikely that biological impacts or changes to the marine environment will result from placing dredge spoil material at DMPA4.

However, decreased water quality due to sedimentation may have an impact to marine MNES fauna within DMPA4 and the predicted zones of impact. Changes in water quality, including elevated turbidity and the presence of contaminants, can lead to behavioural modifications in marine fauna. For example, increased sedimentation can cause fish and invertebrates to alter their feeding, migration, and breeding patterns. Mardie Minerals engaged Baird in 2025 to provide additional detail regarding the characteristics of the dredge plumes generated at DMPA4 (Att18_Dredge Plume Characteristics 2025). A summary of this report has been provided below.

The extent of the dredge plume impacts (ZoHI and ZoMI) and the reporting location used for the model time series is show in Figure 9. This shows the ZoHI area extends to a maximum of approximately 2.5 km from the DMPA along its West to Northeast arc.

Time series data from the model results was undertaken to examine how quickly the plumes develop once dumping commences, and how long the SSC level stays elevated in the water column once dumping concludes. For this analysis, the model was run with reporting locations at approximately 2.5 km around the DMPA at the boundary of the ZoHI and ZoMI.

The model results indicate the magnitude of the SSC is influenced both by the time of the dumping (three times a day) and by the movement of the plume in the tidal currents. In general, the following is noted:

- Sediment plumes are generated immediately at and around DMPA4 following the dumping program, with elevated SSC spikes for short periods of time noted; and
- Once dumping stops, there is a gradual settling of the level of SSC in the water column over a series of tides. The model indicates that within four days of the last disposal into DMPA4, the SSC level has dropped to background level at the ZoHI/ZoMI interface location (approximately 2.5 km West) as noted in Figure 10.

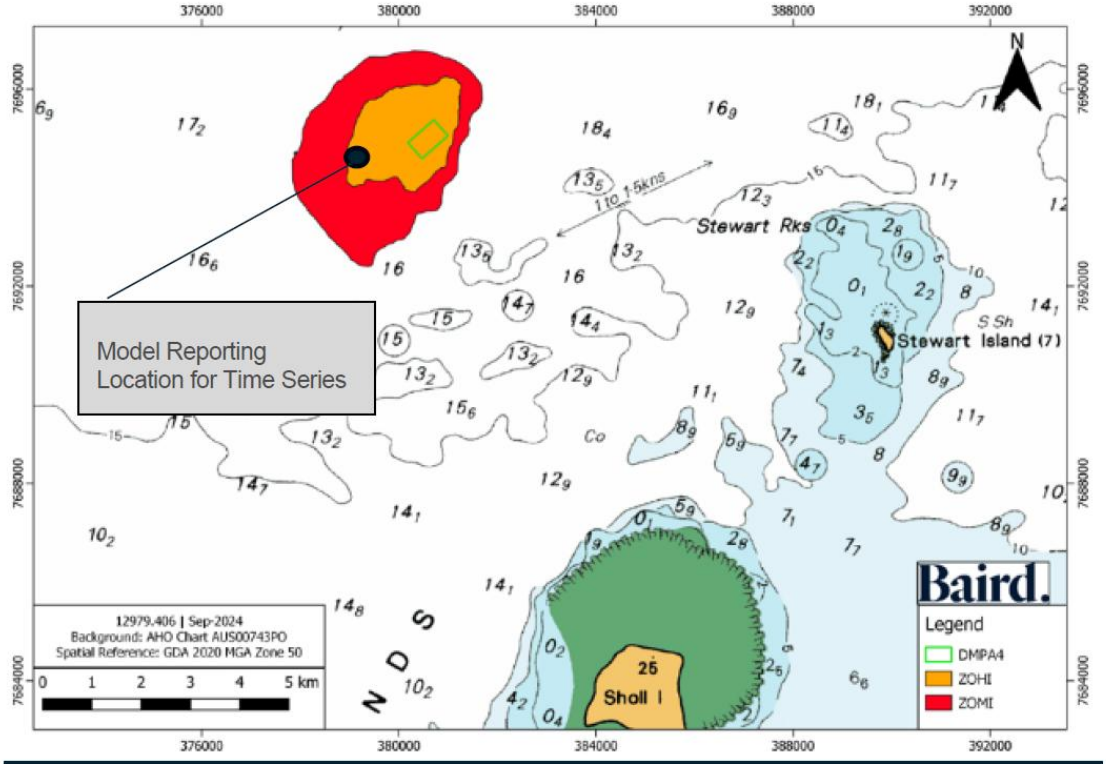

Figure 9: Model reporting location within the DMPA4 ZoHI/ZoMI

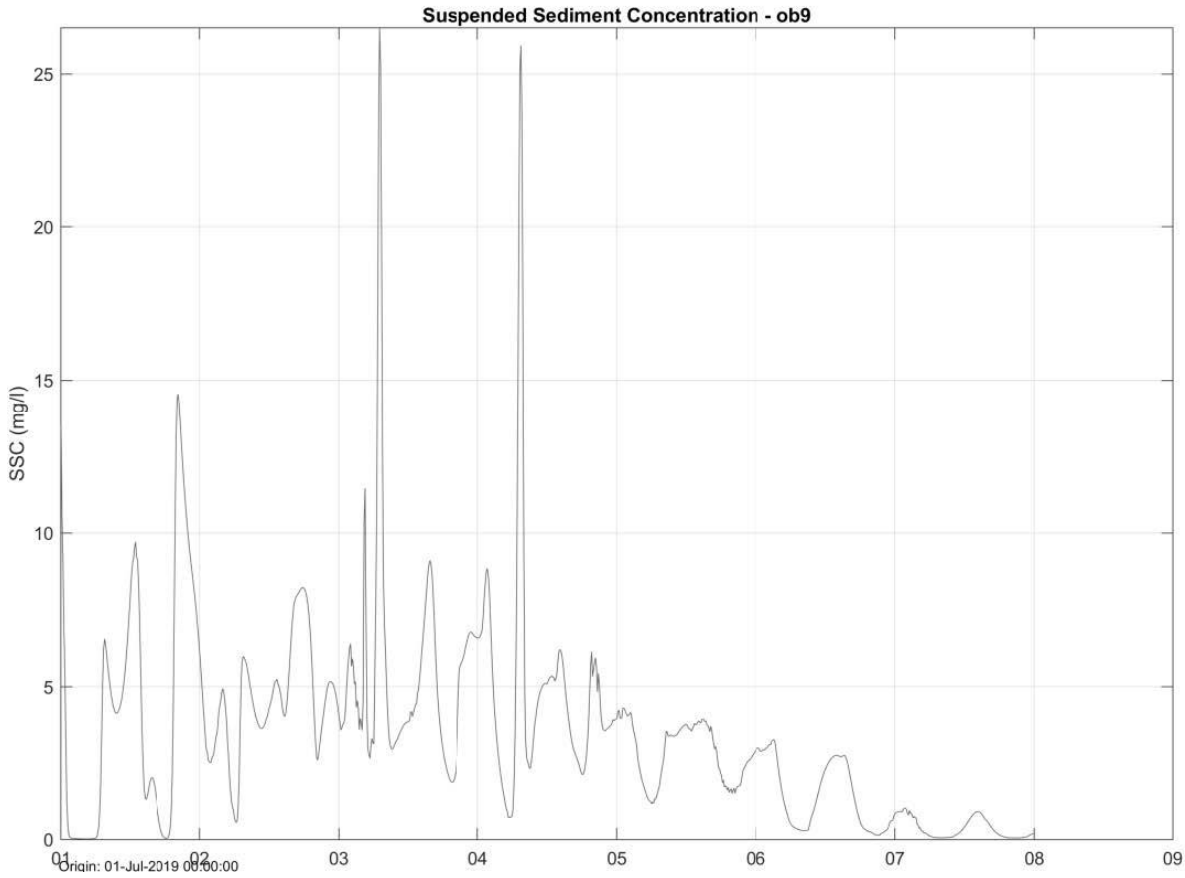

Figure 10: Model SSC at location on the ZoHI/ZoMI boundary to the West of DMPA4

The assessment of the Approved Action (Preston Consulting 2018) considered the following:

- Refuelling of vessels is proposed to occur at the Mardie Export Facility, and therefore there is a risk of hydrocarbon spill from vessels during construction and operation as a result of vessel collisions or hydraulic hose leaks. With the exception of vessels used in jetty construction, the majority of these vessels would be located several kilometres offshore as refuelling will occur at the end of the trestle jetty. Construction vessels are also small in size and therefore would not contain significant volumes of hydrocarbons.

The Proposed Action will present a minor increase in risk of potential spill of hydrocarbons and dredge spoil during transport, with potential impacts including:

- Water pollution: spills can introduce sediments, pollutants, and contaminants into the water column, leading to increased turbidity and reduced water quality.
- Habitat destruction: spills can smother benthic habitats (seafloor ecosystems), damaging coral reefs, seagrass beds, and other sensitive habitats, which are crucial for marine biodiversity.
- Sediment resuspension: spilled dredge spoil can resuspend sediments, reducing light penetration and affecting photosynthetic marine organisms like phytoplankton and aquatic plants.
- Contamination: if dredge spoil contains contaminated materials (heavy metals, hydrocarbons, or other pollutants), spills can introduce these toxins into the marine environment, affecting marine life and potentially entering the food chain.
- Disruption of marine life: spills can cause mortality or stress to marine organisms, including fish, invertebrates, and coral reefs, affecting biodiversity and ecosystem stability.
- Alteration of seafloor topography: uncontrolled dredge spoil spills can change the seafloor landscape, impacting species that depend on specific habitats.
- Spread of invasive species: uncontrolled dredge spoil spills can facilitate the spread of invasive species attached to spoil material, disrupting native ecosystems.
- Fishing industry: reduced fish populations due to habitat loss or pollution can impact local fisheries and livelihoods.
- Navigation hazards: large spills or mismanaged disposal can create navigational hazards, risking accidents for ships.

These risks are likely to be lower than those associated with the approved onshore disposal method, with any spills likely to occur and disperse more readily offshore than inshore.

Marine MNES fauna that could be impacted by impacts to marine environmental quality are most likely those that have potential (but not preferred) habitat present within DMPA4 and the surrounding zones of impact, which includes Leaf-scaled Sea Snake, Short-nosed Sea snake, Narrow Sawfish, Dwarf Sawfish and Green Sawfish.

4.1.4 Vessel Strike

Vessel movements will be required to transport dredge spoil from the dredge channel to DMPA4 for disposal. As such, there is a risk of vessels interacting with marine fauna, which could result in injury or death. Risks of vessel strike would extend into a new area (DMPA4 and vessel route) as a result of the Proposed Action. Marine MNES fauna that could be impacted by vessel strike are large marine mammals (i.e. Humpback Whale, dolphins, Dugong), marine turtles, sharks and rays.

4.1.5 Introduced Marine Pests

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. As such, the Proposed Action has the potential to result in IMPs being established into a new area.

The following information has been summarised from the Marine Pest Management Procedure (O2 Marine 2022b), which will be applied to all dredge disposal vessels.

Nodes are the locations to, or from which, a potential marine pest is transported. Nodes can be broad like a port or region, or as refined as a structure within a port or harbour such as a mooring or pylon. Nodes with IMP translocation risk for the Approved Proposal originally included:

- Anchorage/mooring areas;
- Trestle Jetty pilings and structure in intertidal and sub-tidal zones;
- Outfall and intake pipelines in intertidal and sub-tidal zones;
- Substrate surrounding and below the trestle jetty;
- Transhipment channel with increased/deeper area of soft bottom substrate and reduced coverage of existing BCH; and
- Transhipment turning basin.

This Proposed Action introduces a new node; DMPA4.

Vectors are the mechanism by which a potential marine pest can be translocated from donor to receiving node. Primary vectors of concern include biofouling on vessel hulls and other surfaces, ballast water, or other internal water or sediment carried by a vessel or marine equipment.

The Mardie area has not been surveyed specifically for IMPs, however, BCH surveys to-date have not identified any IMPs. The IMP species which are most likely to be introduced to Mardie as a result of the Approved Proposal (and the Proposed Action) are provided in Table 1 of the Marine Pest Management Procedure (O2 Marine 2022b).

4.1.6 Artificial Light

Offshore dredge spoil disposal will require vessel movements between the dredge channel and DMPA4, which will require lighting at night. This could result in the temporary alteration of marine MNES fauna behaviour due to artificial light from vessels during dredging and disposal, in particular, marine reptiles.

Baseline artificial light results found the overhead skies at the Approved Proposal location are typically very dark and representative of pristine, natural dark skies unaffected by artificial light. The only light source visible from all mainland and offshore light monitoring sites was the Sino Iron facilities located over 30 km away on the easterly horizon (Att2_DSDMP 2025, Section 2.6.2, Page 29).

The results of the 2024/25 artificial light monitoring surveys as part of the marine turtle monitoring program (Att12_Marine Turtle Survey Report 2025) were suitably analysed and compared to the baseline data of previous surveys (2021/22: offshore island, and 2022/23: mainland – as summarised above) to quantify any changes in whole-of-sky (WOS) brightness and identify new light sources. A notable 55.6% increase in WOS brightness was observed from Sholl Island (West), which was attributed to the newly constructed Approved Proposal Onshore Facilities. This increase represented the greatest change to the artificial light-scape for the Approved Proposal in 2024/25, however, fell below the WOS brightness levels predicted during light modelling studies for all Approved Proposal-related facilities during operations (Att12_Marine Turtle Survey Report 2025, Section 1, Page 2).

The greatest risk from the Proposed Action vessel lighting is to hatchling marine turtles emerging on the mainland and offshore islands. The temporary nature of the Proposed Action reduces the long-term impacts on the local marine turtle populations. However, it is important to note that the brightness and high visibility of the lights used in construction, along with the lights for the Proposed Action vessels, can potentially generate impact over large areas (> 20 km) and so management and mitigation of vessel light is necessary. Lights associated with the Proposed Action are mobile and would only be used when necessary outside of key ecological periods for marine turtles. This would reduce impacts of lighting on hatchlings as according to Mrosovsky (1978) they are more influenced by permanent cues and continuous sources of light than lights that may go on and off. Hatchling marine turtles on the nearshore islands are most at risk of a negative impact from the Proposed Action vessel lighting, while hatchling marine turtles on the mainland, nesting adult turtles and hatchlings offshore are at lower risk (BCI 2024a).

