Dungeness EPBC Referral

Dredge Channel and Coastal Infrastructure

Hinchinbrook Shire Council

25 Lannercost St
Ingham, Qld 4850

Prepared by:

SLR Consulting Australia Pty Ltd

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Making Sustainability Happen

Revision Record

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02	23 March 2026	Alex Munro and Carol Conacher	Carol Conacher	Carol Conacher
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Basis of Report

This report has been prepared by SLR Consulting Australia Pty Ltd (SLR) with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with Hinchinbrook Shire Council (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

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Executive Summary

Hinchinbrook Shire Council (HSC) has proposed construction of a small breakwater and dredging the Dungeness Enterprise Channel to increase accessibility so that it provides all-tide access and safe passage for boats. Construction of the breakwater will reduce the overall requirements for dredging, with dredging only required approximately every 5 years. The dredged material will be used for beach replenishment on the Dungeness foreshore, to protect the remaining spit from further erosion, and thus protect neighbouring marine infrastructure and commercial enterprises.

These works were approved with conditions by the Queensland State Assessment Referral Agency (SARA).

This report addresses potential impacts to Matters of National Environmental Significance (MNES) under the *Environment Protection and Biodiversity Conservation Act 1999 (*the EPBC Act) as a result of the proposed work, and will accompany the EPBC referral.

The Receiving Environment

The Hinchinbrook Channel forms one of the largest and most complex estuarine systems in eastern Queensland and has numerous coastal tributaries, including the Dungeness Enterprise Channel, that drain into it from the mainland and from Hinchinbrook Island. It is an important nursery ground for a variety of recreationally and commercially important prawn and fish species and provides habitat for a range of threatened and migratory aquatic species.

The area that may be impacted by the Project is surrounded by large areas of mangroves, and includes areas of unvegetated sediment, and seagrass beds. Although the Dungeness Enterprise Channel is dominated by unvegetated sediment, there are patches of seagrass surrounding the mouth of the channel.

During heavy rainfall the Hinchinbrook and Enterprise Channels are likely to be fluvially dominated, while the remainder of the time they are dominated by tides, with currents flowing along a northwest-southeast axis parallel to the foreshore. While both flood and ebb tides have high current velocities, peak current speeds are greater during the flood than on the ebb tide.

There have been considerable changes to the morphology of this area, primarily due to erosion, such that the spit no longer protects the entrance to the channel, and resulting in considerable loss of mangroves along the northern mangrove lined beach.

The proposed works would stabilise the area, improve access via the channel, and would likely result in a decrease in the loss of mangroves, and an increase in the area of seagrass.

MNES that may potentially be impacted by the proposed works comprise:

- the Great Barrier Reef Marine Park
- World Heritage Areas: Great Barrier Reef
- National Heritage Places: Great Barrier Reef
- threatened ecological communities
- threatened species, and
- migratory species (protected under international agreements).

Potential Impacts

Potential direct impacts of the proposed works comprise impacts from:

- construction of the breakwater
- dredging
- placement of the pipeline
- the access track
- placement of the dredge material, and
- boat anchoring.

It is anticipated that the fauna in the area to be dredged will recolonise in the short-term. While some unvegetated benthic habitat will be lost under the breakwater, this structure will provide an area of rocky reef habitat.

Marine plants will be mapped prior to the works commencing, and dredge material will be placed to avoid burial of marine plants, and boats will avoid anchoring over areas of marine plant.

Consequently, direct impacts to marine plants are relatively small, with only 0.065 ha of marine plants lost (which, as a condition of the State approval, will be offset). The dredge material is similar in composition to that in the beach nourishment area. While fauna abundance is likely to be low in this area, it is expected to recolonise once the dredge material has been placed.

Potential indirect impacts consist of impacts from:

- changes in erosion and sedimentation
- changes to turbidity
- disturbance of acid sulfate soils
- spills of hydrocarbons and other contaminants
- Light
- noise, air and vibration emissions
- litter, and
- pest species.

The impact of proposed works on sedimentation and erosion and on turbidity have been comprehensively modelled. Modelling indicates the proposed works will reduce the requirement for dredging, stabilise the shoreline from further erosion, and will promote sediment accretion and deposition along the entire shoreline. These more stable conditions will promote the growth of marine plants, likely resulting in an overall increase in the area of marine plants. It is also expected that the loss of mangroves along the Dungeness foreshore due to erosion may be reduced by up to 0.12ha of mangroves per year. Hydrodynamic and sediment transport modelling indicates that the proposed dredging works will have minimal, short term and localised water quality impacts, and that once placed the dredge spoil will have minimal resuspension.

Risks from the other potential impacts are low, and will be managed by implementation of a comprehensive Construction Management Plan.

Assessment of Significant Residual Impacts

Significant impacts to the MNES were assessed according to the Significant Impact Guidelines and it was determined there was unlikely to be a significant residual impact to any MNES. While part of the proposed works are with the Great Barrier Reef Marine Park, World Heritage Area, and National Heritage Place, the potential impacts are not of a scale to have a significant impact on the values of these areas.

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1.0 Introduction

1.1 Background

The Dungeness Boat Ramp and the Enterprise Channel are important infrastructure in the Hinchinbrook region. Together, they provide a gateway to Hinchinbrook Island, the Great Barrier Reef and many other islands, including Orpheus and the Palm Islands. They also provide access for fishers, with fishing participation in the area (34%) one of the highest in Queensland (Water Technology 2024).

Enterprise Channel, which connects the Dungeness Boat Ramp to the deeper waters of Hinchinbrook Channel, is subject to excess sediment build-up, inhibiting access at low and mid tides, particularly for vessels with deeper drafts.

The Dungeness Boating Safety Project (the Project) proposed by Hinchinbrook Shire Council (HSC) addresses these issues and restores full-tide access from the Dungeness Boat Ramp to the Hinchinbrook Channel (Water Technology 2024a and 2024b).

The Project comprises (Figure 1 and Figure 2):

- dredging between the Dungeness Boat Ramp and the mouth of the Enterprise channel to restore all-tide access and boating safety
- construction of a breakwater to stabilise sediments and reduce siltation, hence reducing the need for on-going dredging, and
- placing the dredged material on Dungeness Beach to minimise ongoing erosion of this foreshore.

