

BCI MINERALS LIMITED

MARDIE PROJECT UNDERWATER NOISE MANAGEMENT PROCEDURE

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1. BACKGROUND

Underwater noise generated from piling works and vessel operations during construction will be managed by BCI in accordance with the following underwater noise management procedure described below and presented in Figure 1. Target marine fauna for underwater noise management includes whales, dugong, dolphins, turtles and Green sawfish.

Note that other limitations to piling work apply, including:

- marine piling will not be conducted during the sawfish pupping season (currently 1 September to 31 October)
- marine piling will be restricted to sunrise to sunset operations from 10 August to 10 October to avoid the Humpback Whale nearshore southern migration
- marine piling will be minimised during turtle nesting season (1 October to 31 March).

To mitigate and manage noise impacts generated from piling works on the target marine fauna, noise impacts from piling will be managed according to the depth of water which piling will be conducted i.e. shallow water (<3 m Depth - Low Tide) and deeper water (> 3 m Depth - Mid & High Tide). Within each depth corresponding management zones will be applied. A suitable trained marine fauna observer will conduct visual observations for both shallow and deep-water zones. A marine fauna observer will conduct visual observations on the piling platform during low tide and each vessel during high tide when undertaking marine pile driving operations. The marine fauna observer will be present for the full duration of the operations. The individual(s) will be suitably trained in marine fauna observations, including adhering to the requirements of the *Wildlife Conservation (Closed Season Marine Mammals) Notice 1998*. All observed marine fauna will be recorded in a log and will be made publicly available through *Department of Biodiversity Conservation and Attractions (DBCA)*, Atlas of Living Australia and reported to DAWE.

The multiple marine species have been modelled in an underwater noise assessment (Talis 2019), which found various levels of impacts will occur by the noise generated by the piling works and dredging. The noise from the dredging is predicted to be SPL of 167 dB re 1 μ Pa @ 1 m and pile driving SEL of 205 dB re 1 μ Pa.s @ 1 m. The impacts of these marine noise sources have been summarised below in Table 1.

Dredging noise will be addressed in the ‘*Mardie Project Dredge Management Plan*’.

Table 1 Impacts of noise from dredging, barging and piling activities on whales, dugong and dolphins from the proposed action (Talis, 2019).

Marine Fauna	Possible TTS (Distance less than)	Possible behavioural response
Humpback Whales and Dugong	500 m at high tide 300 m at men tide Low tide – only at pile	High tide and mean tides: 10 km Low tide – only at pile

Marine Fauna	Possible TTS (Distance less than)	Possible behavioural response
Australian Humpback Dolphins	100 m at high and mean tide Low tide - only at pile	High and mean tides: 4 – 5 km Low tide – only at pile
Marine turtles and Green Sawfish	100 m at high and mean tide Low tide – only at pile	High and mean tides: 500 m Low tide – only at pile

1.1 Management Zones

The marine fauna observer will perform visual observations within a 500 m Observation zone (distance from piling works) for all target marine fauna during shallow water piling. Within the observation zone is a 100 m exclusion zone for all target marine fauna (Figure 2).

During Deep water piling the marine fauna observer will perform visual observations within a 2 km observation zone for all target marine fauna. Due to the extent of this zone, roaming vessel observations will be conducted. Within the observation zone is a 1 km exclusion zone which applies to whales and dugongs, and a 500 m exclusion zone which applies to turtles, which means that marine piling will be suspended (Figure 3).

Dredging and barging activities: the marine fauna observer will perform visual observations within a 1, 500 m Observation Zone (distance from dredging works) for cetaceans and dugong and other marine fauna. Within the observation zone is a 200 m exclusion zone for all target marine fauna (Figure 4).

2. PROCEDURE

2.1 Commence Marine Fauna Visual Observation Prior to Commencement of Piling or dredging and barging activities

Prior to piling or dredging and barging works each day the marine fauna observer will commence visual observations for 30 minutes within a radius of 1,000 m for cetaceans and dugongs and 300 m for turtles and sawfish immediately prior to the commencement of the piling or dredging and barging operations (Figure 1).