5. PROPOSED AVOIDANCE AND MITIGATION MEASURES

5.1 Alternatives

The approved disposal method under Condition 36(g) of EPBC 2018/8236 and EPBC 2022/9169 is onshore disposal within the Approved Proposal development envelope. In accordance with these approvals, Mardie Minerals undertook a number of detailed feasibility studies, including a detailed geophysical survey.

5.1.1 Onshore locations

In March 2022, Mardie Minerals initiated a formal tender process to explore dredging options based on the outcomes of comprehensive feasibility studies. Nine dredging contractors were approached; however, only two responded, while the remaining seven declined to submit quotes. Feedback from potential contractors highlighted significant challenges associated with onshore disposal, particularly the extensive distance involved and the shallow nearshore environment, which collectively posed considerable technical and environmental obstacles.

Subsequently, as more detailed evaluations of how these challenges might be addressed by the remaining two contractors were conducted, one withdrew its tender in July 2022. This left only a single contractor actively engaged in the process. Further negotiations and detailed assessments on onshore disposal options with the remaining contractor continued until November 2022. However, key issues remained unresolved, preventing the conclusion of the tender process. The primary challenges identified for onshore spoil disposal included:

- Long-distance transport and shallow nearshore conditions:
  - The shallow marine environment restricts the method of transportation of dredge spoil onshore to slurry pipelines only. Implementing this method necessitates up to six in-liner booster pumps (approximately every 500 m), which pose environmental risks such as:
    - Physical disturbance of the seabed during pump installation.
    - Potential slurry leakage or loss due to pipeline rupture or pump failure, risking impacts beyond the Approved Proposal's development envelope and its zones of influence),
    - Emissions from pump operation, including combustion-related pollution and greenhouse gases.
    - Introduction of invasive species via pipeline infrastructure.

- On-water refuelling (estimated at 160 L of diesel per pump per hour) further elevates spill and leakage risks, alongside noise pollution affecting marine fauna, and additional air emissions.

- Rocky substrate in certain dredge areas and on-water crushing:
  - Geotechnical surveys of the dredge channel area identified that certain areas contain rock, which complicates pumping slurry and spoil transport to the shore.
  - To allow for this, additional machinery for on-water rock crushing and rehydration would be necessary, increasing operational complexity, cost, and duration.
  - Extended dredging operations would heighten noise, emissions, and environmental disturbance.
- Land-based management of dredge spoil:
  - Dewatering processes of dredge spoil near sensitive mangrove habitats present environmental risks, especially if bunding or containment measures fail.
  - Severe weather events, such as cyclones, could mobilise dredge spoil sediments into tidal creeks and nearshore environments, impacting water quality.
  - The airborne dispersion of dredge spoil from the stockpile could cross-contaminate stockpiled salt produced by Mardie Minerals.
  - The airborne dispersion of dredge spoil from the stockpile could impact the nearshore BCH (mangroves and algal mats).
- *Minuria tridens*
  - An additional concern was the likely impacts to records previously identified as *Minuria tridens* (Vulnerable) 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). This is shown in Figure 11, with the onshore spoil disposal location represented by the disturbance footprint north of the causeway where the records are located. There is some uncertainty about the potential status of this new species, therefore avoidance is still being considered where practicable.
- Alternative sites on land:
  - Disposal of dredged material to an alternative location on land (i.e., other than within the Approved Proposal development envelope) may also require double/triple handling of the material increasing costs, fuel usage, dredging time and risks of a spill/bund wall failure incident. The material would need to be pumped through a pipeline to a bunded area at a distance even greater than 2 km from the dredge channel area, where the dredged material may then need to be treated. There will be the generation of a large amount of turbid water. In order to pump this material, it must be less than 20% solids; this would require at least four times as much water as dredge spoil material and this water would need to be treated to avoid harm to the receiving environment and before being discharged back into the sea.
  - Beneficial re-use options for the dredge spoil materials on land have not been identified, and the potential for such reuse remains uncertain. The relative isolated location of the Approved Proposal to existing or proposed projects, located within a reasonable distance from the dredge area, is a challenge as dredge spoil materials would need to be transported offsite over long distances.
- Cost and feasibility reasons:
  - Delivery of a successful land disposal of dredge spoil operation remains uncertain due to complexity of operations.

– Initial cost estimates for land disposal collected during the tender process (based on a minimum contingency scenario) are approximately $15M above the $80M budget.

Mardie Minerals evaluated various design options and contracting strategies to address challenges associated with onshore disposal listed above. However, the challenges 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.

The justifications for offshore disposal to DMPA4 rather than onshore disposal include:

- Minimising land disturbance: utilising DMPA4 avoids disrupting terrestrial habitats and ecosystems, especially sensitive areas.
- Reduced land use: eliminates the need for constructing and maintaining extensive land disposal facilities.
- Natural dilution and dispersion: the open ocean provides a vast medium for dilution, significantly reducing contaminant concentrations.
- Low contaminant levels: the dredge spoil is not contaminated with heavy metals or hydrocarbons, minimising environmental risks.
- Environmental compatibility: DMPA4 lacks sensitive ecological features, making it suitable for disposal without adverse impacts on marine biodiversity (discussed further in Section 5.1.2).
- Cost efficiency: sea disposal reduces infrastructure costs relative to land-based alternatives.
- Long-term capacity: In addition to capital dredging, DMPA4 is capable of accommodating ongoing maintenance dredging (estimated at up to 50,000 m³ annually) over a 56-year period.
- Regulatory compliance: both the EPBC Act and the Sea Dumping Act facilitate controlled offshore disposal, requiring permits, environmental management plans, and ongoing monitoring to ensure environmental protection and compliance are maintained.

The above assessment underscores the technical, environmental, and financial considerations influencing the dredge spoil disposal strategy decisions for the Approved Proposal, with offshore disposal at DMPA4 identified as the most viable approach under current conditions.

A risk assessment of the potential impact to MNES (terrestrial and marine) for the onshore dredge spoil disposal has been undertaken (refer to Attachment 23). The risk assessment is based on the expected methodology for the disposal of dredge spoil as per the methodology outlined in the submissions received from contractors (i.e. use of a slurry pipeline) from the previous tender process.

A summary and comparison of the risk assessment for onshore versus offshore disposal of the dredge spoil is provided in Attachment 24.

5.1.2 Offshore locations

Several offshore disposal sites have been identified and investigated for this Proposed Action, including (shown on Figure 12):

- Spoil Ground E;
- DMPA1;
- DMPA2; and
- DMPA3.

a. 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.

b. DMPA1, DMPA2 and DMPA3

Several offshore disposal sites closer to the Approved Proposal (within approximately 14.5 NM) were investigated by Baird (Att3_DMPA4 Disposal Plume Modelling 2024, Figure 1, Page 1).

In order to determine the most suitable disposal location, Baird was engaged to undertake spoil ground disposal plume modelling for two sites; DMPA1 (Att19_DMPA1 Dredge Plume Modelling 2024) and DMPA4 (Att3_DMPA4 Disposal Plume Modelling 2024, Page 10). 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 (Att3_DMPA4 Disposal Plume Modelling 2024, Page 10).

Furthermore, DMPA2 and DMPA3 were deemed unsuitable as they are situated closer to Stewart, Fortescue, Sholl 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, and therefore avoiding these areas would lessen the potential impact to habitat, as well as vessel movements near the Islands.

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Legend

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

388500 389000 389500 390000 390500 391000

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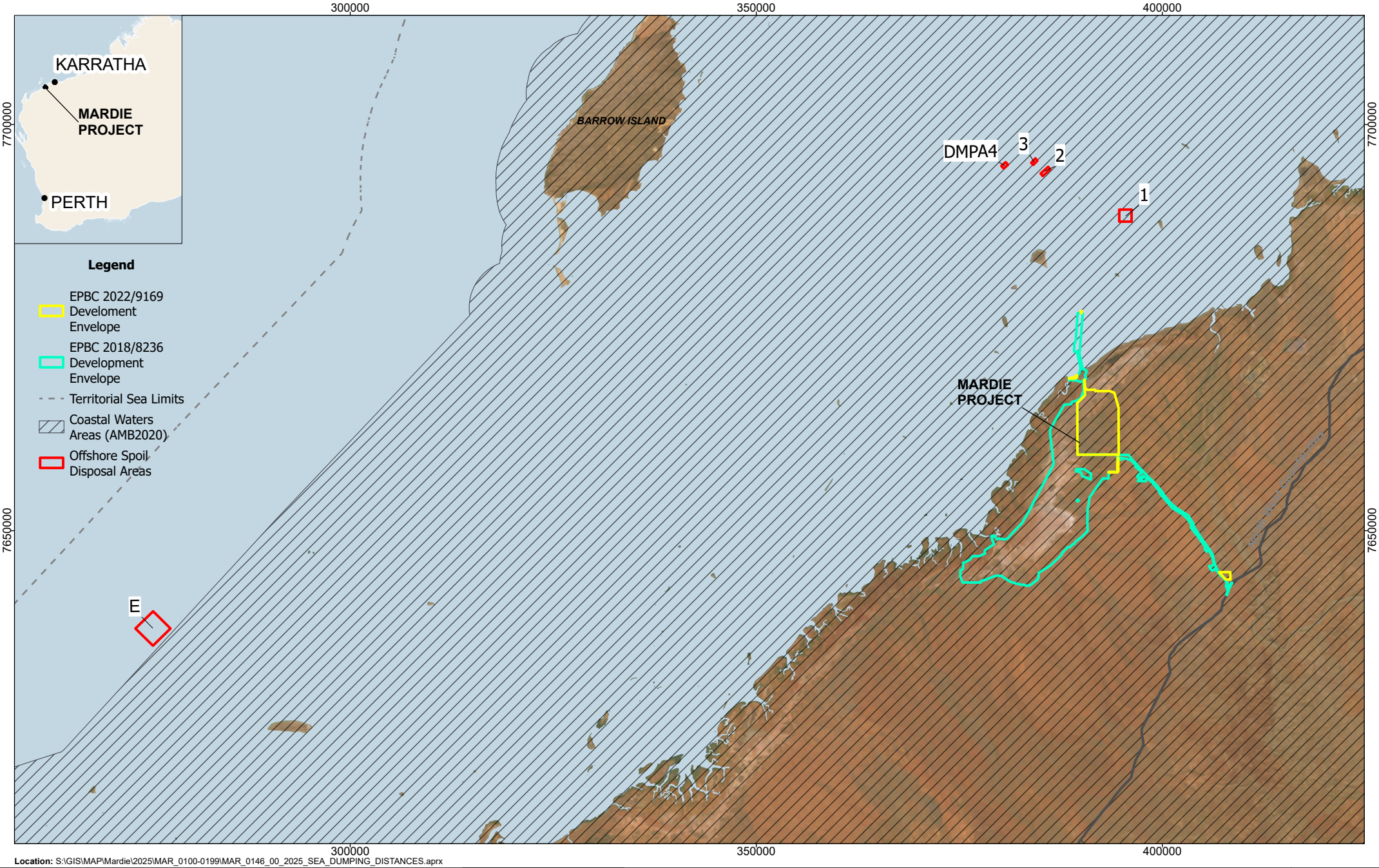
Offshore Dredge Spoil Disposal - Mardie Project Onshore spoil disposal locations and *Minuria* sp. Onslow (A.J. Perkins & M. Henson AJP WA167) records

Figure: 11



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Offshore Dredge Spoil Disposal - Mardie Project
Offshore spoil disposal locations investigated

Figure: 12

5.1.3 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.

5.1.4 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 and predicted zones of impact 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 (Att1_DMPA4 BCH Report 2024, Section 6, Page 26).

5.2 Avoidance and Mitigation Measures

Mardie Minerals has mitigated the potential impacts to Threatened and Migratory species according to the mitigation hierarchy; avoid, minimise, rehabilitate, offset (DCCEEW 2023c). This section details the avoidance and mitigation measures proposed.

5.2.1 Dredge and Spoil Disposal Management Plan

The EPBC Act approvals for the Approved Proposal (EPBC 2018/8236 and EPBC 2022/9169) require the implementation of the approved Dredge Management Plan (DMP) (O2 Marine 2023b) prior to commencement of dredging operations, until the completion of all dredging operations. The approved DMP has been updated and renamed as the DSDMP to mitigate and manage the environmental impacts on Threatened and Migratory fauna from both the Approved Proposal dredging and the Proposed Action spoil disposal activities (Att2_DSDMP 2025).

The DSDMP takes a precautionary approach, outlining environmental protection outcomes and management targets that must be achieved through monitoring and management actions (Att2_DSDMP 2025, Section 7, Pages 48-64).

Avoidance and mitigation measures are detailed within a DSDMP (Att2_DSDMP 2025, Section 7, Pages 48-64). The DSDMP will be implemented to ensure residual impacts to Threatened and Migratory species as a result of the Proposed Action are not significant.

Avoidance and mitigation measures within the DSDMP relevant to Threatened and Migratory species include:

- Utilise a satellite-based vessel monitoring system on dredge vessel and transport barges to ensure no works occur outside the approved disturbance area;
- All dumping activities shall occur within the spoil grounds approved under the Sea Dumping Permit;
- The dredge spoil shall be dumped in a manner over the nominated spoil ground to minimise mounding from the dumping activities;
- Monitor dredge spoil disposal operations (duration, intensity, overflow rates etc) to minimise and control SSC where possible;
- Pre- and post-dredge bathymetric surveys;
- Scheduling to avoid key ecological windows (1 October - 31 March);
- Marine water quality monitoring;
- BCH monitoring;

- Marine fauna monitoring;
- Observation and exclusion zones;
- Noise management protocols and procedures:
  - Ensure all vessel equipment and machinery is in good condition and subject to regular maintenance. When in transit, all dredge vessels will be operated in accordance with EPBC Regulations 2000- Part 8 Division 8.1 (Interacting with Cetaceans);
  - Ensure all vessels understand and comply with EPBC Act Policy Statement 2.1 (DEWHA 2008a);
  - 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 (noting that dredge spoil disposal will only be undertaken prior to 30 September each calendar year)) including transit to 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 Proposed Action will not exceed 8 knots within 500 m of any identified cetacean, Dugong, or marine turtle;
- Chemical/oil spill controls:
  - Develop and implement Proposed Action specific management procedures;
  - All Proposed Action vessels to maintain adequate spill response equipment on board;
  - All crew to be trained in emergency spill response;
  - Hydrocarbons (including hydrocarbon wastes) shall be stored in accordance with AS1940-2004 (The storage and handling of flammable and combustible liquids);
  - 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;
  - Mardie Minerals is to be notified immediately in the event of a hydrocarbon spill of any volume. An incident report will be submitted for each spill;
- IMP control measures:
  - All relevant vessels to comply with the Marine Pest Management Procedure (O2 Marine 2022b);
  - 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);
  - All vessels that mobilise to the Project Area are required to complete the WA 'Vessel Check' risk assessment (DPIRD 2021).
- Waste control measures;
- Implement the Illumination Plan (BCI 2024a); and
- Recording and reporting requirements.