The proposed dredge area is at the confluence of the Dungeness Enterprise and Hinchinbrook Channels near Lucinda on the North Queensland Coast. It is estimated that 13,500 m^3 of spoil will be removed from the channel, to be distributed as beach replenishment (Water Technology 2024a). After the initial 3 year period, it is anticipated that approximately 20,000m^3 of material will need to be dredged approximately every 5 years (Water Technology 2024b). Dredging will only be conducted between 1 February and 31 October, to minimise impacts on fish migration and spawning (SARA Decision Notice 2025).

The proposed breakwater is 370 m long, with a crest width of 4 m, and base width varying between approximately 26 and 33 m. The proposed breakwater will have a low crest that minimises impacts to marine plants and has a relatively small footprint compared to higher breakwaters, that would also be wider (Water Technology 2024a).

Morphological modelling (Water Technology 2024b) indicates that:

- the proposed work will reduce infill rate of the dredge channel by approximately 50%
- the frequency of dredging required to maintain safe access will be effectively halved
- any impacts to coastal morphology are limited to a highly localised area, with little risk of propagation into the wider coastal zone
- the breakwater stabilises surrounding sediment, significantly reducing erosion of the Spit and along Dungeness Beach, and reducing current impacts to mangroves and seagrass communities, and
- there are no wide ranging or long-term impacts to sediment budgets in the region.

These works were approved with conditions by the Queensland State Assessment Referral Agency (SARA) on 9 April 2025 (the “SARA Decision Notice 20205”; SARA Reference 2410-42851 SRA).

This report addresses potential impacts to Matters of State Environmental Significance (MNES) under the *Environment Protection and Biodiversity Conservation Act 1999 (*the EPBC Act) as a result of the proposed work, and will accompany the EPBC referral. The report provides:

- a description of the existing receiving environment, based on literature review and previous field surveys by frc environmental (now part of SLR Australia), and SLR Australia.
- a summary of potential impact pathways
- an assessment of the likelihood that listed MNES are likely to occur in the area, and may be impacted by the proposed works
- assessment of potential impacts according to the Significant Impact Guidelines
- recommendations for mitigation of impacts, and
- an assessment of potential residual impacts.

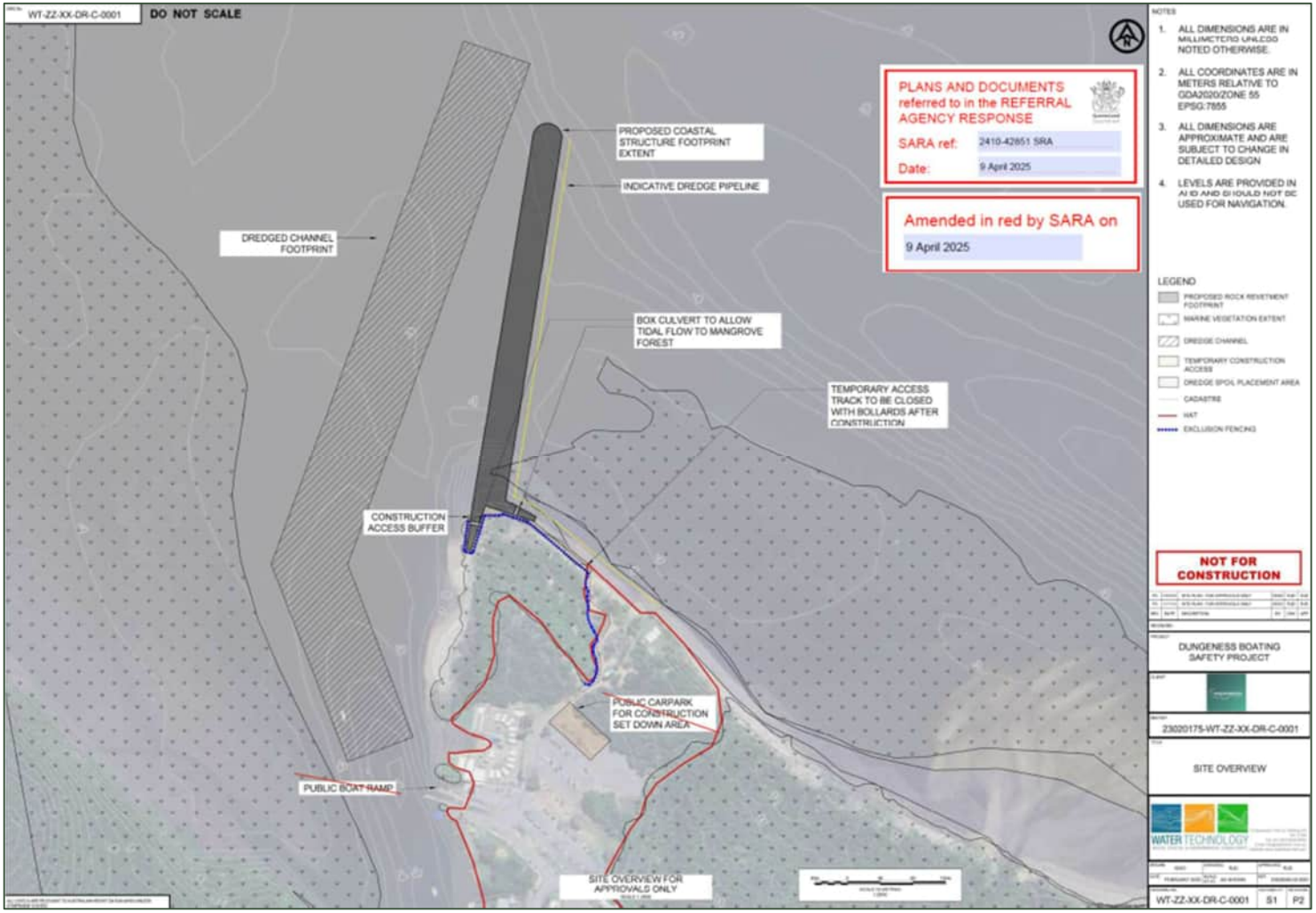

Figure 1 Site overview plans as approved by SARA (2025).