- If target marine fauna are observed within the management zone, piling or dredging and barging operations shall delay until target marine fauna have exited the management zones or have not been seen for 20 minutes.
- If target marine fauna are not observed within the management zone, piling or dredging and barging operations may commence with soft-start procedures.
- Daily records of all target marine fauna observations within 500 m of piling or dredging and barging operations will be collected;
 - Record observed cetaceans in a format consistent with the National Cetacean Sighting and Stranding's Database;

- Other target marine fauna observations within 500 m of piling or dredging and barging operations;
- Fauna behaviors, in particular any behaviors that could be attributed to piling or dredging and barging activities;
- Management responses in relation to dead and injured wildlife, including suspension of piling or dredging and barging activities; and
- Observation effort in relation to piling or dredging and barging activities.
- Records will be sent to DBCA and DAWE (Ports and Marine Section)

2.2 Soft-Start Piling

Soft-start procedures involve gradually increasing the piling impact energy over a 30-minute period. The soft-start procedure may alert marine mammals to the presence of the piling activity and enable animals to move away to distances where injury is unlikely. The marine fauna observer will continually monitor the management zones during soft-start procedure. Marine Fauna observers must demonstrate a knowledge of marine wildlife species in the Pilbara region, including Threatened and Migratory Species listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC), and *Biodiversity Conservation Act 2016* (BC Act) and priority listing, and their behaviours.

Noise emission will not exceed a SEL of 205 dB re 1 μ Pa.s @ 1 m. Monitoring of this noise will be undertaken by the implementation of the following method:

- A mobile underwater noise logger will be placed at an appropriate distance from the piling where:
 - It is expected that the pressure wave will be fully formed.
 - Clipping of hydrophone data will be avoided.
- The measured data will be used to determine the source level (i.e. SEL @ 1m [dB re 1 μ Pa.s @ 1m]) of the pile using methods similar to ANSI/ASA S12.64 and ISO 17208.

2.2.1 Observation Zones

- Where target marine fauna are observed within the observation zone then following procedure shall be applied:
 - If it is evident that the marine fauna are in distress then piling operations shall cease until marine fauna have exited the management zones or have not been seen for 20 minutes. Once target marine fauna have exited the management zone, soft start piling may recommence.
 - If target marine fauna are not showing signs of distress, soft start procedures will continue and the marine fauna observer will continue to monitor the marine fauna.
 - Where target marine fauna are not observed within the management zones for the duration of the soft-start procedure then normal piling operations may commence.

2.2.2 Exclusion/ shutdown Zones

- Where target marine fauna are observed within the exclusion zone then soft-start piling operations shall cease until target marine fauna have exited the management zones or have not been seen for 20 minutes. Once target marine fauna have exited the management zone, soft start piling may recommence.
- Where target marine fauna are not observed within the management zones for the duration of the soft-start procedure then normal piling operations may commence.

2.3 Normal Piling

Where target marine fauna are not observed in management zones during soft start procedures then normal piling can commence. Normal piling involves commencement of full impact piling..The marine fauna observer will continually monitor the management zones during normal piling. Marine Fauna observers must demonstrate a knowledge of marine wildlife species in the Pilbara region, including Threatened and Migratory Species listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC), and *Biodiversity Conservation Act 2016* (BC Act) and *priority listing, and their behaviors*.

Noise emission will not exceed a SEL of 205 dB re 1 μ Pa.s @ 1m. Monitoring of this noise will be undertaken by the implementation of the following method:

- This will be implemented by a mobile noise logger installed adjacent to the piling operations for the duration of the work, as for soft-start piling.

2.3.1 Observation Zones

- Where target marine fauna are observed within the observation zone then following procedure shall be applied:
 - If it is evident that the marine fauna are in distress then piling operations shall cease until marine fauna have exited the management zones or have not been seen for 20 minutes. Once marine fauna have exited the management zone, soft-start piling may recommence.
 - If target marine fauna are not showing signs of distress, piling operations will continue and the marine fauna observer will continue to monitor the marine fauna.

2.3.2 Exclusion / Shutdown Zones

- Where target marine fauna are observed within the exclusion zone then piling operations shall cease until target marine fauna have exited the management zones or have not been seen for 20 minutes. Once target marine fauna have exited the management zone, soft-start piling may recommence.
- Where target marine fauna are not observed within the management zones then normal piling operations may continue.