In addition to the avoidance and mitigation measures listed above, Mardie Minerals will adhere to existing legislative approvals and relevant standards, policies and guidance materials, as summarised in Section 1.3. The DSDMP has been prepared in accordance with relevant standards, policies and guidance materials, which is discussed in further detail in the section below.

The Illumination Plan (BCI 2024a) included as a mitigation measure within the DSDMP does not include the Proposed Action, however it is expected that the measures within the Illumination Plan for the Approved Action will be applicable to the Proposed Action to mitigate potential impacts. However, it is noted that as per condition 53 of EPBC 2018/8236 and EPBC 2022/9169, Mardie Minerals will update the Illumination Plan to include lighting associated with the Proposed Action.

No offsets are proposed, as the impacts from the Proposed Action are not considered to be significant following the implementation of avoidance and mitigation measures listed in the DSDMP.

a. Effectiveness of Mitigation Measures

The avoidance and mitigation measures outlined in the DSDMP (and summarised above) align with Technical Guidance – EIA of marine dredging proposals (EPA 2021c) by:

- Incorporating thorough baseline data collection and risk assessments.
- Scheduling activities to minimise ecological impacts.
- Establishing robust monitoring and adaptive management frameworks.
- Ensuring transparent reporting and compliance measures.

The effectiveness of key avoidance and mitigation measures detailed within the DSDMP (as summarised above) has been assessed below, referencing the intended use of best practice techniques, standards and accepted industry guidance:

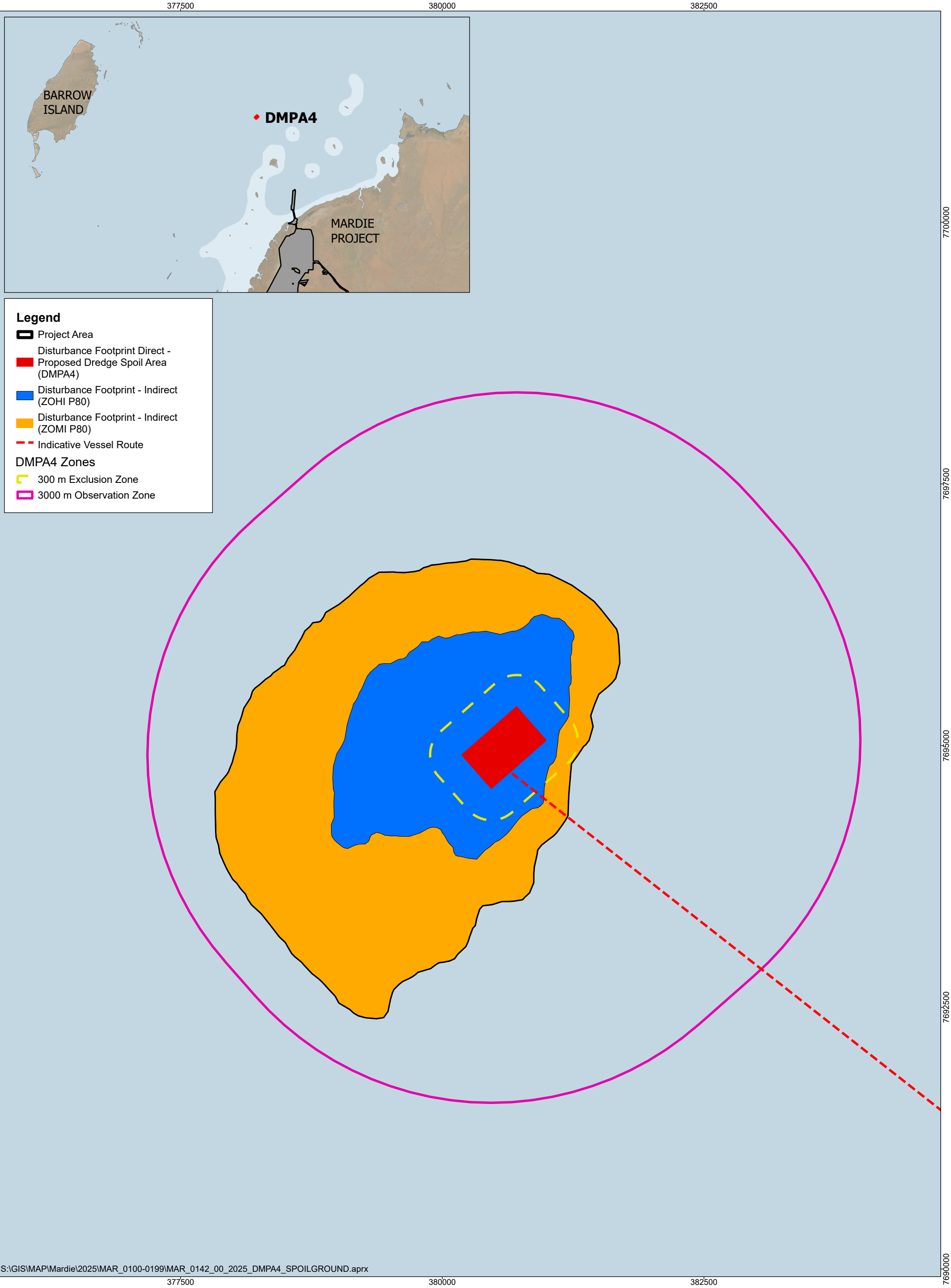
- Environmental risk assessments:
  - Mitigation measures such as scheduling disposal activities to avoid ecological windows, establishing marine fauna monitoring zones, and implementing illumination controls are based on environmental risk assessments.
  - These assessments are a core component of planning as part of the International Organization for Standardization (ISO) environmental management standard ISO 14001 (ISO 2015), enabling Mardie Minerals to identify significant environmental aspects and impacts proactively.
  - The avoidance and mitigation measures translate identified risks into specific objectives (e.g., minimising marine fauna disturbance) and operational controls (e.g., timing of activities); this ensures that environmental considerations are embedded into operational procedures.
- Monitoring and Measurement:
  - the proposed monitoring plans (including marine fauna, BCH, marine water quality and sediment dispersion) will allow Mardie Minerals to evaluate the effectiveness of avoidance and mitigation measures continuously. Collected data supports adaptive management, where measures can be adjusted based on real-time feedback, increasing their effectiveness over time.
  - The DSDMP is based on guidelines from ISO 14001 (ISO 2015), which emphasise systematic planning to reduce environmental impacts.
- Observation and exclusion zones for marine fauna:
  - Application of the Australian National Guidelines for Whale and Dolphin Watching (DotEE 2017a) reduces the risk of vessel strikes and disturbance, supports marine mammal conservation, and promotes sustainable vessel operations in marine environments.

- Reporting large marine fauna sightings to vessels:
  - Implementing a Marine Fauna Reporting System aligns with marine mammal protection guidelines (e.g., DotEE 2017a; DotEE 2017d; DEWHA 2008a;), emphasising real-time communication to mitigate vessel collisions and disturbances.
- Scheduling to avoid key ecological windows of marine fauna:
  - Scheduling disposal activities outside of breeding, migration, or feeding windows minimises disturbance (EPA 2021c; DEWHA 2009a).
- Implement Illumination Plan:
  - The Illumination Plan (BCI 2024a) is designed following marine lighting best practices outlined in the national light pollution guidelines for wildlife (DCCEEW 2023a) which recommend minimising light pollution to prevent disorientation and disturbance of marine fauna, especially during nocturnal periods.
  - Use of red or amber lighting, which has minimal impact on marine species such as marine turtles (Witherington and Martin, 2003), reduces behavioural disturbances.
  - Studies like Lorne and Salmon (2007) demonstrate that controlled lighting reduces the risk of disorientation and habitat avoidance by sensitive species.

b. Observation and Exclusion Zones

The proposed observation and exclusion zones for the Proposed Action are shown in Figure 13 and detailed in the DSDMP (Att2_DSDMP 2025, Section 8.3.1, Pages 86-88).

Figure 13 shows the observation and exclusion zones at 3,000 m and 300 m, respectively. The extent of these zones are to ensure that noise impacts are adequately considered as recommended by MScience (Att17_Underwater Noise Risk Assessment, Section 1.5.3, Pages 16-17). Additional noise modelling may be conducted which may inform whether the extent of these zones need to be reviewed.



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MARDIE PROJECT

Offshore Dredge Spoil Disposal - Mardie Project Current Observation and Exclusion Zones for the Proposed Action

Figure: 13

5.2.2 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.

The potential impacts from the Proposed Action are likely to be adequately regulated by Sea Dumping Permit conditions (when granted).

5.2.3 Other Mitigation Measures

The following mitigation measures specific to managing potential impacts to marine fauna affected by the plumes created by offshore dredge spoil disposal will be applied in addition to the measures presented in the DSDMP.

- Selection of Disposal Method:
  - Use of split hopper barges for bottom dumping to limit plume size and duration.
- Sediment Plume Management:
  - Adaptive dredge spoil placement within DMPA4 based on prevailing weather conditions and turbidity at time of disposal event.
- Operational Controls:
  - Avoid disposal during adverse weather conditions (e.g., storms, high winds) that could exacerbate plume dispersion.
  - Limit the wash out of barge vessels during adverse weather conditions to be within the approved dredge area as per the Approved Proposal only.

6. SUMMARY OF POTENTIAL IMPACTS, AVOIDANCE AND MITIGATION MEASURES

There are limited BCH values within DMPA4 and the ZoMI/ZoHI, and as such it is unlikely that these areas provide important habitat for the Threatened and Migratory species identified. There are also industry best-practice mitigation measures proposed to address the direct and indirect impacts, particularly for vessel movement between the dredge channel and DMPA4 and dumping within DMPA4 (refer to Section 5). 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 environmental values, including marine fauna, from dredge material disposal activities are detailed within the DSDMP (Att2_DSDMP 2025, Section 67, Pages 48-64). This plan takes a precautionary approach and includes the measures summarised in Section 5.2.1.

6.1 Relevant Impacts and Risk Assessment

Section 4 of this Preliminary Documentation has assessed the potential impacts on marine MNES fauna in detail. To avoid repetition, a summary of the potential impacts for the Proposed Action as applicable to marine MNES fauna, including a risk assessment of inherent and residual risk following the application of the mitigation hierarchy, is provided in Table 11.

The risk assessment is based on the risk criteria described in Section 6.1.1.

Table 11: Potential Impacts to Marine MNES Fauna

Potential Impact	Relevant Marine MNES Fauna	Assessment of Impacts
Direct impacts		
Impacts to MNES resulting from the loss of BCH/marine MNES fauna habitat from disposal of dredge spoil within DMPA4.	Leaf-scaled Sea Snake Short-nosed Sea Snake Green Sawfish Narrow Sawfish Dwarf Sawfish	**Nature and extent of impact:** Direct permanent loss of 4.61 ha sparse to moderate filter feeders on unconsolidated sediment and 25.65 ha of sparse to moderate filter feeder on low profile reef with sand veneer within DMPA4. **Unknown, unpredictable or irreversible impacts:** Direct irreversible loss of 30.3 ha within DMPA4 is predicted to occur as a result of the Proposed Action. This habitat, however, does not represent preferred habitat for any marine MNES fauna species. No unknown or unpredictable impacts are predicted from this direct disturbance of habitat. **Significance of impacts:** The BCH survey of DMPA4 and the surrounding Detailed Study Area identified that these areas are comprised of habitats that are unlikely to represent particular regional or conservation significance compared to other areas within the Mardie and Pilbara region, where higher covers and diversities are observed. As such, this survey supports the finding that DMPA4 is comprised of relatively poor quality (i.e. low cover and diversity) vegetated habitats for foraging compared to areas where marine MNES fauna species typically congregate. Leaf-scaled Sea Snake, Short-nosed Sea Snake, Narrow Sawfish, Dwarf Sawfish and Green Sawfish are species that may inhabit the low quality habitat within DMPA4. The habitat described is well represented along the Pilbara coast, and in higher covers and diversities. Therefore, this habitat type within DMPA4 is unlikely to represent critical habitat for marine fauna. **Inherent Risk Rating:** The likelihood of the impact occurring has been given a rating of 'Likely', and a consequence of impact rating of 'Moderate', resulting in a risk rating of 'Medium'. **Avoidance and Mitigation Measures:** Detailed in Section 5.2, including the measures summarised below: • Implement DSDMP (Att2_DSDMP 2025). • Monitoring and management zones. • Report large marine fauna sightings to vessels. **Residual Risk Rating:** Following the application of the above avoidance and mitigation measures, the likelihood of the impact occurring has been given a rating of 'Likely', and a consequence of impact rating of 'Minor', resulting in a risk rating of 'Low'. **Additional Technical Data:** • Section 2.2.4 provides detail regarding the BCH identified within DMPA4. • Section 2.2.2 provides detail regarding marine MNES fauna that may utilise the habitat within DMPA4. • Section 4 provides detail regarding the impacts to BCH. • Attachment 1 (Att1_DMPA4 BCH Report 2024) provides further technical information regarding the BCH within DMPA4.
Dredge spoil disposal (dumping) operations	Humpback Whale Australian Humpback Dolphin Australian Snubfin Dolphin Spotted Bottlenose Dolphin Blue Whale Dugong Hawksbill Turtle Green Turtle Flatback Turtle	**Nature and extent of impact:** The Proposed Action includes the disposal of dredge spoil into DMPA4, which could increase the risk of disturbance, injury or death to marine MNES fauna if in the vicinity of the dredge barge during disposal operations. **Unknown, unpredictable or irreversible impacts:** No impacts would be considered unknown. This impact is generally unpredictable, as the presence of fauna beneath the dredge barge when dumping is likely to be extremely rare and may not occur at all. No irreversible impacts are predicted. **Significance of impacts:** This potential impact is unlikely to occur but could result in the loss of individuals on very rare occasions. Therefore, the risk to an MNES population is considered low.