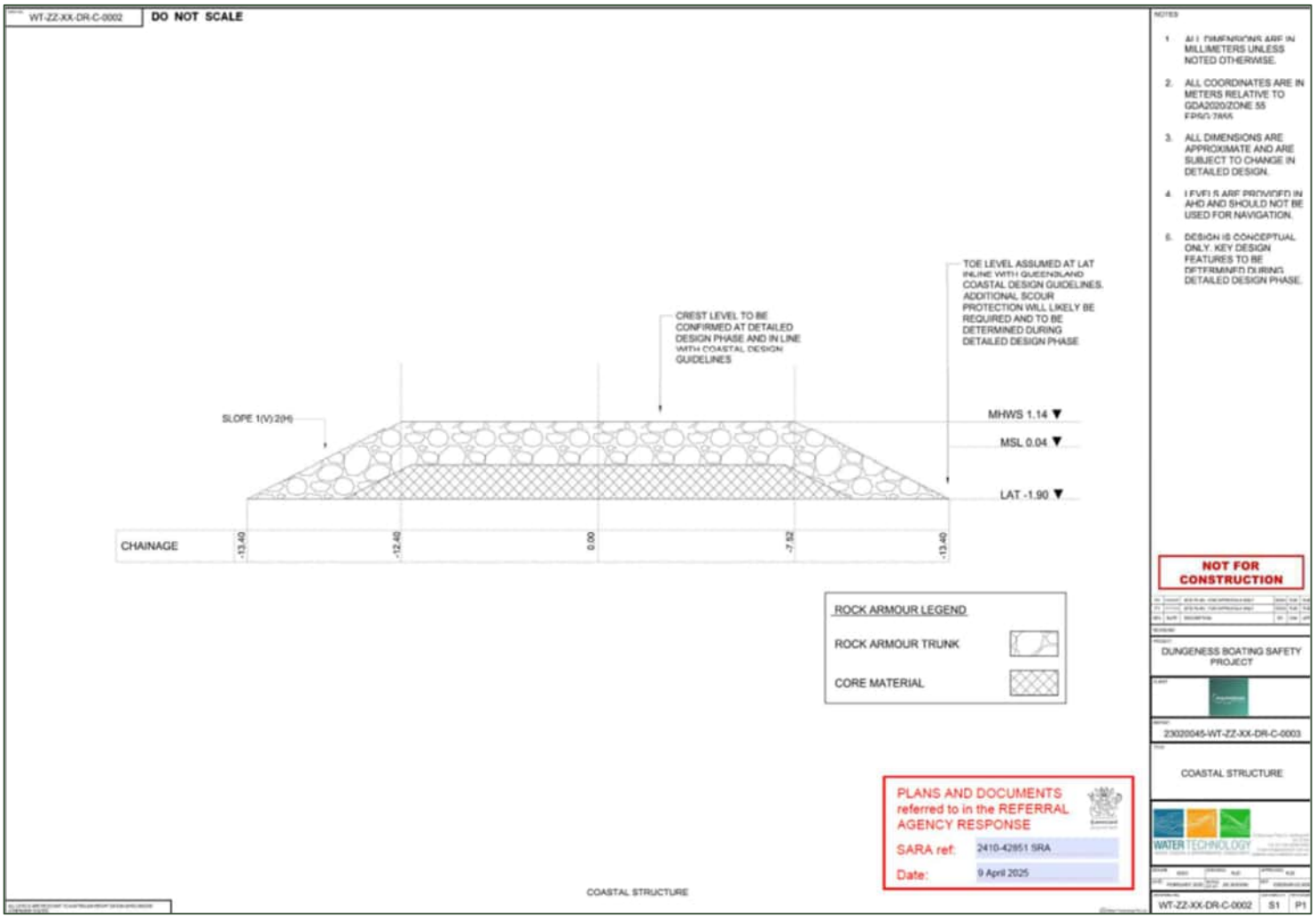

Figure 2 Cross section of the breakwater as approved by SARA (2025).

2.0 Commonwealth Regulatory Environment

2.1 Environment Protection and Biodiversity Conservation Act 1992

The *Environment Protection and Biodiversity Conservation Act 1999* (the EPBC Act) provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places. These are defined in the EPBC Act as Matters of National Environmental Significance (MNES). Approval under the EPBC Act is required for any action that has, will have, or is likely to have a significant impact on MNES. An offset may be applicable for significant residual impacts.

If a project may impact MNES, then a referral should be submitted to the Commonwealth Environment minister. Currently, the Department of Climate Change, Energy, the Environment and Water (DCCEEW). Prior to referral, a self-assessment is required that considers:

- what MNES may be impacted, and
- whether impacts to any MNES may be significant, with reference to the Significant Impact Guidelines (DEWHA 2013 and DCCEEW 2024)

When an activity is referred to the federal environment department, it is assessed to determine whether or not it will have a significant impact on nationally protected matters. The minister or departmental delegate determines whether the activity will need to be further assessed – this is the 'referral decision'. A referral decision will deem the action is either:

- **a controlled action**: a significant impact on an MNES is likely, and further assessment is required
- **not a controlled action, particular manner**: no further assessment is required but the action must be carried out in the manner described in the decision
- **not a controlled action**: unlikely to have significant impact on MNES, no further assessment required, or the
- **action clearly unacceptable**: the activity cannot proceed as it will have an unacceptable impact on MNES.

2.2 Great Barrier Reef Marine Park Act 1975

The *Great Barrier Reef Marine Park Act 1975* (GBRMP Act) is the primary Act for managing the GBRMP and includes provisions which:

- establish the GBRMP
- establish the Great Barrier Reef Marine Park Authority (GBRMPA), a Commonwealth authority responsible for the management of the Marine Park
- provide a framework for planning and management of the marine park, including through zoning plans, plans of management and a system of permissions, and
- provides enforcement mechanisms including criminal enforcement action, civil penalties, administration action, infringement notices and emergency powers

3.0 Assessment Methods

3.1 Biologically Description of the Existing Environment

The existing environment and values of the area that may be impacted by the Project were assessed via a desktop review, previous reports by frc environmental (now part of SLR Consulting), and reports from external consultants such as Water Technology.

All references used in the desktop assessment are listed in Section 14.0.

3.1.1 Previous Field Surveys

Previous field surveys include surveys of:

- seagrass communities, reef habitats and benthic infauna in March 2019 (frc environmental 2019a)
- marine plant communities in March 2021 (frc environmental 2021),
- sediment in 2019 (frc environmental 2019b)

3.2 Approach to Impact Assessment

The impact assessment approach aimed to identify all potential impact pathways which may affect any of the identified marine ecological values during any stage of the proposed Project. Construction and operation phase impact pathways were identified separately.