2.4 Low-Visibility Conditions

During periods of low visibility (i.e. where a distance of 500 m cannot be clearly viewed), then piling operations may commence with soft-start procedures provided that during the preceding 24-hour period:

- There have not been three or more circumstances where marine fauna have been observed which resulted in ceasing of piling operations;
- A 2-hour period of continual observations was undertaken in good visibility within the 24-hour period prior to proposed piling and no marine fauna sighted; and
- Piling should occur during daylight hours unless in the case of a safety/emergency; at such times it will not extend beyond 10pm.

2.5 Additional Considerations

- Piling should be undertaken in shallow (i.e. < 3m depth) waters whenever possible;
- Deep-water (i.e. > 3m depth) piling should not occur between July and September to December when Humpback Whales are migrating throughout the Pilbara region; October to March when marine turtles are nesting on beaches near the trestle jetty; Green Sawfish pupping season September to October and Dugong calving seasons August to December;
- Piling should only be undertaken during daily hours when marine fauna observations can occur; and
- The management procedure must be repeated from the beginning for all piles.
- Marine Fauna observers must demonstrate a knowledge of marine wildlife species in the Pilbara region, including Threatened and Migratory Species listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC), and *Biodiversity Conservation Act 2016* (BC Act) and *priority listing, and their behaviors.*