Potential Impact	Relevant Marine MNES Fauna	Assessment of Impacts
	Loggerhead Turtle Leatherback Turtle Green Sawfish Narrow Sawfish Dwarf Sawfish White Shark Grey Nurse Shark Whale Shark Reef Manta Ray Giant Manta Ray	**Inherent Risk Rating:** The likelihood of the impact occurring has been given a rating of 'Unlikely', and a consequence of impact rating of 'High', resulting in a risk rating of 'Low'. **Avoidance and Mitigation Measures:** Detailed in Section 5.2, including the measures summarised below: • Implement DSDMP (Att2_DSDMP 2025). • Scheduling to avoid key ecological windows. • Monitoring and management zones. • Report large marine fauna sightings to vessels. **Residual Risk Rating:** Following the application of the above avoidance and mitigation measures, the likelihood of the impact occurring has been given a rating of 'Rare', and a consequence of impact rating of 'High', resulting in a risk rating of 'Low'. **Additional Technical Data:** • Section 2.2.2 provides detail regarding marine MNES fauna that may utilise the habitat within DMPA4. • Section 4 provides detail regarding the impacts to marine MNES fauna. • Attachment 2 (Att2_DSDMP 2025) provides further technical details regarding management of impacts to marine fauna during dredge spoil disposal operations.
Vessel strike	Humpback Whale Australian Humpback Dolphin Australian Snubfin Dolphin Spotted Bottlenose Dolphin Blue Whale Dugong Hawksbill Turtle Green Turtle Flatback Turtle Loggerhead Turtle Leatherback Turtle Green Sawfish Narrow Sawfish Dwarf Sawfish White Shark Grey Nurse Shark Whale Shark Reef Manta Ray Giant Manta Ray	**Nature and extent of impact:** The Proposed Action includes vessel movements between the dredge channel and DMPA4, which could increase the risk of injury or death to marine MNES fauna due to vessel strike. **Unknown, unpredictable or irreversible impacts:** No impacts would be considered unknown. No unpredictable or irreversible impacts are predicted that would affect fauna at a local population scale. **Significance of impacts:** The consequence of vessel strike on marine fauna may result in injury or mortality. However, the likelihood of a vessel strike during the transport of dredge spoil from the dredge channel to DMPA4 is considered low due to the slow speed of the dredge vessel (8 – 12 knots), the short journey length (approximately 27 NM per return trip), the low frequency of vessel movements (up to three return trips per day) and relatively short duration (for capital dredging and maintenance dredging as required). Dolphins are quick moving and would react quickly to avoid potential impact to vessels. Whales may be present within the deeper waters of the vessel route. Dugongs may be present. **Inherent Risk Rating:** The likelihood of the impact occurring has been given a rating of 'Possible', and a consequence of impact rating of 'Moderate', resulting in a risk rating of 'Medium'. **Avoidance and Mitigation Measures:** Detailed in Section 5.2, including the measures summarised below: • Implement DSDMP (Att2_DSDMP 2025). • Scheduling to avoid key ecological windows. • Monitoring and management zones. • Report large marine fauna sightings to vessels. **Residual Risk Rating:** Following the application of the above avoidance and mitigation measures, the likelihood of the impact occurring has been given a rating of 'Unlikely', and a consequence of impact rating of 'Moderate', resulting in a risk rating of 'Low'. **Additional Technical Data:** • Section 2.2.2 provides detail regarding marine MNES fauna that may utilise the habitat within DMPA4 and vessel route. • Section 4 provides detail regarding the impacts of vessel strike to marine fauna. • Attachment 2 (Att2_DSDMP 2025) provides further technical details regarding management of impacts to marine fauna due to vessel strike.

Potential Impact	Relevant Marine MNES Fauna	Assessment of Impacts
Marine Noise	Humpback Whale Australian Humpback Dolphin Australian Snubfin Dolphin Spotted Bottlenose Dolphin Blue Whale Dugong Hawksbill Turtle Green Turtle Flatback Turtle Loggerhead Turtle Leatherback Turtle Leaf-scaled Sea Snake Short-nosed Sea Snake	**Nature and extent of impact:** The Proposed Action will produce marine noise from vessel movements or dredge spoil disposal activities, which could lead to the injury or alteration of marine MNES fauna behaviour. **Unknown, unpredictable or irreversible impacts:** Marine noise impacts are known and a risk assessment was undertaken to predict these impacts. No irreversible impacts are predicted from this direct impact. **Significance of impacts:** The inherent risk to the marine MNES fauna from the Proposed Action, with the exception of the LF cetacean group, is considered low. Noise criteria thresholds from estimated sound source levels for the Proposed Action were considered unlikely to be reached. The inherent risk to LF cetaceans, including Humpback Whales, was considered moderate. A previous modelling study (JASCO 2025) has shown the onset of TTS in LF cetaceans may extend for 170 m from a vessel noise source with a similar level to that estimated for the Proposed Action. Disposal activity will be frequent but brief. It will generally be three periods of 15 minutes for spoil disposal and three periods of ~3.5 hours for vessel transit per day. The probability of marine megafauna being within the vicinity of the Proposed Action for sufficient time periods to accumulate the requisite length of exposure to noise at damaging levels and the mitigating potential of the recommended management measures, further reduce risk profiles. **Inherent Risk Rating:** The likelihood of the impact occurring has been given a rating of ‘Possible’, and a consequence of impact rating of ‘Moderate’, resulting in a risk rating of ‘Medium’. **Avoidance and Mitigation Measures:** Detailed in Section 5.2, including the measures summarised below: • Implement DSDMP (Att2_DSDMP 2025). • Scheduling to avoid key ecological windows. • Monitoring and management zones. • Report large marine fauna sightings to vessels. **Residual Risk Rating:** Following the application of the above avoidance and mitigation measures, the likelihood of the impact occurring has been given a rating of ‘Unlikely’, and a consequence of impact rating of ‘Minor’, resulting in a risk rating of ‘Low’. **Additional Technical Data:** • Section 2.2.2 provides detail regarding cetaceans and marine reptiles in proximity to the Proposed Action. • Section 4 provides detail regarding the impacts to marine MNES fauna. • Section 4.1.2 provides detail regarding impacts from underwater noise. • Attachment 17 (Att17_Underwater Noise Risk Assessment 2025) provides further technical information regarding noise impacts and risk assessment.
Light spill to the marine environment	Hawksbill Turtle Green Turtle Flatback Turtle Loggerhead Turtle Leatherback Turtle	**Nature and extent of impact:** The Proposed Action will require lighting on dredge vessels during transit between the dredge channel and DMPA4 at night, which may result in the alteration of marine MNES fauna behaviour. **Unknown, unpredictable or irreversible impacts:** No irreversible impacts are predicted from this direct impact. **Significance of impacts:** While exact light emissions are unable to be predicted, it is understood that the Proposed Action will not require any permanent lighting, but will include lighting on vessels during transit at night. The vessel route passes through offshore islands (Sholl island) that are known marine turtle nesting areas, noting that no dredge spoil disposal will occur during the 1 October to 31 March environmental blackout period, during which turtle nesting takes place. **Inherent Risk Rating:** The likelihood of the impact occurring has been given a rating of ‘Possible’, and a consequence of impact rating of ‘Moderate’, resulting in a risk rating of ‘Medium’.

Potential Impact	Relevant Marine MNES Fauna	Assessment of Impacts
		Avoidance and Mitigation Measures: Detailed in Section 5.2, including the measures summarised below: • Implement Illumination Plan (BCI 2024a). • Implement DSDMP (Att2_DSDMP 2025). • Consider design recommendations provided in the National Light Pollution Guidelines for Wildlife (DCCEEW 2023a) in order to ensure that lighting impacts are as low as practicable. • Scheduling to avoid key ecological windows. • Monitoring and management zones. • Report large marine fauna sightings to vessels. **Residual Risk Rating:** Following the application of the above avoidance and mitigation measures, the likelihood of the impact occurring has been given a rating of 'Unlikely', and a consequence of impact rating of 'Moderate', resulting in a risk rating of 'Low'. **Additional Technical Data:** • Section 2.2.2 provides detail regarding marine turtles and their habitat identified in proximity to the Proposed Action. • Section 4 provides detail regarding the impacts to marine MNES fauna. • Section 4.1.6 provides detail regarding impacts from artificial light. • Attachment 10 (Att10_Marine Turtle Monitoring Program 2023), Attachment 11 (Att11_Marine Turtle Survey Report 2024), and Attachment 12 (Att12_Marine Turtle Survey Report 2025) provide further technical information regarding marine turtles in the Approved Proposal area and surrounds.
Indirect Impacts		
Impact to MNES resulting from the permanent and temporary loss of BCH/marine MNES fauna habitat from disposal of dredge spoil within ZoHI and ZoMI respectively.	Leaf-scaled Sea Snake Short-nosed Sea Snake Green Sawfish Narrow Sawfish Dwarf Sawfish	**Nature and extent of impact:** Indirect permanent loss of 355 ha of sparse to moderate filter feeders within the ZoHI, and indirect recoverable impact of 720 ha of sparse to moderate filter feeders within the ZoMI **Unknown, unpredictable or irreversible impacts:** Irreversible loss of 355 ha within the ZoHI is predicted to occur as a result of the Proposed Action. This habitat, however, does not represent preferred habitat for any marine MNES fauna species. No unknown or unpredictable impacts are predicted from this indirect disturbance of habitat, however the size of the ZoHI is defined by modelling predictions, which are based on assumptions (which are often conservative). The actual size of the ZoHI could therefore be different from predictions, however it is most likely to be smaller due to the use of these conservative assumptions. **Significance of impacts:** The BCH survey of DMPA4 and the surrounding Detailed Study Area identified that these areas are comprised of marine MNES fauna habitats that are unlikely to represent particular regional or conservation significance compared to other areas within the Mardie and Pilbara region, where higher covers and diversities are observed. As such, this survey supports the finding that ZoHI/ZoMI is comprised of relatively poor quality (i.e. low cover and diversity) vegetated habitats for foraging compared to areas where marine MNES fauna species typically congregate. Leaf-scaled Sea Snake, Short-nosed Sea Snake, Narrow Sawfish, Dwarf Sawfish and Green Sawfish are the most likely species to be occasionally found within the low quality habitat within the ZoHI/ZoMI. The habitat described is well represented along the Pilbara coast, and in higher covers and diversities. Therefore, this habitat type within ZoHI/ZoMI is unlikely to represent critical or preferred habitat for marine fauna. **Inherent Risk Rating:** The likelihood of the impact occurring has been given a rating of 'Likely', and a consequence of impact rating of 'Minor', resulting in a risk rating of 'Low'. **Avoidance and Mitigation Measures:** Detailed in Section 5.2, including the measures summarised below: • Implement DSDMP (Att2_DSDMP 2025). • Contain spoil disposal within DMPA4 boundary. • Monitoring and management zones.

Potential Impact	Relevant Marine MNES Fauna	Assessment of Impacts
		• Report large marine fauna sightings to vessels. **Residual Risk Rating:** Following the application of the above avoidance and mitigation measures, the likelihood of the impact occurring has been given a rating of 'Possible', and a consequence of impact rating of 'Minor', resulting in a risk rating of 'Low'. **Additional Technical Data:** • Section 2.2.4 provides detail regarding the BCH identified within the Detailed Study Area. • Section 2.2.2 provides detail regarding marine MNES fauna that may utilise the habitat within the Detailed Study Area. • Section 4 provides detail regarding the impacts to BCH. • Attachment 1 (Att1_DMPA4 BCH Report 2024) provides further technical information regarding the BCH within the Detailed Study Area.
Impacts to use of the water column by marine MNES fauna due to sedimentation and decreased water quality	Humpback Whale Australian Humpback Dolphin Australian Snubfin Dolphin Spotted Bottlenose Dolphin Blue Whale Dugong Hawksbill Turtle Green Turtle Flatback Turtle Loggerhead Turtle Leatherback Turtle Green Sawfish Dwarf Sawfish Narrow Sawfish White Shark Grey Nurse Shark Whale Shark Reef Manta Ray Giant Manta Ray Leaf-scaled Sea Snake Short-nosed Sea Snake	**Nature and extent of impact:** Reduction in marine MNES fauna use of the water column within DMPA4, ZoHI and ZoMI. The size of impacted areas will vary depending on hydrodynamic conditions at the time. Some impacts may occur if dredge material spills occur during transport. **Unknown, unpredictable or irreversible impacts:** No impacts would be considered unknown. The size of the impacted areas will vary, as the modelled boundaries of the zones of impact represent the maximum extent (all weather conditions). The actual size will be a smaller area within the zones of impact. No irreversible impacts are predicted. **Significance of impacts:** Dredge spoil disposal activities have the potential to increase suspended sediment and sedimentation in marine waters. This change in water quality has potential to indirectly impact marine MNES fauna behaviour by reducing light penetration through the water column (Att2_DSDMP 2025, Section 8.1.1, Page 65). Based on modelling, sediment plumes are generated immediately at and around DMPA4 following the dumping program, with elevated SSC spikes for short periods of time noted. Once dumping stops, there is a gradual settling of the level of SSC in the water column over a series of tides. The model indicates that within four days of the last disposal into DMPA4, the SSC level has dropped to background level at the ZoHI/ZoMI interface location (approximately 2.5 km west). **Inherent Risk Rating:** The likelihood of the impact occurring has been given a rating of 'Highly Likely', and a consequence of impact rating of 'Minor', resulting in a risk rating of 'Medium'. **Avoidance and Mitigation Measures:** Detailed in Section 5.2, including the measures summarised below: • Implement DSDMP (Att2_DSDMP 2025). • Monitoring and management zones. • Report large marine fauna sightings to vessels. **Residual Risk Rating:** Following the application of the above avoidance and mitigation measures, the likelihood of the impact occurring has been given a rating of 'Likely', and a consequence of impact rating of 'Minor', resulting in a risk rating of 'Low'. **Additional Technical Data:** • Section 2.2.4 provides detail regarding the BCH identified within the Detailed Study Area. • Section 2.2.2 provides detail regarding marine MNES fauna that may utilise the habitat within the Detailed Study Area. • Section 2.2.3 provides detail regarding the sediment characteristics of DMPA4, the Dredge Channel and surrounds. • Section 4.1 provides detail regarding impacts from sedimentation and decreased water quality. • Attachment 1 (Att1_DMPA4 BCH Report 2024) provides further technical information regarding the BCH within the Detailed Study Area. • Attachment 1 (Att1_DMPA4 BCH Report 2024, Appendix A, Page 31), Attachment 14 (Att14_Baseline Marine Sediment Assessment 2019) and Attachment 15 (Att15_Marine Sediment Quality Assessment 2023) provide further technical details regarding sediment. • Attachment 2 (Att2_DSDMP 2025) provides further technical details regarding sediment and the management of reduced water quality from dredge spoil disposal.