Potential impact pathways were identified through review of the Project description and information provided in:

- The SARA change application decision notice (SARA 2025)
- Dungeness Boating Safety Project – Detailed Morphological Modelling: Stage 1 Report (Water Technology 2024a)
- Dungeness Boating Safety Project – Detailed Morphological Modelling: Stage 2 Report (Water Technology 2024b)
- Dungeness Breakwater and Dredging – Dredge Management Plan (Water Technology 2021)
- Dungeness Breakwater and Dredging – Modelling and Breakwater Design (Water Technology 2021)
- Dungeness Enterprise Channel Dredging, Rock Wall & Beach Replenishment Sediment Sampling and Analysis 2019 (frc environmental 2019b)
- Dungeness Enterprise Channel Dredging and Beach Replenishment Ecological Survey and Environmental Impact Assessment 2019 (frc environmental 2019a)
- Dungeness Enterprise Channel Proposed Works: Assessment of Potential Impacts to Marine Plants (frc environmental 2021)
- Dungeness Boating Safety Project: Assessment of Potential Impacts to Marine Plants (frc environmental 2024a)
- Dungeness Beach: SARA Advice Notice Response (frc environmental 2024b) and,
- Dungeness Dredge Channel and Boat Ramp (Jacobs 2018)

Impact assessment involved evaluation of the intensity, duration, magnitude, irreversibility and cumulative interactions of the identified direct and indirect impact pathways. The assessment also identified any potential residual impacts after mitigation measures noted in

the Project description were implemented. Specifically, impacts to MNES were assessed using the Significant Impact Criteria (DCCEEW 2013). Where a significant residual impact was identified, further mitigation measures were considered to reduce the impact. Where it was not possible to reduce the residual impact on MNES to insignificant levels, the requirement for an offset was recognised, and considered in conjunction with the offsets required under the SARA approval.

4.0 Description of Existing Environment

4.1 Background

The Hinchinbrook Channel is bounded to the east by Hinchinbrook Island, and to the west by a low-lying but narrow coastal plain with coastal ranges behind (Bunt & Bunt 1999). The channel is approximately 45 km long, and in some places over 20 m deep. It extends from Cardwell to Lucinda, with a relatively little development along the estuary (Wet Tropics Waterways 2025).

The climate of the area is marked by dry winters and irregularly wet summers with annual rainfall in the long term averaging around 2000 mm. Monthly temperature means at sea level range from 19°C in July to 27°C in January (Bunt & Bunt 1999).

Water quality in the Hinchinbrook Channel is predominantly good. However the grading for chlorophyll a decreased from moderate to poor in 2024, with monthly median concentrations often exceeding guideline values, and the grading for turbidity declined from ‘very good’ to ‘good’ (Wet Tropics Waterways 2025).

The Hinchinbrook Channel forms one of the largest and most complex estuarine systems in eastern Queensland (Lawrence et al. 2025), and has numerous coastal tributaries, including the Dungeness Enterprise Channel, that drain into it from the mainland and from Hinchinbrook Island (Wet Tropics Waterways 2025). Hinchinbrook Channel supports a complex mosaic of coastal habitats including mangroves, seagrass beds, sandy channels, oyster reefs, deep water habitats and coastal wetlands that provide habitat for a diverse range of species including turtles, dolphins, dugong, sharks, rays and a variety of shore birds.

The Hinchinbrook area is an important nursery ground for banana and offshore tiger prawn fisheries and supports a range of commercially important species including mud crab, barramundi, threadfin and mackerel. Important recreational species include barramundi, blue salmon, bream, estuary cod and mangrove jack (Lawrence et al. 2025).

4.1.1 Hydrodynamics and Shoreline Evolution

During heavy rainfall the Hinchinbrook and Enterprise Channels are likely to be fluvially dominated, while the remainder of the time they are dominated by tides, with currents flowing along a northwest-southeast axis parallel to the foreshore. While both flood and ebb tides have high current velocities, peak current speeds are greater during the flood than on the ebb tide (Water Technology 2019). The strong flood currents close to the northern Dungeness Beaches have caused significant erosion along those beaches. Some of the eroded material travels around the spit, causing the formation of sediment pulses and accretion on the eastern bank of Enterprise Channel (Water Technology 2019).

Analysis of historical aerial images indicates there has been considerable changes in the spit, channel and foreshore (Water Technology 2019). In summary (Figure 3)

- there has been significant erosion of the spit, such that the spit no longer protects the entrance to the channel
- the western bank of Enterprise Channel has significantly accreted

- the northern mangrove lined beach of Dungeness has significantly eroded (approximately 125 m between 1956 and 2017, or on average 2 m per year)
- there has been some accretion on the western side of the spit, inside the channel, and
- the northern beaches of Lucinda have been protected with coastal protection works and are relatively stable.

Figure 3: Aerial imagery from 1956 and 2017 (dotted outline) showing significant erosion of the spit and the northern foreshore of Dungeness (Water Technology 2019).

4.1.2 Conceptual Models of Sediment Transport Processes

Updated conceptual models of sediment transport processes with and without a breakwater are presented in the Stage 1 Modelling Report (Water Technology 2024a).

The conceptual model for the existing condition (Figure 4) indicates that:

- There is a tidal asymmetry, with a very strong flood tide and weaker ebb tide, which drives sediment transport processes in the area
- The strong flood tide results in high current speeds in the main channel
- The strong flood tide is associated with significant longshore transport and bedload movement in these areas.
- The Spit has significantly eroded due to exposure to strong tidal currents and waves.
- Some of this eroded material is deposited in the navigation channel, preventing access in all tide conditions.
- The south-western end of West Island is a lower energy environment and has experienced some erosion, due to the loss of the protection provided by the (now eroded) Spit.