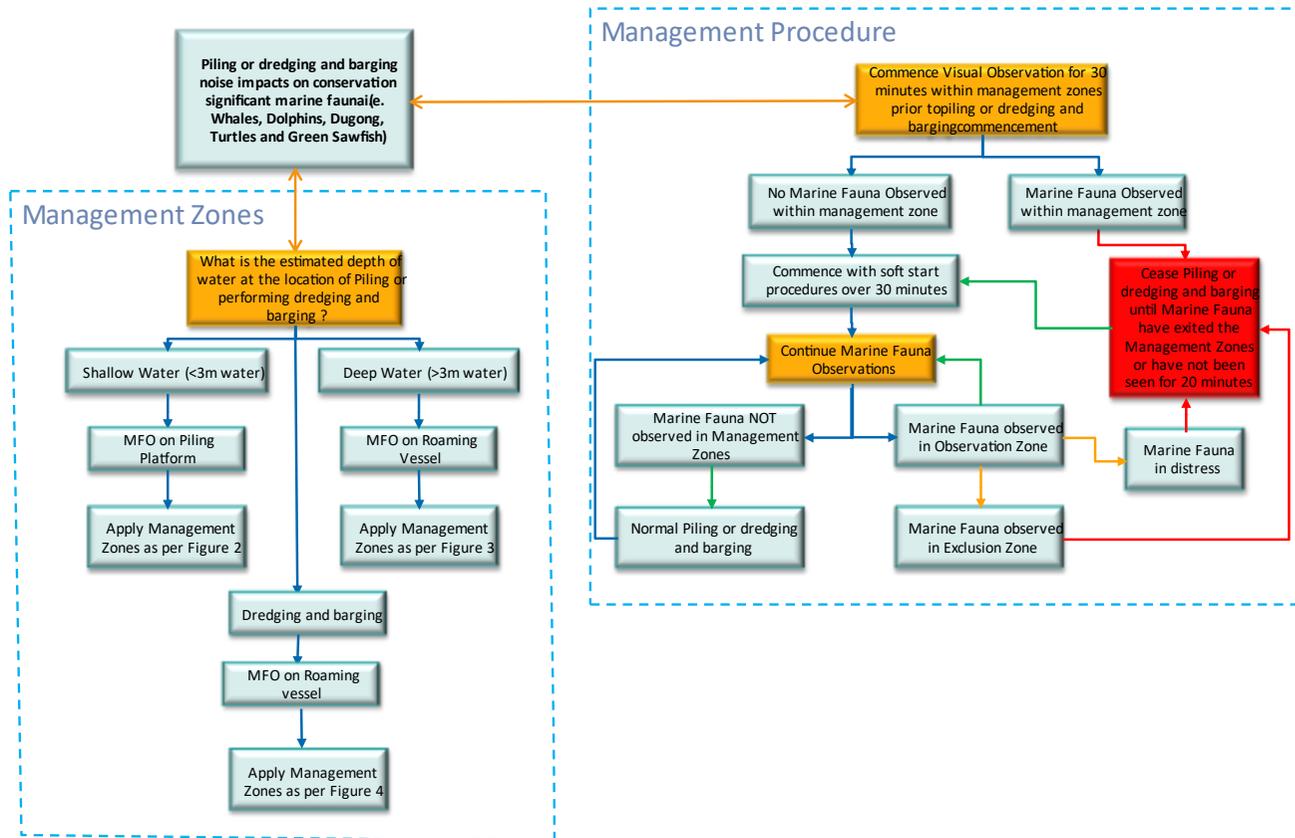


Figure 1 Underwater Noise Management Process

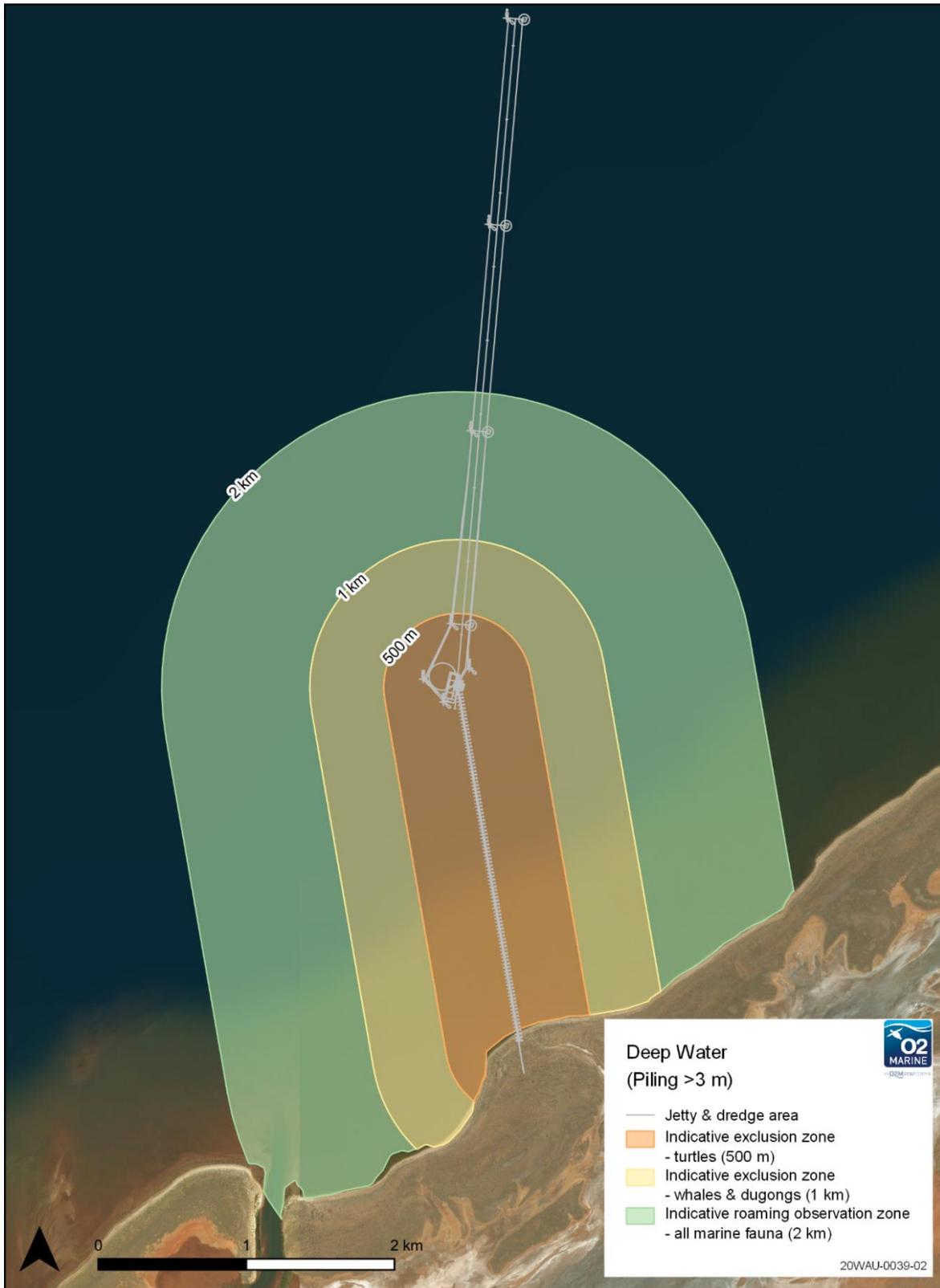