Potential Impact	Relevant Marine MNES Fauna	Assessment of Impacts
Hydrocarbon spills	Humpback Whale Australian Humpback Dolphin Australian Snubfin Dolphin Spotted Bottlenose Dolphin Blue Whale Dugong Hawksbill Turtle Green Turtle Flatback Turtle Loggerhead Turtle Leatherback Turtle Green Sawfish Dwarf Sawfish Narrow Sawfish	**Nature and extent of impact:** Impacts to marine MNES fauna habitat associated with the potential spillages of hydrocarbons from vessels travelling between the dredge channel and DMPA4. **Unknown, unpredictable or irreversible impacts:** Hydrocarbon spill contamination events are expected to be incidental and are therefore unable to be quantified. It is expected that the potential impact would be reversible. **Significance of impacts:** The assessment of the Approved Proposal (Preston Consulting 2018) considered the following: • Refuelling of vessels is proposed to occur at the Mardie Export Facility, and therefore there is a risk of hydrocarbon spill from vessels during construction and operation as a result of vessel collisions or hydraulic hose leaks. With the exception of vessels used in jetty construction, the majority of these vessels would be located several kilometres offshore as refuelling will occur at the end of the trestle jetty. Construction vessels are also small in size and therefore would not contain significant volumes of hydrocarbons. The Proposed Action will present a minor increase in risk of potential spill of hydrocarbons. **Inherent Risk Rating:** The likelihood of the impact occurring has been given a rating of 'Unlikely', and a consequence of impact rating of 'Moderate', resulting in a risk rating of 'Low'. **Avoidance and Mitigation Measures:** Detailed in Section 5.2, including the measures summarised below: • Implement DSDMP (Att2_DSDMP 2025). • Monitoring and management zones. • Report large marine fauna sightings to vessels. • Implement spoil and hydrocarbon spill controls. **Residual Risk Rating:** Following the application of the above avoidance and mitigation measures, the likelihood of the impact occurring has been given a rating of 'Rare', and a consequence of impact rating of 'Moderate', resulting in a risk rating of 'Low'. **Additional Technical Data:** • Section 2.2.3 provides detail regarding the sediment characteristics of DMPA4, the Dredge Channel and surrounds. • Section 4.1 provides detail regarding impacts from dredge spoil or hydrocarbon spills. • Attachment 1 (Att1_DMPA4 BCH Report 2024, Appendix A, Page 31), Attachment 14 (Att14_Baseline Marine Sediment Assessment 2019) and Attachment 15 (Att15_Marine Sediment Quality Assessment 2023) provide further technical details regarding sediment. • Attachment 2 (Att2_DSDMP 2025) provides further technical details regarding sediment and the management of spillages from vessels.
IMP could be introduced and become established	Australian Humpback Dolphin Australian Snubfin Dolphin Spotted Bottlenose Dolphin Dugong Hawksbill Turtle Green Turtle Flatback Turtle Loggerhead Turtle Leatherback Turtle Green Sawfish Dwarf Sawfish Narrow Sawfish Leaf-scaled Sea Snake	**Nature and extent of impact:** The Proposed Action includes the use of dredge barges and potentially other vessels, which may be brought to site from areas with high IMP risks, potentially resulting in IMP translocation. **Unknown, unpredictable or irreversible impacts:** No impacts would be considered unknown. The impacts of IMPs is understood. It is impossible to predict whether this impact would occur. If an IMP was to become fully established the impacts could potentially be irreversible. **Significance of impacts:** Vectors are the mechanism by which a potential marine pest can be translocated from donor to receiving node. Primary vectors of concern include biofouling on vessel hulls and other surfaces, ballast water, or other internal water or sediment carried by a vessel or marine equipment. The Proposed Action represents a small increase to the IMP translocation risk as assessed under the Approved Proposal, but includes new areas outside of the existing area considered for the Approved Proposal. **Inherent Risk Rating:** The likelihood of the impact occurring has been given a rating of 'Unlikely', and a consequence of impact rating of 'High', resulting in a risk rating of 'Medium'.

Potential Impact	Relevant Marine MNES Fauna	Assessment of Impacts
	Short-nosed Sea Snake	**Avoidance and Mitigation Measures:** Detailed in Section 5.2, including the measures summarised below: • Implement DSDMP (Att2_DSDMP 2025). • Implement IMP controls as listed in the Marine Pest Management Procedure (O2 Marine 2022b). **Residual Risk Rating:** Following the application of the above avoidance and mitigation measures, the likelihood of the impact occurring has been given a rating of 'Rare', and a consequence of impact rating of 'High', resulting in a risk rating of 'Low'. **Additional Technical Data:** • Section 4.1.5 provides detail regarding impacts from IMPs. • Attachment 2 (Att2_DSDMP 2025) and Attachment 9 (Att9_Marine Fauna Review 2020, Section 3.4.3, Page 36) provide further technical details regarding IMPs.

6.1.1 Risk Criteria

Each environmental risk is given a rating in terms of likelihood and consequence using the criteria in Table 12 and Table 13.

Table 12: Risk criteria matrix – Likelihood of impact occurring

Qualitative measure of likelihood (how likely is it that this event/issue will occur after control strategies have been put in place)	
Highly likely	Is expected to occur in most circumstances
Likely	Will probably occur during the life of the project
Possible	Might occur during the life of the project
Unlikely	Could occur but considered unlikely or doubtful
Rare	May occur in exceptional circumstances

Table 13: Risk criteria matrix – Consequence of impact

Qualitative measure of consequences (what will be the consequence/result if this issue does occur rating)	
Minor	Minor incident of environmental damage that can be reversed
Moderate	Isolated but substantial instances of environmental damage that could be reversed with intensive efforts
High	Substantial instances of environmental damage that could be reversed with intensive efforts
Major	Major loss of environmental amenity and real danger of continuing
Critical	Severe widespread loss of environmental amenity and irrecoverable environmental damage

A risk score is assigned to inherent and treated risk pathways identified with the Proposed Action activities. The risk score is assigned using the risk matrix (Table 14) to generate a risk rating of low, medium, high or severe. In general, risk scores can be reduced by implementing a treatment that will reduce the likelihood of the impact from occurring. If a risk is eliminated or substituted, then the consequence can be reduced, reducing the risk score.

Table 14: Risk criteria matrix – Risk levels

Likelihood	Consequence				
	Minor	**Moderate**	**High**	**Major**	**Critical**
Highly Likely	Medium	High	High	Severe	Severe
Likely	Low	Medium	High	High	Severe
Possible	Low	Medium	Medium	High	Severe
Unlikely	Low	Low	Medium	High	High
Rare	Low	Low	Low	Medium	High

6.2 Summary of Impacts to Matters of National Environmental Significance

A summary of the potential impacts, avoidance and mitigation measures to each marine MNES fauna species for the Proposed Action has been summarised in Table 15.

Table 15: Summary of Marine MNES Fauna Impacts

Listed species and communities (Sections 18 and 18A)	Recovery Plan	Threat Abatement Plan	Approved Conservation Advice	Listing Advice	Bioregional Plan	Survey Guidelines	Other references	References	Adequate survey/abundance	Impact	Avoidance	Mitigation	Residual	Offset
Australian Humpback Dolphin (*Sousa sahulensis*) – Vulnerable, Migratory	None	None	DCCEEW (2025a)	None	DSEWPaC (2012d)	DCCEEW (2024c)	DSEWPaC (2012b) DotEE (2017a)	Att9_Marine Fauna Review 2020	Likely to occur in the vicinity of the Proposed Action area. No suitable habitat is present in the Proposed Action area.	Disturbance, injury or death as a result of dredge spoil disposal operations or vessel strike. Injury or alteration of behaviour from underwater noise from vessel movements or dredge spoil disposal activities. Impacts to habitat associated with the dredge spoil or hydrocarbon spills from vessels travelling between the dredge channel and DMPA4. IMP translocation from dredge spoil vessels.	DMPA4 chosen as it avoids important BCH.	Implement DSDMP. Scheduling to avoid key ecological windows. Monitoring and management zones. Minimise the risk of fatal vessel strikes to marine fauna. Report large marine fauna sightings to vessels. Implement noise controls. Implement spoil and hydrocarbon spill controls. Implement IMP controls.	No significant residual Impact predicted	None proposed
Spotted Bottlenose Dolphin (*Tursiops aduncus* Arafuna/Timor Sea populations) - Migratory	None	None	None	None	DSEWPaC (2012d)	DCCEEW (2024c)	DSEWPaC (2012b) DotEE (2017a)	Att9_Marine Fauna Review 2020	Likely to occur in the vicinity of the Proposed Action area. No suitable habitat is present in the Proposed Action area.					
Australian Snubfin Dolphin (*Orcaella heinsohni*) – Vulnerable, Migratory	None	None	DCCEEW (2025b)	None	DSEWPaC (2012d)	DCCEEW (2024c)	DSEWPaC (2012b) DotEE (2017a)	Att9_Marine Fauna Review 2020	May occur in the vicinity of the Proposed Action area. No suitable habitat is present in the Proposed Action area, which is outside of this species' recognised range.					
Blue Whale (*Balaenoptera musculus*) – Endangered, Migratory	DotE (2015a)	DotEE (2018)	None	None	None	DEWHA (2008a) DCCEEW (2024c)	DotEE (2017a)	Att9_Marine Fauna Review 2020	May occur in the vicinity of the Proposed Action area. No suitable habitat is present in the Proposed Action area.					
Humpback Whale (*Megaptera novaeangliae*) –Migratory	None	DotEE (2018)	None	TSSC (2022)	DSEWPaC (2012d)	DEWHA (2008a) DCCEEW (2024c)	DSEWPaC (2012b) DotEE (2017a)	Att9_Marine Fauna Review 2020	High potential to occur in the vicinity of the Proposed Action area, particularly during the northern and southern migrations. The species has been recorded in the region (desktop searches). Typically occur further offshore (>35 km) during migratory routes, although some whales recorded in <10 m water during southern migration (i.e., September).					
Dugong (*Dugong dugon*) - Migratory	None	DotEE (2018)	None	None	DSEWPaC (2012d)	DCCEEW (2024c)	-	Att9_Marine Fauna Review 2020	Likely to occur in the vicinity of the Proposed Action area. No suitable habitat is present in the Proposed Action area.					
Hawksbill Turtle (*Eretmochelys imbricata*) –Vulnerable, Migratory **Green Turtle** (*Chelonia mydas*) – Vulnerable, Migratory	DotEE (2017b)	DCCEEW (2024d) DotEE (2017c) DotEE (2018) DEWHA (2008d) (apart from	DEWHA (2008b) (Loggerhead Turtle)	TSSC (2009a) (Loggerhead Turtle)	DSEWPaC (2012d)	Pendoley (2005) DCCEEW (2024c)	Wilson et al. (2018) DCCEEW (2023a) DSEWPaC (2012c)	Pendoley Environmental (2019) Att10_Marine Turtle Monitoring Program 2023	Surveys undertaken in 2018/19, 2021/22, 2022/23 and 2023/24, in accordance with guidelines. The surveys identified that nesting at offshore islands was predominately Flatback Turtles, with relatively less effort seen	Disturbance, injury or death as a result of dredge spoil disposal operations or vessel strike. Injury or alteration of behaviour from underwater noise from vessel movements or	DMPA4 chosen as it avoids important BCH.	Implement DSDMP. Implement Illumination Plan. Minimise use of unnecessary light sources that are not	No significant residual Impact predicted	None proposed

Listed species and communities (Sections 18 and 18A)	Recovery Plan	Threat Abatement Plan	Approved Conservation Advice	Listing Advice	Bioregional Plan	Survey Guidelines	Other references	References	Adequate survey/abundance	Impact	Avoidance	Mitigation	Residual	Offset
Flatback Turtle (*Natator depressus*) – Vulnerable, Migratory **Loggerhead Turtle** (*Caretta caretta*) – Endangered, Migratory **Leatherback Turtle** (*Dermochelys coriacea*) – Endangered, Migratory.		Hawksbill Turtle)						Att11_Marine Turtle Survey Report 2024 Att12_Marine Turtle Survey Report 2025	from Hawksbill Turtles and Green Turtles. No habitat is present in the Proposed Action area, however the proposed vessel transport route passes near Sholl Island. Loggerhead Turtles and Leatherback Turtles may occur in the vicinity of the Proposed Action area, but DMPA4 and the surrounding area does not represent nesting habitat for these species (unlike the other species of marine turtles that nest at the offshore islands)	dredge spoil disposal activities. Alteration of behaviour from artificial light from dredge vessel movements and disposal at night. Impacts to habitat associated with dredge spoil or hydrocarbon spills from vessels travelling between the dredge channel and DMPA4 IMP translocation from dredge vessels.		required for safe operation of dredge and disposal vessels. Scheduling to avoid key ecological windows. Monitoring and management zones. Minimise the risk of fatal vessel strikes to marine fauna. Report large marine fauna sightings to vessels. Implement noise controls. Implement spoil and hydrocarbon spill controls. Implement IMP controls.		
Green Sawfish (*Pristis zijsron*) – Vulnerable, Migratory	DotE (2015b)	None	DEWHA (2008c)	TSSC (2008)	DSEWPaC (2012d)	Kyne and Pillans (2014) DSEWPaC (2011a)	-	Att9_Marine Fauna Review 2020	High potential to occur. Although distribution is mainly along coastlines and estuary habitats, they are known to travel to waters further offshore.	Irreversible loss of 30.26 ha of potential habitat within DMPA4, 355 ha within the ZoHI, and recoverable impact of 720 ha within ZoMI. Disturbance, injury or death as a result of dredge spoil disposal operations or vessel strike. Permanent or temporary loss of habitat through sedimentation and decreased water quality. Impacts to habitat associated with the potential spillages of dredge spoil or hydrocarbon spills from vessels travelling between the dredge channel and DMPA4. IMP translocation from dredge vessels.	DMPA4 chosen as it avoids important BCH.	Implement DSDMP. Monitoring and management zones. Minimise the risk of fatal vessel strikes to marine fauna. Report large marine fauna sightings to vessels. Implement spoil and hydrocarbon spill controls. Implement IMP controls.	No significant residual impact predicted	None proposed.
Dwarf Sawfish (*Pristis clavata*) – Vulnerable, Migratory	DotE (2015b)	None	DEWHA (2009b)	TSSC (2009b)	DSEWPaC (2012d)	DSEWPaC (2011a)	-	Att9_Marine Fauna Review 2020						
Narrow Sawfish (*Anoxypristis cuspidata*) - Migratory	None	None	None	None	None	None	-	Att9_Marine Fauna Review 2020						