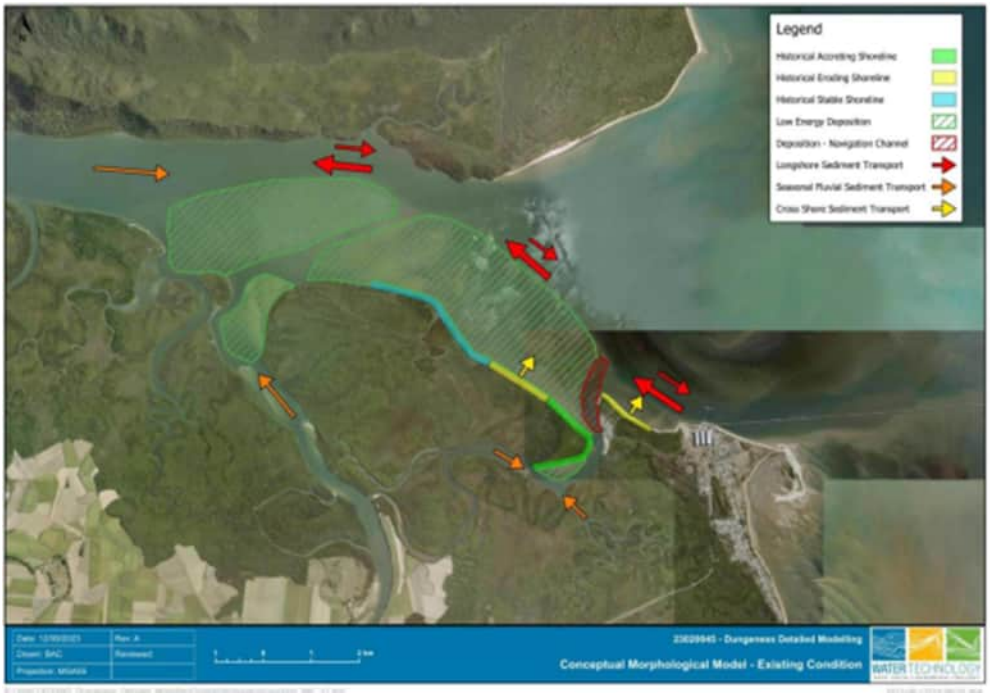

Figure 4: Conceptual model of existing sediment transport processes (Water Technology 2024a).

The conceptual model of sediment transport processes with a breakwater (Figure 2) indicates that:

- There is no reduction in the high bedload movement and major sediment transport processes in the main channel.
- The current rate of cross-shore transport at Dungeness Beach will be reduced, but will not cease.
- Cross shore transport at Dungeness Beach will only be reduced in areas directly adjacent to the breakwater.
- On the eastern portion of the beach cross shore transport will be slightly reduced.
- The longshore transport in the main channel will remain, and while there will be a slightly reduced sediment budget due to reductions in cross-shore transport at Dungeness Beach, this will not cause downstream erosion as most of this sediment previously settled in the navigation channel and on the inside bend of the western bank.
- The proposed alignment will allow sediment deposition on the western side of the breakwater, historically where the spit extended prior to its erosion.

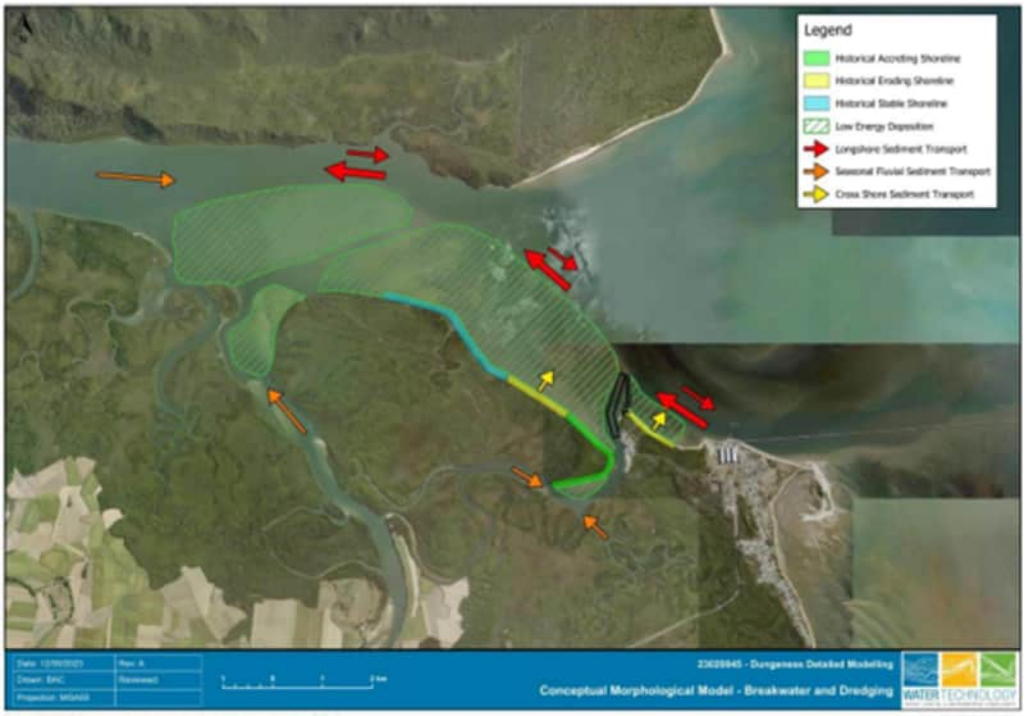

Figure 5: Conceptual model of sediment transport processes with a breakwater (Water Technology 2024a).

4.1.3 Stage 2 Morphological Modelling

The Stage 2 Modelling Report (Water Technology 2024b) focuses on sediment transport rates in the local area, and the broader geographical context of sediment transport pathways and seabed morphology at Dungeness, in the Enterprise Channel, and in the broader Hinchinbrook Passage. The local area was split into zones to describe and report on the model results (Figure 6; Map 1 Appendix B).

Figure 6: Zones used in the Stage 2 modelling (Water Technology 2024b).

Three scenarios were modelled:

- the base case
- works option 1 - dredged channel, and
- works option 2 - dredged channel and coastal structure.

Each of these scenarios were modelled for both La Nina and El Nino years, with results reported as cubic metres of sediment eroded or deposited per annum.

Time series plots of bed level at 9 sites were produced by Water Technology to assist in the interpretation of potential impacts to marine plants (Figure 7; Appendix A).