Figure 2 Deep water piling management zones

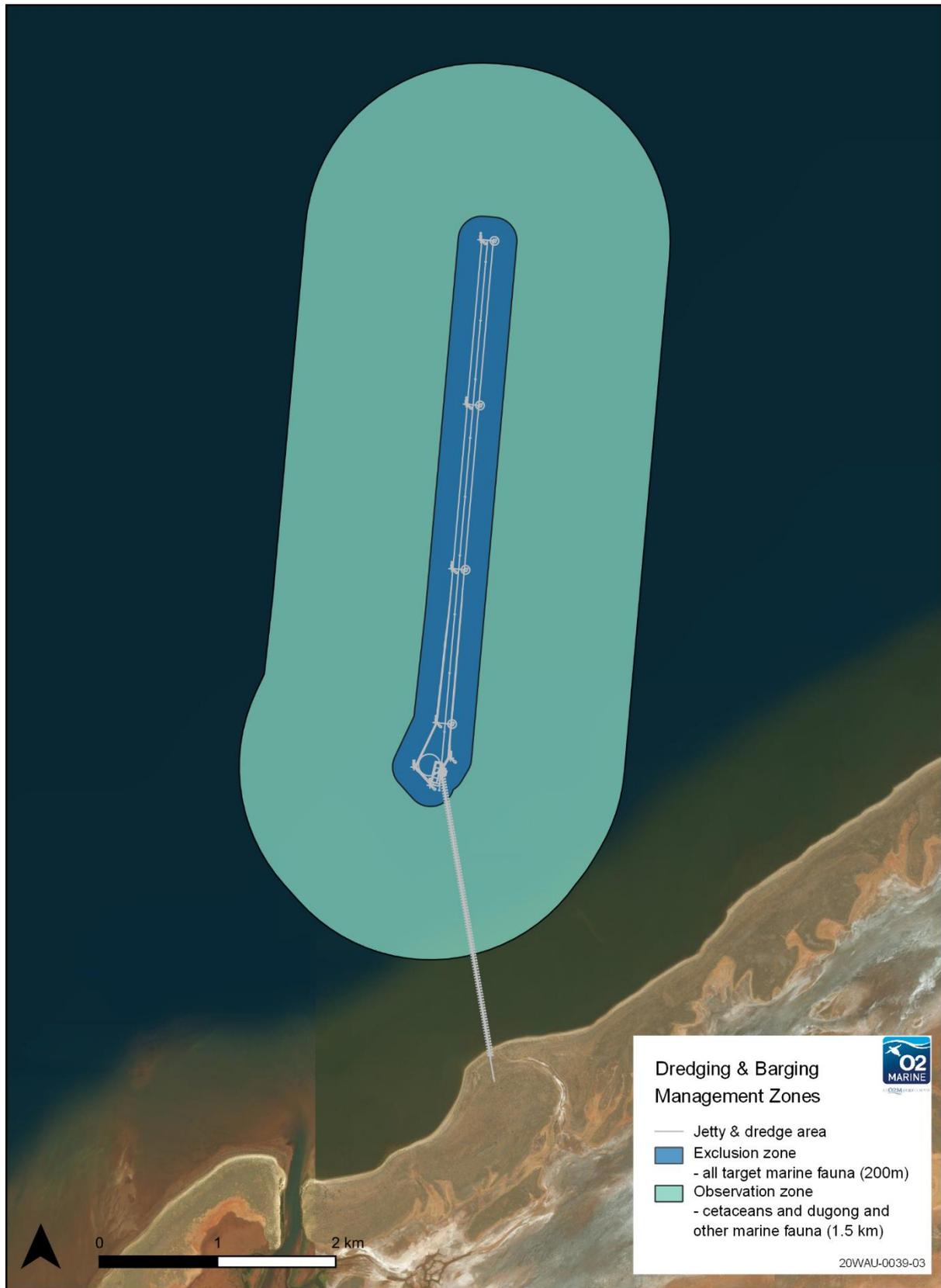


Figure 3 Dredge and Barging management zones