Listed species and communities (Sections 18 and 18A)	Recovery Plan	Threat Abatement Plan	Approved Conservation Advice	Listing Advice	Bioregional Plan	Survey Guidelines	Other references	References	Adequate survey/abundance	Impact	Avoidance	Mitigation	Residual	Offset
Short-nosed Sea Snake (*Aipysurus apraefrontalis*) – Critically Endangered	None	None	DSEWPaC (2011b)	TSSC (2011a)	DSEWPaC (2012d)	None	-	Att9_Marine Fauna Review 2020	Not recorded but suitable habitat present at the Proposed Action area.	Irreversible loss of 30.26 ha of potential habitat within DMPA4, 355 ha within the ZoHI, and recoverable impact of 720 ha within ZoMI. Disturbance, injury or death as a result of dredge spoil disposal operations or vessel strike. Injury or alteration of behaviour from underwater noise from vessel movements or dredge spoil disposal activities. Permanent or temporary loss of habitat through sedimentation and decreased water quality; Impacts to habitat associated with the dredge spoil or hydrocarbon spills from vessels travelling between the dredge channel and DMPA4 IMP translocation from dredge vessels.	DMPA4 chosen as it avoids important BCH.	Implement DSDMP. Monitoring and management zones. Minimise the risk of fatal vessel strikes to marine fauna. Report sea snake sightings to vessels. Implement noise controls. Implement spoil and hydrocarbon spill controls. Implement IMP controls.	No significant residual Impact predicted	None proposed
Leaf-scaled Sea Snake (*Aipysurus foliosquama*) – Critically Endangered	None	None	DSEWPaC (2011c)	TSSC (2011b)	DSEWPaC (2012d)	None	-	Att9_Marine Fauna Review 2020	Not recorded but suitable habitat present at the Proposed Action area.					
White Shark (*Carcharodon carcharias*) – Vulnerable, Migratory	DSEWPaC (2013)	None	None	None	DSEWPaC (2012d)	DSEWPac (2011a)	-	Att9_Marine Fauna Review 2020	Not recorded in desktop searches, but may occur in the vicinity of the Proposed Action area. No suitable habitat is present in the Proposed Action area.	Disturbance, injury or death as a result of dredge spoil disposal operations or vessel strike.	DMPA4 chosen as it avoids important BCH.	Implement DSDMP. Monitoring and management zones. Minimise the risk of fatal vessel strikes to marine fauna. Report large marine fauna sightings to vessels.	No significant residual Impact predicted	None proposed
Grey Nurse Shark (*Carcharias taurus* west coast population) – Vulnerable	DotE (2014a)	DotEE (2018)	None	None	DSEWPaC (2012d)	DSEWPac (2011a)	DotE (2014b)	Att9_Marine Fauna Review 2020	Not recorded in desktop searches, but may occur in the vicinity of the Proposed Action area. No suitable habitat is present in the Proposed Action area.					
Whale Shark (*Rhincodon typus*) – Vulnerable, Migratory	None	None	TSSC (2015)	TSSC (2001)	DSEWPaC (2012d)	DSEWPac (2011a)	-	Att9_Marine Fauna Review 2020	Not recorded in desktop searches, but may occur in the vicinity of the Proposed Action area. No suitable habitat is present in the Proposed Action area.					
Reef Manta Ray (*Mobula alfredi*) – Migratory **Giant Manta Ray** (*Mobula birostris*) – Migratory	None	None	None	None	None	N/A	N/A	Att9_Marine Fauna Review 2020	May occur in the vicinity of the Proposed Action area. No suitable habitat is present in the Proposed Action area.					

7. SUPPORTING BASELINE AND MODELLING INFORMATION

The supporting baseline and modelling information presented in the Referral documentation, which has been updated (as required) and provided within this Preliminary Documentation, has been summarised throughout this Preliminary Document. This has included:

- DMPA4 BCH Survey Report (Att1_DMPA4 BCH Report 2024).
- DSDMP (Att2_DSDMP 2025).
- Dredge disposal plume modelling for DMPA4 (Att3_DMPA4 Disposal Plume Modelling 2024).
- Approved Proposal Maintenance dredging estimate (Att4_Maintenance Dredging Estimate 2020).
- Approved Proposal Marine Fauna Review (Att9_Marine Fauna Review 2020).
- Approved Proposal Marine Turtle Monitoring Program 2022/23 (Att10_Marine Turtle Monitoring Program 2023).
- Approved Proposal Marine Turtle Monitoring Program 2023/24 (Att11_Marine Turtle Survey Report 2024).
- Approved Proposal Marine Turtle Monitoring Program 2024/25 (Att12_Marine Turtle Survey Report 2025).
- Summary of the Interim Results for the O2 Marine 2025 Targeted Fish Survey (Att13_Bluespotted Emperor Study Summary 2025)
- Approved Proposal Baseline Sediment Quality Assessment Report (Att14_Baseline Marine Sediment Assessment 2019).
- Approved Proposal Sediment Quality Assessment 2024 (Att15_Marine Sediment Quality Assessment 2023).
- Proposed Action Underwater Noise Risk Assessment Technical Memorandum (Att17_Underwater Noise Risk Assessment 2025).
- DMPA4 Dredge Disposal Plume Characteristics (Att18_Dredge Plume Characteristics 2025).
- Dredge disposal plume modelling for DMPA1 (Att19_DMPA1 Disposal Plume Modelling 2024).
- DMPA4 Bathymetric Field Survey Hydrographic Survey Report (Att20_DMPA4 Bathymetric Survey 2024).

In addition, this Preliminary Documentation includes the following sources of information:

- Site and regional context maps.
- Maps from Schedule 2 of the WCD2018/006 Determination (Att16_WCD2018-006 S2 Maps).
- Stakeholder Consultation Register (Att5_Stakeholder Consultation Register).
- Stakeholder Engagement Management Plan (Att21_Stakeholder Engagement Management Plan 2025).

Mardie Minerals received RFI's from DCCEEW throughout the referral process. Responses to these were provided to DCCEEW on 3 April and 10 April 2025 (Att5_Stakeholder Consultation Register, Page 17).

The documents and sources of information discussed above have been provided as Appendices to this Preliminary Documentation, and additional sources of information have been referenced where publicly available.

8. CONSIDERATIONS FOR DECISION-MAKING

8.1 Principles of Ecologically Sustainable Development

The Proposed Action has been assessed against the principles of Ecologically Sustainable Development (ESD), as defined in Section 3A of the EPBC Act. This assessment to determine how the Proposed Action meets the ESD Principles is provided in Table 16.

Table 16: Assessment against ESD Principles

ESD Principle	Assessment
Decision making processes should effectively integrate both long term and short term economic, environmental, social, and equitable considerations.	The Approved Proposal is the first major salt project developed in Australia in two decades and the only Australian operation to produce commercially saleable salt and SoP. Once operational, it will be the largest salt operation in Australia, and with the potential expansion into newly acquired tenements (not included in the optimisation), it can become one of the largest evaporative operations globally. Production of high value by-product from waste seawaters adds downstream processing credentials to the Approved Proposal, which aligns with the WA Government's long-standing objective for the resources industry to include secondary processing in project planning. In addition to these circular economy benefits, the Approved Proposal has strong environmental credentials with an independent KPMG study finding that 99% of the Approved Proposal energy requirement is in the evaporation process which will be derived from natural sun and wind energy. Mardie Minerals continues to enhance its decision-making processes to more effectively balance immediate operational needs with long-term economic, environmental, social, and governance (ESG) considerations. The recent completion of Mardie Minerals' double materiality assessment, supported by community consultation, has provided a clearer view of where our most significant sustainability risks and opportunities lie, both in terms of business impact and stakeholder expectations. These insights are now being embedded into strategic planning and governance frameworks, supporting more informed, transparent, and forward-looking decisions. By integrating ESG considerations into core business processes, Mardie Minerals is strengthening its ability to create enduring value, manage reputational and non-financial risk, and align with best practice expectations for responsible development.
If there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.	Information prepared and submitted in response to the RFI from DCCEEW (EPBC 2024/10054, 2 June 2025) has been incorporated in this Preliminary Document where relevant. Additional information requested by DCCEEW has been provided, including an underwater noise risk assessment (Att17_Underwater Noise Risk Assessment 2025) and the updated DSDMP (Att2_DSDMP 2025). These documents seek to specifically address queries provided by DCCEEW and justify sufficient scientific investigations to support this Preliminary Document and the Proposed Action. The precautionary principle has been applied (and referenced) throughout this Preliminary Document and the DSDMP (Att2_DSDMP 2025). Where there is uncertainty regarding the potential impacts that may occur to marine MNES fauna from the Proposed Action, Mardie Minerals has adopted a conservative approach by adopting avoidance and mitigation measures. For example,

ESD Principle	Assessment
	neither Dugongs or Short-nosed Sea Snakes have ever been reported in the area, however, Mardie Minerals has included monitoring and management actions for these species to avoid or mitigate any potential impacts on these species.
The principle of inter-generational equity—that 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 Proposed Action has been designed to specifically target areas of low density and low quality BCH with lower biological significance in order to ensure the health, diversity and productivity of the current environment is maintained. Mardie Minerals will implement the avoidance and mitigation measures outlined in Section 5.2, with monitoring commitments to ensure adverse impacts from the Proposed Action are identified so that adaptive management can be undertaken.
The conservation of biological diversity and ecological integrity should be a fundamental consideration in decision making.	Alternative offshore dredge spoil disposal areas were investigated for the Proposed Action, including Spoil Ground E and DMPA1, 2 and 3, which were ultimately ruled out due to economic and environmental concerns. Spoil Ground E is situated too far away from the dredge channel, which would result in a longer vessel transit that increases the risk of vessel related impacts to marine MNES fauna. DMPA1, 2 and 3 are located closer to Stewart, Fortescue, Sholl 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 marine MNES fauna species, particularly as nesting habitat for marine turtles, and therefore avoiding these areas would lessen the potential impact to marine MNES fauna habitat, as well as reducing vessel movements near the islands. The Proposed Action is a short-term activity (several months per dredge program) that has specifically been located in an area with BCH that is not unique or important to any marine MNES fauna species. Marine MNES fauna species are therefore likely to be traversing the site rather than residing within it. Strict management measures are proposed to ensure that any impacts to marine MNES fauna that may be present are minimised. The Proposed Action will result in temporary and permanent impacts to BCH within the ZoMI and ZoHI respectively. These impacts are, however, within an area that is only traversed by marine MNES fauna species, with no likely residents. As such, the Proposed Action is unlikely to result in impacts that would cause any irreversible damage to the marine environment and fauna inhabiting the areas.
Improved valuation, pricing and incentive mechanisms should be promoted.	The Approved Proposal has been revised through the Proposed Action by changing from onshore disposal of dredge spoil to disposal at sea, due to technical concerns following the tender period for onshore disposal. The Proposed Action will result in a reduction in costs that have been considered in the Approved Proposal detailed feasibility stage.

8.2 Economic and Social Matters

Information specific to Economic and Social Matters requested in the DCCEEW RFI (EPBC 2024/10054, 2 June 2025) has been provided in Table 17.

Table 17: Economic and Social Matters

DCCEEW RFI Enquiry	Response/Action
General	
An analysis of the economic and social impacts of the action, both positive and negative.	The Approved Proposal is positioned to deliver significant long-term benefits to the State of WA, the Pilbara region, and Traditional Owners. Over its 60-year operational life, it is projected to contribute $4.8 billion in Gross Regional Product to northern Australia, strengthening regional economic development and resilience. The Approved Proposal will have a peak construction workforce of approximately 500 people, a permanent operating workforce of more than 200 people and will create additional indirect employment in the Pilbara region. Since 2019, Mardie Minerals has invested more than $103M into local business, and has engaged over 120 local businesses, demonstrating a strong and ongoing commitment to local industry participation and regional growth. As part of its Stakeholder Engagement Management Plan (Att21_Stakeholder Engagement Management Plan 2025), Mardie Minerals maintains regular engagement with community members and local government stakeholders to provide project updates, address concerns, and ensure transparency around the progress of the Approved Proposal. This ongoing communication enables stakeholders to remain informed and involved, while also supporting early identification and management of potential social and economic impacts, both positive and adverse. To ensure responsible development, Mardie Minerals has implemented a suite of Social and Environmental Management Plans as part of its overarching Environmental and Social Management System. This includes the ESMP (Att7_Mardie Project ESMP 2022). These plans are regularly reviewed and updated to proactively manage potential impacts and reflect our commitment to continuous improvement. Mardie Minerals also creates positive social impacts through targeted partnerships with organisations such as the Pilbara Kimberley University Centre and Karratha Senior High School, while actively supporting the local economy as a platinum member of the Karratha Districts Chamber of Commerce and Industry. In the 2025 Financial Year alone, through procurement and construction processes, Mardie Minerals spent over $40M with local and Indigenous businesses in the Pilbara, reinforcing its commitment to shared regional prosperity.
Details of any public consultation activities undertaken and their outcomes.	Details of public consultation activities undertaken to-date for the Proposed Action and their outcomes are presented in the Stakeholder Consultation Register (Att5_Stakeholder Consultation Register).
Details of any consultation with Indigenous stakeholders.	Details of consultation with Indigenous stakeholders undertaken to-date for the Proposed Action and their outcomes are presented in the Stakeholder Consultation Register (Att5_Stakeholder Consultation Register).