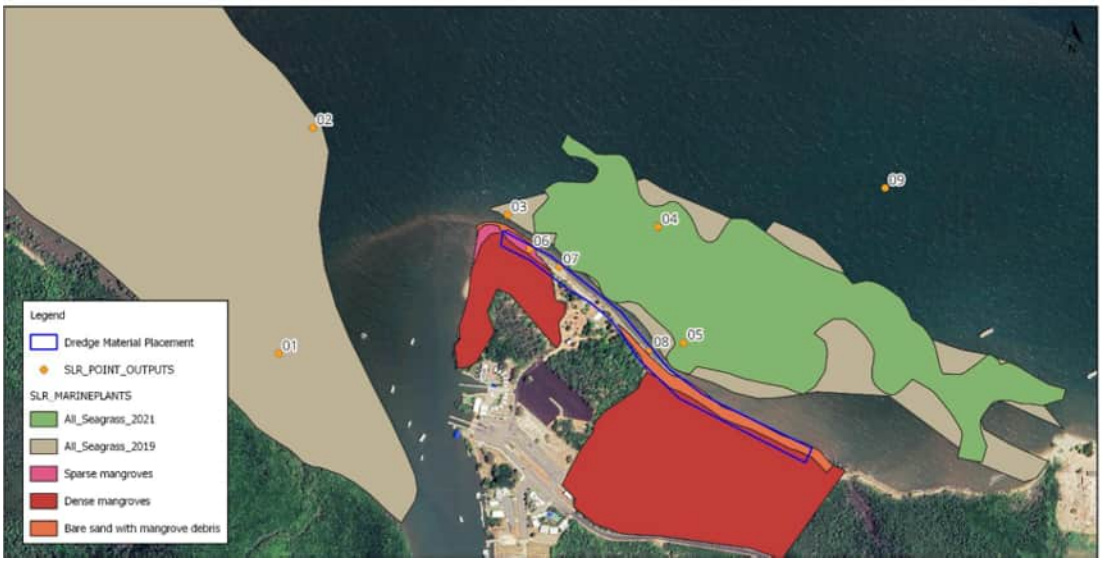

Figure 7: Sites where changes in bed level were modelled over time.

Water Technology also provided sediment and erosion overlays for each of the three scenarios in La Nina and El Nino years. The overlays show areas where modelling indicates there may be an indirect impact of a decrease in sediment height of over 20 mm per annum and the increase in sediment height of over 50 mm per annum. These thresholds were based on the known growth rates of the seagrass species occurring in the area, and their likely resilience to erosion and sedimentation. The thresholds are conservative and are used to indicate possible indirect impacts to seagrass distribution where the sediment erodes more than 20 mm per year, or where there is sedimentation of more than 50 mm per year (Appendix B: Maps 5 to 8). These thresholds were also applied to the mangrove forests, and are considered to be very conservative. In each of these maps, the modelled areas of deposition and erosion are overlain with the predicted areas of deposition and erosion, in each zone, for each scenario in La Nina and El Nino conditions.

4.1.4 Dredge Sand Placement Sensitivity

The dredged material placement zone is constrained by marine plants offshore (seagrass) and onshore (mangrove, including mangrove debris from dead mangroves). Due to the rapid erosion of Dungeness Beach, the available placement zone is changing, and has likely moved landward since the previous mapping of marine plants (frc environmental 2021). The sensitivity of the modelling to changes in the position of the dredge material placement zone was tested, and it was determined that the modelling is not sensitive to these changes (Water Technology 2024b). Further, once placed the dredge spoil is relatively stable and will not spread out to other areas (Water Technology 2024 pers. comm.). To ensure that dredge material is not placed on any marine plants it is recommended that the distribution of marine plants is mapped immediately prior to any works (Water Technology 2024b).

4.1.5 Sea Level Rise Sensitivity.

The model assumes present-day sea level for the 5-year scenarios. However, there was also a sensitivity test for 0.8 m sea level rise. The primary change was along Hinchinbrook Channel mouth and Dungeness Beach, where sediment transport volumes changed in response to changing sea levels and wave climate. Sand bars in the Hinchinbrook Passage Entrance shoaled and adjusted to the rising sea level, while the main channel migrates offshore, reversing the current trend.

Much of the nearshore coast is armoured along Lucinda, apart from Dungeness Beach and The Spit. The southern coast of Hinchinbrook Island becomes more dynamic than in the baseline scenario, indicating a likelihood of ongoing erosion in this area.

Impacts related to coastal flooding due to rising sea levels are likely to be high, and changes to the sediment transport regime are likely to occur.

4.1.6 Summary

Modelling indicates the proposed works will reduce the requirement for dredging, stabilise the shoreline from further erosion, and will promote sediment accretion and deposition along the entire shoreline. These more stable conditions will promote the growth of marine plants, likely resulting in an overall increase in the area of marine plants (frc environmental 2024b). It is also expected that mangrove loss of the Dungeness foreshore may be reduced, with the potential of retention of up to 0.12ha of mangroves per year (frc environmental 2021).

4.2 Seagrass

4.2.1 Literature Review

The intertidal and shallow subtidal waters of Hinchinbrook are ideal habitat for seagrass meadows. The most extensive areas of seagrass meadows in the Wet Tropics region include the Hinchinbrook Island area between Dunk Island and Lucinda (Coles et al. 2007). Seagrass communities in the region are diverse, with thirteen species recognised (Coles et al. 2007).

Seagrass meadows are highly productive habitats and support a diverse range of organisms disproportionate to their area (Maxwell et al. 2019; McPhee 2017). Estuarine seagrass habitats also have higher loadings of micro and macro-algal epiphytes compared with those in other seagrass habitats (Coles et al. 2007). Their high structural complexity provides both protection from predators and enhanced food resources (McPhee 2017). Seagrass habitat may also provide important linkages and refuges between different habitat types (e.g. mangroves and seagrass), and between up and downstream communities. Thus, while a seagrass meadow may not support high abundances of fish or crustaceans at any one time, over a period of time many individuals may use it as they pass through to other areas.

The distribution of seagrass is affected by a combination of factors including light intensity and period, desiccation, nutrient levels, sediment composition, water clarity and wave action. Light availability controls the depth distribution of seagrass, and is mediated through light intensity at the surface, water clarity, depth, and the presence or absence of epiphytes (Abal & Dennison 1996; Dennison 1987; Dennison & Alberte 1985). Other factors, such as currents, prior patterns of distribution, dispersion of propagules, grazing by fish, invertebrates, turtles and dugongs, and episodic events (including cyclones and floods) also play roles in determining the distribution of seagrass.

Episodic land-runoff events are a major source of pulsed sediment and nutrient input resulting in increased turbidity, nutrients and a zone of reduced salinity in nearshore waters (Coles et al. 2007). Salinity fluctuations and scouring make estuary and inlet habitats a seasonally extreme environment for seagrass growth, and seagrass meadows in the region are considered to be at high risk from agricultural runoff (Coles et al. 2007).

The distribution of seagrass in the Hinchinbrook area varies, and little is known about long term changes in its distribution and abundance (Lee Long et al. 1997). For example, aerial surveys in this region in 1992 found little intertidal seagrass habitat where there was seagrass in 1987 (Lee Long et al. 1997), while surveys between 1996 and 2007 found an increase in intertidal seagrass but a decrease in subtidal seagrass in the area (Coles et al. 2007). Cyclone Yasi in 2011 caused damage to seagrass beds in the region, however the meadows are slowly recovering.

Peak flowering times for seagrass species in the Hinchinbrook area vary depending on species. Peak flowering time for *Nanozostera muelleri* is from September to January, for *Halophila ovalis* is from September to April, for *Halophila decipiens* is from September to December, and for *Halodule uninervis* is from September to November (Waycott et al. 2004).

Seagrass species can be broadly categorised into three groups (Figure 8) by their response to disturbances (Kilminster et al. 2015). Seagrass species found in the Hinchinbrook area predominately fall into the 'colonising' and 'opportunistic' groups. Colonising species, such as *Halophila*, are characterised by: short turnover times, reaching sexual maturity quickly, having a high investment in sexual reproduction to produce seeds, building up seed banks, having a low resistance to disturbance, and by recovering rapidly from disturbances (Kilminster et al. 2015). *Halophila ovalis* and *H. decipiens* are typical colonising species, as they have a very small morphology, seed prolifically, and while they commonly die back when conditions are unsuitable (e.g. high turbidity following rainfall), they can also colonise quickly when conditions allow. While *Halophila ovalis* and *H. decipiens* are sensitive to decreases in light availability, these species can withstand significant constant decrease in light (e.g. 80%) for 14 to 28 days without significant impact (Collier et al. 2016).

Opportunistic species have the ability to colonise, produce seeds or seedlings, gain significant persisting biomass and clonality, and rapidly recover from seed or new recruits when necessary (Figure 8; Kilminster et al. 2015). *Nanozostera* and *Halodule* species fall in between colonising and opportunistic with traits from both groups. *Halodule uninervis* grows rapidly and survives well in unstable and depositional environments (Green et al. 2003). *Nanozostera muelleri* is fast growing, short-lived, and can rapidly recover from disturbance when necessary (Kilminster et al. 2015; Maxwell et al. 2019). *Nanozostera muelleri* is also relatively tolerant of turbid water and shading, for example there was no reduction in the cover of *Nanozostera muelleri* growing in Gladstone Harbour when it was completely shaded for three weeks, with light requirements lower in the senescent season than in the growing season (Chartrand et al. 2012).

A study by (Benham et al. 2019) on the impacts of event-based sedimentation on growth in *Nanozostera muelleri* and *Halophila ovalis* found growth rates and shoot density decreased with burial depth, with very low growth when buried by more than 10 mm. However, for both species, there was no significant reduction in rhizome growth rates or shoot density in burial depths of 1 – 5 mm. Further, growth rates for both species were higher when buried by 2.5 mm of sediment, than in plants that were not buried. This was attributed to the sediment anchoring the roots, protecting the plant from physical disturbance, and facilitating the uptake of nutrients.

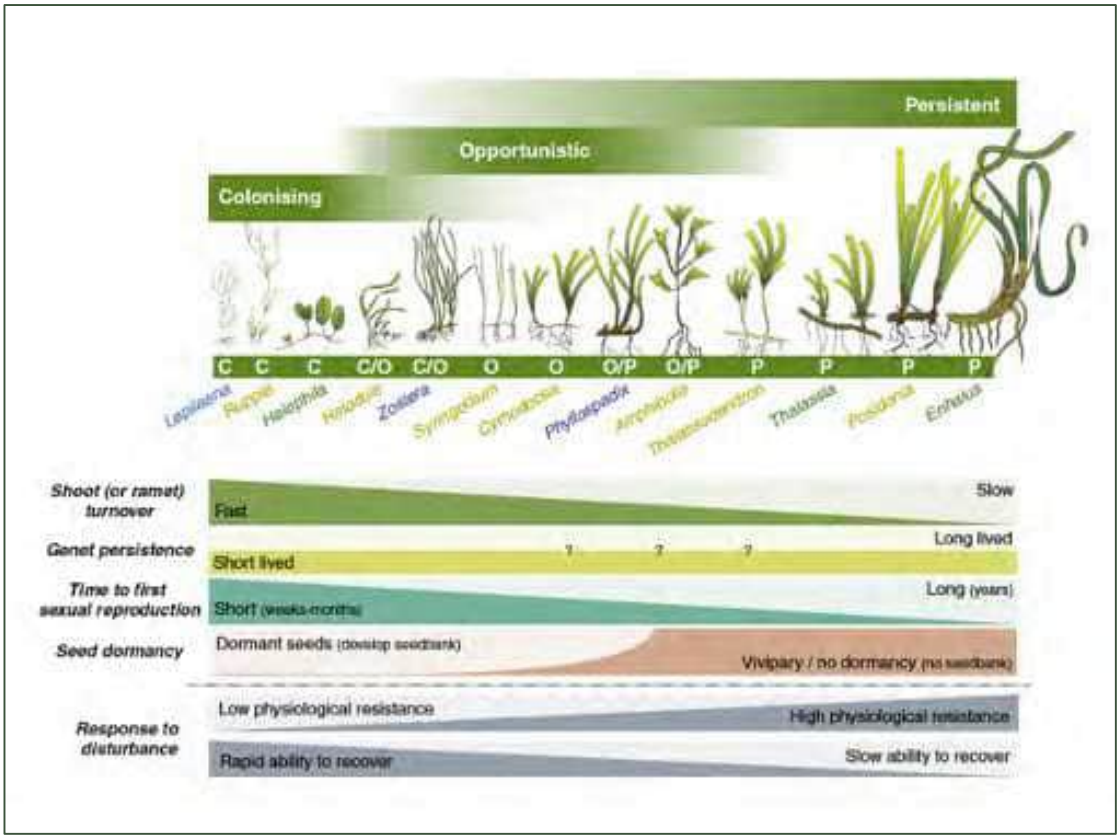

Figure 8: Dominant traits of colonising, opportunistic and persistent seagrasses (Kilminster et al. 2015).