DCCEEW RFI Enquiry	Response/Action
	Further details of engagement with Traditional Owners is provided further below in this table as part of DCCEEW's 'Indigenous Engagement' queries.
Details of any UCH surrounding the proposed action.	The likelihood of UCH to occur surrounding the Proposed Action is considered to be low, for the following reasons: • The PMST Report showed no National or World Heritage Areas within the Proposed Action vicinity (Att8_PMST Report DMPA4_241206, Page 2); • The Australasian Underwater Cultural Heritage Database (AUCHD) (DCCEEW 2024e) showed no significant UCH areas within the Proposed Action vicinity; • Bathymetry surveys conducted by O2 Marine (Att20_DMPA4 Bathymetric Survey 2024), which covered DMPA4, showed no evidence of any underwater artefacts (remains of vessels, submerged aircraft and other archaeological heritage located underwater); • As indicated in Figure 14, a review of the DPLH spatial database indicates there are no European heritage cultural values in the vicinity of DMPA4 (DPLH 2025); and • As indicated in Figure 15, a review of the WA State Shared Location Information Platform (SLIP) 'Locate' indicates there are no shipwrecks or other European heritage values in the vicinity of the DMPA4 (Landgate 2025). As per the UCH Act guidelines (DCCEEW 2024a), the above steps are considered reasonable to identify any UCH resources in the Proposed Action area. As per the DSDMP (Att2_DSDMP 2025, Section 2.7, Page 32), it is unlikely that cultural heritage areas exist within proximity of the Proposed Action. Mardie Minerals' Aboriginal Cultural Heritage Management Plan (ACHMP) (BCI 2024b) includes the process that will be followed in the event of unexpected finds of European or First Nations UCH material(s)
Indigenous Engagement	
Identify existing or potential native title rights and interests, including any areas and objects that are of particular significance to Indigenous peoples and communities, possibly impacted by the proposed action and	The Approved Proposal is located within the YM People Native Title Determination Area (WCD2018/006). As part of the YM People Determination, the YM People are responsible for protection of Country and cultural heritage and have agreed processes for how Traditional Owners manage heritage. Mardie Minerals understand these processes are to be followed by WAC in managing heritage. DMPA4 falls within the boundaries of the YM People's Native Title Determination Area (WCD2018/006), however, it was expressly found that Native Title does not exist seaward of the mean low water mark on the mainland coast, with the "mean low water mark" defined as "the line of the low water mark as depicted in Landgate's Spatial

DCCEEW RFI Enquiry	Response/Action

the potential for managing those impacts.	Cadastral Database dated 2 January 2018 and shown on the maps at Schedule Two" (Federal Court of Australia 2018), which have been provided as Attachment 16 (Att16_WCD2018-006 S2 Maps). Therefore, DMPA4 is not affected by Native Title.
	Mardie Minerals has entered into a Land Access Deed with the YM People (executed November 2012) for the Approved Proposal. A framework for consultation with Traditional Owners is set out in this Deed, along with key obligations for all parties on a range of matters, including the management of impacts of the Approved Proposal on Aboriginal heritage.
	As part of Mardie Minerals' agreement with Traditional Owner groups, Mardie Minerals has committed to:
	• Maintain timely, open and flexible communication with the Aboriginal stakeholder groups.
	• Consult with the Traditional Owner groups in relation to the management of Aboriginal heritage in their respective areas throughout the life of the Approved Proposal in the agreed manner including but not limited to:
	  ○ Consultation methods, such as a minimum of two Implementation Committee meetings per year,; and
	  ○ Continued access to country for traditional laws and customs.
	• Endeavour to avoid identified Aboriginal sites where possible, however, should this prove not possible, a section 18 approval under the *Aboriginal Heritage Act 1972* (WA; AH Act) will be applied for.
	• Fulfil its statutory obligations under the AH Act and exceeding its statutory obligations in terms of best practice heritage management.
	The heritage management system for the Approved Proposal consists of the executed Land Access Deed and the ACHMP (which was approved by DWER in August 2024 (BCI 2024b)).
	The ACHMP describes the process for the ongoing management of Aboriginal heritage places located within the Approved Proposal and sets out steps to be followed by the company, contractors and all employees to identify and manage Aboriginal heritage that may be affected by the Approved Proposal in a manner that complies with legislation, the Land Access Deed with the Traditional Owner groups and the commitments made to these groups.

Describe any Indigenous consultation that has been undertaken, or will be undertaken, in relation to the proposed action and their outcomes.	As summarised in the Stakeholder Consultation Register (Att5_Stakeholder Consultation Register), Mardie Minerals has engaged with the YM People and WAC in relation to the Proposed Action as follows: • 17/02/2025 [Meeting]: Mardie Minerals acknowledged that there is not any formal approval needed from WAC/Chair for proposed disposal of dredge spoil outside of the Native Title boundary. WAC requested that Mardie Minerals develop an info sheet on the Proposed Action for them to review.

DCCEEW RFI Enquiry	Response/Action
	• 30/05/2025 [Implementation Committee Meeting]: Mardie Minerals did a presentation on the proposed dredge disposal which sits outside the Native Title boundary to the WAC Implementation Committee. Mardie Minerals explained that there are two options: land disposal (for which approval has been granted) or sea disposal (for which an application for approval has been submitted to regulators), with the latter being the preferred option. WAC advised that Mardie Minerals need to engage with WAC's heritage consultant and provide further information on potential impacts from the Proposed Action. In turn, WAC's heritage consultant will provide a summary paper to the WAC board for review. • 25/06/2025 [Meeting and Email]: Mardie Minerals provided more information to WAC's heritage consultant on the application for disposal of dredge spoil at sea, as summarised below: o The sea dumping site is 14 NM offshore and in 18-20 m deep water. o Mardie Minerals understands that Native Title does not exist seaward of the mean low water mark on the mainland coast in the vicinity of the proposed sea dumping site (refer to Federal Court of Australia 2018) o A search of the DPLH ACHIS indicates there are no Registered or Lodged heritage sites in the vicinity of DMPA4 (DPLH 2024). o An environmental survey of DMPA4 has indicated that it is dominated by 'Sparse to Low level Coral' habitats, which are not of any regional or conservation significance. o In the unlikely event that unexpected or unknown Aboriginal cultural heritage values are encountered during the Proposed Action, Mardie Minerals has processes in place to notify Traditional Owners and manage any findings appropriately - see Section 10.8 and Section 10.9 of the ACHMP (BCI 2024b). It was agreed that Mardie Minerals and WAC would discuss the Proposed Action in further detail, including any questions that WAC may have, at the upcoming WAC meeting in August 2025.
The department considers that best practice consultation, in accordance with the Guidance for proponents on best practice Indigenous engagement for environmental assessments under the EPBC Act (2016 [referenced as DCCEEW 2023b]) includes:	Mardie Minerals has entered into a Land Access Deed with the YM People (executed November 2012) for the Approved Proposal. A framework for consultation with Traditional Owners is set out in this Deed, along with key obligations for all parties on a range of matters including the management of impacts of the Approved Proposal on Aboriginal heritage. Details of the commitments Mardie Minerals have as part of the agreement with Traditional Owner groups are provided to an earlier response in this table. Mardie Minerals therefore has an established and ongoing relationship with the Traditional Owners and will continue to engage with the Traditional Owners during the construction and operations phases of the Proposed Action.

DCCEEW RFI Enquiry	Response/Action
• identifying and acknowledging all relevant affected Indigenous peoples and communities. • committing to early engagement • building trust through early and ongoing communication for the duration of the project, including approvals, implementation, and future management. • setting appropriate timeframes for consultation; and • demonstrating cultural awareness.	
Describe any state requirements for approval or conditions that apply, or that the proponent reasonably believes are likely to apply, to the proposed action with regards to Indigenous peoples and communities.	The primary legislation governing the management and protection of UCH in WA is the *Heritage Act 2018* (WA). Any activity that may disturb or impact UCH — including dredging, excavation, or dumping — generally requires prior approval from the Heritage Council. Additionally, one of the key environmental factors considered for EIA under Part IV of the EP Act is social surroundings (EPA 2023a), which considers the potential impacts of projects on Aboriginal Cultural Heritage (ACH). In MS 1211, ACH is defined as: • the tangible and intangible elements that are important to the Aboriginal people of the State, and are recognised through social, spiritual, historical, scientific or aesthetic values, as part of Aboriginal tradition to the extent they directly affect or are affected by physical or biological surroundings. Whilst the EPA consider that many impacts to ACH may be mitigated by the AH Act, there are instances where an EPA assessment may still be required (i.e. the AH Act does not apply to a particular place or impact). Social surroundings was considered a key environmental factor for the Approved Proposal. As such, condition B8 of MS 1211 relates to ACH environmental outcomes and objectives that Mardie Minerals are required to meet for the Approved Proposal. Mardie Minerals will continue consultation with Traditional Owners on the Approved Proposal and the Proposed Action (Att5_Stakeholder Consultation Register), in accordance with condition B8 of MS 1211. A search of the DPLH ACHIS indicates there are no Registered or Lodged heritage sites in the vicinity of DMPA4 (DPLH 2024). However, in the event that UCH is identified or discovered during dumping, Mardie Minerals will

DCCEEW RFI Enquiry	Response/Action
	submit an application for clearance or approval for activities that might disturb UCH. If approval is granted, it may come with conditions such as implementation of an Unexpected Finds Procedure, use of qualified heritage professionals, monitoring during works, and reporting requirements. If the UCH identified or discovered is regarded as First Nations UCH, then Mardie Minerals will comply with the AH Act, as well as the EP Act, especially if activities impact marine ecosystems. Any such application will be prepared and submitted in consultation with the Traditional Owners.
Projected economic costs and benefits of the project, including the basis for their estimate through cost/benefit analysis or similar studies.	The Approved Proposal is positioned to deliver significant long-term benefits to the State of WA, the Pilbara region, and Traditional Owners. Over its 60-year operational life, it is projected to contribute $4.8 billion in Gross Regional Product to northern Australia, strengthening regional economic development and resilience. Since 2019, Mardie Minerals has invested more than $103M to local business, and has also engaged over 120 local businesses, demonstrating a strong and ongoing commitment to local industry participation and regional growth
Employment opportunities expected to be generated by the project (including construction and operational phases).	An employment plan is being prepared for each stage of the Proposed Action. Preference will be given to Traditional Owners for all relevant works on their Country, including employment and business opportunities. Mardie Minerals has formally committed through correspondence for future works for the YM People on whose land the Approved Proposal and associated infrastructure sits, including a portion of the Proposed Action.

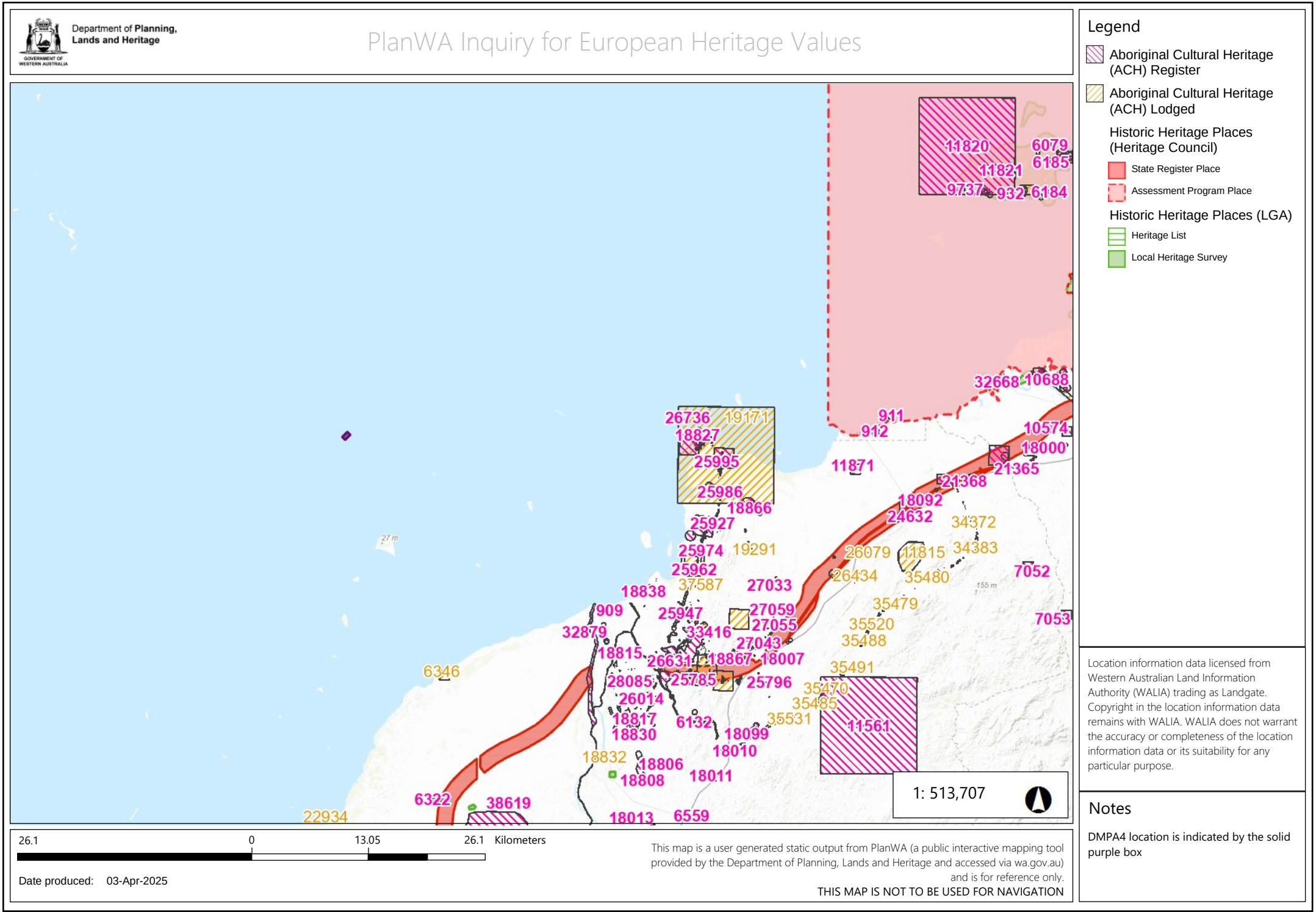
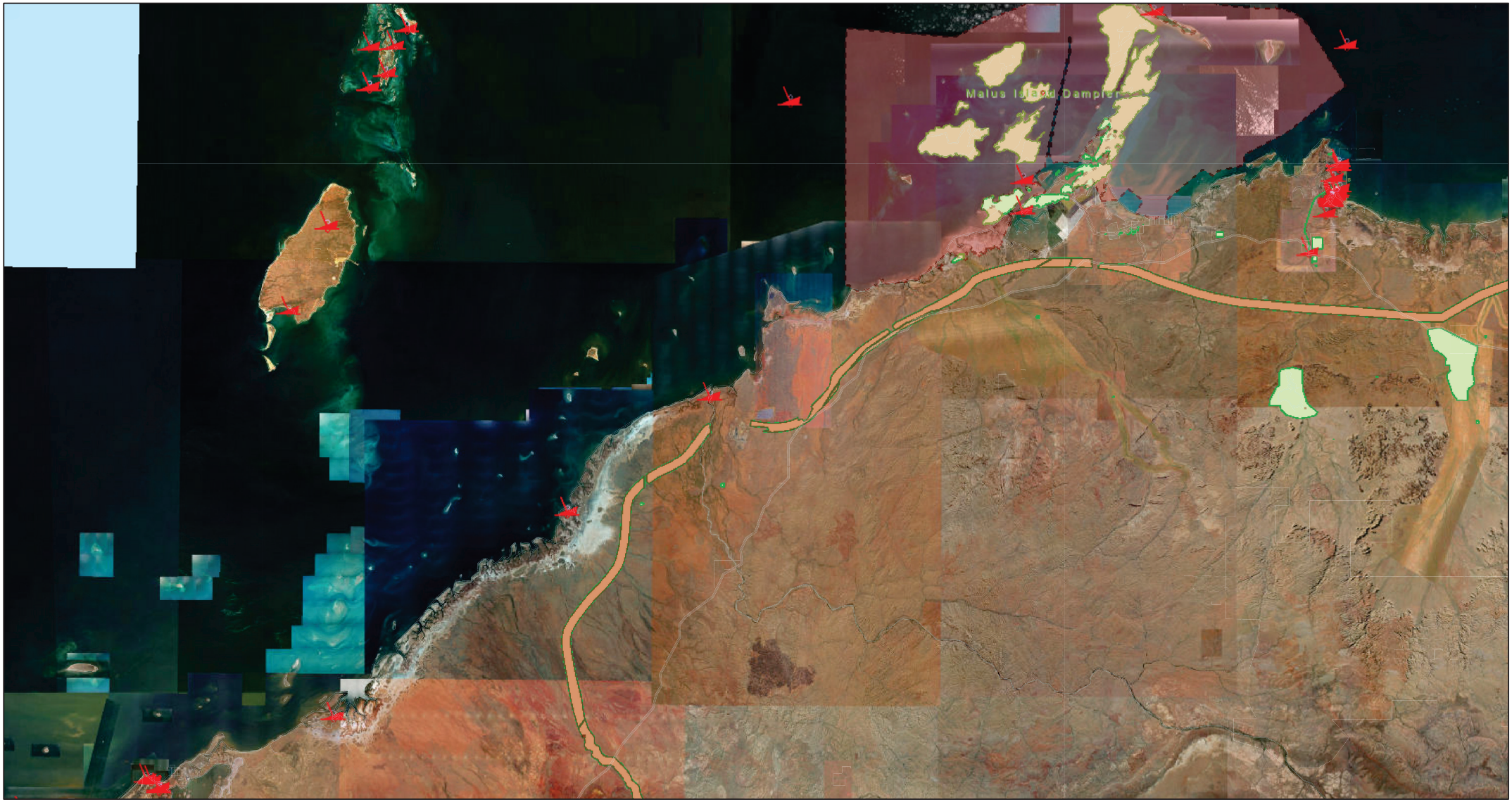


Figure 14: PlanWA Inquiry for European Heritage Values in proximity to DMPA4 (DPLH 2025)

Locate WA



03/04/2025, 1:07:21 pm

1:733,799

0 5 10 20 mi

0 12.5 25 50 km

Heritage Council WA - Local Heritage Survey (DPLH-008)

Heritage Council WA - Assessment Program (DPLH-007)

Individual Place

Precinct / Group

Heritage Council WA - State Register (DPLH-006)

Individual Place

Precinct / Group

Maritime Archaeological Sites (WAM-001)

Shipwrecks - Live Sync Beta (WAM-022)

Shipwrecks (WAM-002)

Esri, TomTom, Garmin, FAO, METI/NASA, USGS, LANDGATE/SLIP, Esri, CGIAR, Landgate / SLIP

powered by SLIP

Figure 15: SLIP Locate Search of European Heritage Values in proximity to DMPA4 (Landgate 2025)

DEFINITIONS

Term	Definition
ACH	Aboriginal Cultural Heritage
ACHIS	Aboriginal Cultural Heritage Inquiry System
ACHMP	Aboriginal Cultural Heritage Management Plan
ADCP	Acoustic Doppler Current Profiler
AH Act	*Aboriginal Heritage Act 1972* (WA)
AHD	Australian Height Datum
ANZG	Australia and New Zealand Governments
Approved Proposal	The Mardie Project (EPBC 2018/8236) and the Optimised Mardie Project (EPBC 2022/9169)
AUCHD	Australasian Underwater Cultural Heritage Database
Baird	Baird Australia Pty Ltd
BCH	Benthic Communities and Habitat
BCHMMP	Benthic Communities and Habitat Monitoring and Management Plan
BCI	BCI Minerals Limited
BIA	Biologically Important Area
Biosecurity Act	*Biosecurity Act 2015* (Cth)
BRUVS	Baited Remote Underwater Video Systems
BTEXN	Benzene, Toluene, Ethylbenzene, Xylenes and Naphthalene
CEO	Chief Executive Officer
cm	centimetre
CoPC	Contaminant of Potential Concern
CPUE	Catch per unit effort
Cth	Commonwealth
DAWE	Department of Agriculture, Water and the Environment
dB	Decibel
dB re 1 μPa^2m^2	Unit for Source Level, the average change in water pressure associated with underwater noise at one metre from the source
DBCA	Department of Biodiversity, Conservation and Attractions
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DEC	Department of Environment and Conservation
Detailed Study Area	BCH Study Area in Attachment 1 (Att1_DMPA4 BCH Report 2024)
DEWHA	Department of the Environment, Water, Heritage and the Arts

Term	Definition
Disturbance Footprint - Direct	DMPA4
Disturbance Footprint - Indirect	The ZoHI and ZoMI (without DMPA4)
DJTSI	Department of Jobs, Tourism, Science and Innovation
DLI	Daily Light Integral
DMP	Dredge Management Plan
DMPA	Dredge Material Placement Area
DotE	Department of the Environment
DotEE	Department of the Environment and Energy
DPIRD	Department of Primary Industries and Regional Development
DPLH	Department of Planning, Lands and Heritage
DSDMP	Dredge and Spoil Disposal Management Plan
DSEWPaC	Department of Sustainability, Environment, Water, Population and Communities
DWER	Department of Water and Environmental Regulation
eDNA	Environmental DNA
EIA	Environmental Impact Assessment
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
ESD	Ecologically Sustainable Development
ESG	Environmental and Social Governance
ESMP	Environmental and Social Management Plan
Esso Australia	Esso Australia Resources Pty Ltd
GMMP	Groundwater Monitoring and Management Plan
ha	Hectares
HF	High Frequency
hr	Hour
Hz	Hertz
IMO	International Maritime Organization
IMP	Introduced Marine Pests
ISO	International Organization for Standardization
ISQG	Interim Sediment Quality Guideline

Term	Definition
IUCN	International Union for Conservation of Nature
JASCO	JASCO Applied Sciences
kHz	Kilohertz
Km	Kilometre
km/h	Kilometres per hour
KPMG	Klynveld Peat Marwick Goerdeler
L	Litre
LF	Low Frequency
M	Million
m	metre
m^3	Cubic metres
m^3/day	Cubic metres per day
m^3/year	Cubic metres per year
Management Zone(s)	Includes the Observation Zone(s) and Exclusion Zone(s) for marine fauna observations at the dredge location and disposal location
Mardie Minerals	Mardie Minerals Pty Ltd, a wholly owned subsidiary of BCI Minerals Limited
MBES	Multibeam Eco Sounder
MFO	Marine Fauna Observers
mg/kg	Milligrams per kilogram
Migratory	Listed as 'Migratory' under the EPBC Act
Mining Act	*Mining Act 1978* (WA)
MNES	Matters of National Environmental Significance
MPSC	Marine Pest Sectoral Committee
MS	Ministerial Statement
MScience	MScience Marine Research
NAGD	National Assessment Guideline for Dredging
NM	Nautical Miles
NMFS	National Marine Fisheries Service
NNTT	National Native Title Tribunal
no	number
O2 Marine	O2 Marine Group
OSPAR	OSPAR Commission
P80	80th Percentile
PA Act	*Port Authorities Act 1999* (WA)

Term	Definition
Pendoley Environmental	Pendoley Environmental Pty Ltd
PLF	Pilbara Line Fishery
PMST	Protected Matters Search Tool
ppt	Parts per thousand
Preston Consulting	Preston Consulting Pty Ltd
Project Area	DMPA4, ZoHI and ZoMI
Proposed Action	To transport and dispose of dredge spoil from capital and maintenance dredging activities for the Approved Proposal (EPBC 2018/8236 and EPBC 2022/9169) within a defined offshore spoil ground 'DMPA4'.
PSD	Particle size distribution
PTIMF	Pilbara Trawl (Interim) Managed Fishery
PTMF	Pilbara Trap Managed Fishery
PTS	Permanent Threshold Shift
re 1 μPa^2	Reference value (P^2_o) for sound in water: 1 μPa^2
RFI	Request for Information
S40AA	Section 40AA Application under Part IV of the EP Act.
Sea Dumping Act	*Environment Protection (Sea Dumping) Act 1981* (Cth)
SEL*24h*	Sound Exposure Level (cumulative over a 24 hour period)
SLIP	Shared Location Information Platform
SoP	Sulphate of Potash
SSC	Suspended Sediment Concentration
SSS	Side Scan Sonar
TACC	Port of Ashburton Technical Advisory and Consultation Committee
TBT	Tributyltin
Threatened	Listed as 'Critically endangered', 'Endangered' or 'Vulnerable' under the EPBC Act
Tp< 5 s	Peak wave period less than 5 seconds
TRH	Total recoverable hydrocarbons
TSHD	trailer suction hopper dredge
TSSC	Threatened Species Scientific Committee
TTS	Temporary Threshold Shift
UCH	Underwater Cultural Heritage
UCH Act	*Underwater Cultural Heritage Act 2018* (Cth)
UCL	Upper confidence level

Term	Definition
UKC	Under Keel Clearance
UWA	University of Western Australia
WA	Western Australia
WAC	Wirrawandi Aboriginal Corporation
WAFIC	Western Australia Fishing Industry Council
WAMSI	Western Australian Marine Science Institution
Worley	Worley Consulting Pty Ltd
WOS	Whole-of-sky
WSP	WSP Australia Pty Limited
YM People	Yaburara and Mardudhunera People
ZoHI	Zone of High Impact
ZoMI	Zone of Moderate Impact
µPa	Micropascal
μPa^2	Squared micropascal

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ATTACHMENTS

Attachment Number	File Name	Document Number/Author/Source
1	Att1_DMPA4 BCH Report 2024	R240358 / O2 Marine
2	Att2_DSDMP 2025 (Rev5)	R190043 / O2 Marine
3	Att3_DMPA4 Disposal Plume Modelling 2024	12979.406.M2.RevA / Baird
4	Att4_Maintenance Dredging Estimate 2020	12979.101.L1.Rev1 / Baird
5	Att5_Stakeholder Consultation Register	Revision 1 / Mardie Minerals
6	Att6_BCI Environment Policy 2022	BCI-ENV-POL-001 REV 0 / BCI
7	Att7_Mardie Project ESMP 2022	BCI-ESM-PLN-001 / Preston Consulting
8	Att8_PMST Report DMPA4_241206	Dated 06 December 2024 / DCCEEW
9	Att9_Marine Fauna Review 2020	R190012 / O2 Marine
10	Att10_Marine Turtle Monitoring Program 2023	J59006 / Pendoley Environmental
11	Att11_Marine Turtle Survey Report 2024	J59009 / Pendoley Environmental
12	Att12_Marine Turtle Survey Report 2025	Rev 0: 311012-02345-EN-REP-0001 / Worley
13	Att13_Bluespotted Emperor Survey Summary 2025	Mardie Minerals
14	Att14_Baseline Marine Sediment Assessment 2019	J59009 / O2 Marine
15	Att15_Marine Sediment Quality Assessment 2023	R220345 / O2 Marine
16	Att16_WCD2018-006 S2 Maps	Schedule 2 of WCD2018/006 / NNTT
17	Att17_Underwater Noise Risk Assessment 2025	Dated 07 July 2025 / MScience
18	Att18_Dredge Plume Characteristics 2025	12979.406.M4.Rev0 / Baird
19	Att19_DMPA1 Disposal Plume Modelling 2024	12979.406.M1.Rev0 / Baird
20	Att20_DMPA4 Bathymetric Survey 2024	24MET184/R240372 / O2 Marine
21	Att21_Stakeholder Engagement Management Plan 2025	0000-SM-PLN-0003 / BCI
22	Att22_Updated Maintenance Dredge Estimate	N/A
23	Att23_Onshore Disposal Risk Assessment	N/A
24	Att24_ Summary comparison of the risk assessment for onshore versus offshore disposal	N/A

Attachment 1: Att1_DMPA4 BCH Report 2024

Attachment 2: Att2_DSDMP 2025

Attachment 3: Att3_DMPA4 Disposal Plume Modelling 2024

Attachment 4: Att4_Maintenance Dredging Estimate 2020

Attachment 5: Att5_Stakeholder Consultation Register

Attachment 6: Att6_BCI Environment Policy 2022

Attachment 7: Att7_Mardie Project ESMP 2022

Attachment 8: Att8_PMST Report DMPA4_241206

Attachment 9: Att9_Marine Fauna Review 2020

Attachment 10: Att10_Marine Turtle Monitoring Program 2023

Attachment 11: Att11_Marine Turtle Survey Report 2024

Attachment 12: Att12_Marine Turtle Survey Report 2025

Attachment 13: Att13_Bluespotted Emperor Survey Summary 2025

Attachment 14: Att14_Baseline Marine Sediment Assessment 2019

Attachment 15: Att15_Marine Sediment Quality Assessment 2023

Attachment 16: Att16_WCD2018-006 S2 Maps

Attachment 17: Att17_Underwater Noise Risk Assessment 2025

Attachment 18: Att18_Dredge Plume Characteristics 2025

Attachment 19: Att19_DMPA1 Disposal Plume Modelling 2024

Attachment 20: Att20_DMPA4 Bathymetric Survey 2024

Attachment 21: Att21_Stakeholder Engagement Management Plan 2025

Attachment 22: Att23_Updated Maintenance Dredge Estimates

Attachment 23: Att 23_ Onshore Disposal Risk Assessment

Attachment 24: Att24_Summary comparison of the risk assessment for onshore versus offshore disposal