4.2.2 Field Surveys

The lower intertidal area near the proposed Project is a shallow, sand and mud flat. This extends seaward for approximately 380 m before a steep drop off to > 4 m below lowest astronomical tide.

In the most recent seagrass survey (17 March 2021) there was 17.2 ha of seagrass within the investigation area (Figure 9), which was slightly less than the previous survey in March 2019.

There were extensive areas of seagrass to the northwest and southeast of the dredge area. On the western side of the channel, seagrass was mostly sparse (<5% cover) with one small area, each of moderate (5–40% cover) and dense cover (40–80% cover). Immediately adjacent to the Dungeness Foreshore there was moderate cover of seagrass which became sparse further from shore.

The seagrass meadows consisted of mixed beds of four species: *Halodule* sp., *Nanozostera muelleri*, *Halophila ovalis* and *Halophila decipiens*. *Halodule* sp. and *N. muelleri* were the most widespread species followed by *H. ovalis*. *H. decipiens* was only recorded immediately east of the headland.

In 2021, *Halodule uninervis* was the dominant species, covering over 16.8 ha in both monospecific and mixed species communities. Other seagrass species included *Nanozostera muelleri* and *Halophila decipiens*. *Nanozostera muelleri* was present in sparse and moderate patches covering an area of 0.37 ha and 0.64 ha respectively. *Halophila*

decipiens was found in mixed communities with *H. uninervis* and covered an area of approximately 0.378 ha.

Fluctuations in the cover of seagrass cover in this area are expected due to the location of these beds on the mouth of the Dungeness Enterprise Channel, where there are significant fluctuations in turbidity due to rainfall, and significant movement of sediment (Water Technology 2024). Periods of heavy rainfall in the catchment, as experienced during the wet season and prior to both the 2019 and 2021 surveys, cause heavy sediment loads to be deposited in the area, and reduce the amount of light available for seagrass growth, due to the highly turbid flood waters. In the 2021 survey, the seagrass was covered in a layer of sediment from recent floodwater runoff. There was also a substantial amount of seagrass detritus in the area in this survey.

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PO Box 2363
Wellington Point
Q 4160 Australia

P 07 3286 3850
E info@frcenv.com.au
www.frcenv.com.au

Dungeness Enterprise Channel
Proposed Works

Figure 9: Distribution of Marine Plants

SOURCES

frc environmental marine plant surveys 2019 and 2021
Hinchinbrook Shire Council propose works

Document Path: Z:\Utility\Mapping\Mappings\2021\210202_HSC_Env_Consultancy_Services\Workspaces\210202_Marine_plants_21_07_13_BL.mxd

LEGEND

- Maintenance Area
- Works Area
- Breakwater and Seawalls
- Investigation Area 2021
- Beach Nourishment Area
- Estimated HAT
- MHWS
- MSL
- Dense mangroves
- Sparse mangroves
- Bare sand with mangrove debris
- All seagrass 2021
- All seagrass 2019
- Dewatering Locations

N

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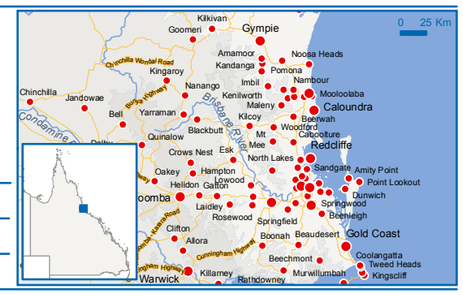


4.3 Mangroves and Saltmarsh

4.3.1 Literature Review

The foreshores of the Dungeness Enterprise Channel are dominated by mangroves (Figure 9). There are over 31 different species of mangroves in the area, with a mixture of wet and dry tropical mangrove species. The area also extends the southern limit of a number of species including *Bruguiera sexangula* (upriver orange mangrove) and *Nypa fruticans* (mangrove palm). The extensive mangrove forests are crucial habitat for fish nurseries, act as natural barriers for shoreline protection and are considered critical for carbon sequestration.

Mangroves in the region are dominated by *Bruguiera gymnorhiza, Rhizophora* and *Ceriops* species (Asbridge et al. 2018). Peak flowering times of these species range over the entire year with *Bruguiera gymnorrhiza* predominantly flowering from April to August, *Ceriops* species from September to March, and *Rhizophora* species from April to May, and August to December (Duke 2006).

Recent tropical cyclones, and in particular cyclone Yasi in 2011, damaged mangrove forests in the region. Rhizophora species were particularly susceptible to damage due to their large prop roots being unable to withstand cyclonic winds, and have been slow to recolonise (Asbridge et al. 2018). Reasons for the lack of recovery are in part associated to changes in hydrological and sedimentary changes (Asbridge et al. 2018).

In recent years, mangrove habitat on the Dungeness spit has been lost due to erosion. Between 1956 and 2017 the spit moved approximately 400 m towards the south-east (Water Technology 2019), resulting in the loss of mangrove forest vegetating this area. Mangrove habitat in this area is still under threat with the long-term erosion rate of the Dungeness spit approximately 6.6 metres per year (Water Technology 2019).

There are also small patches of saltmarsh dominated by succulent species such as *Tecticornia* sp. and *Suaeda australis*. The saltmarsh regional ecosystem (7.1.2a) is listed as ‘of concern’ under the *Vegetation Management Act 1999*, meaning that:

- 10–30% of the pre-clearing extent across the bioregion remains, or
- more than 30% of its pre-clearing extent remains and the remnant extent is less than 10,000 ha

Saltmarsh is predominantly set back from the Dungeness Enterprise Channel, with mangroves between the saltmarsh and the channel.

4.3.2 Field Survey

The distribution of marine plants in the vicinity of the proposed works was mapped in 2019 and 2021, via field surveys and interpretation of aerial photography (frc environmental 2019 and frc environmental 2021). This mapping was supplemented in 2024 by interpretation of aerial photography to determine the current distribution of mangroves (frc environmental 2024a).

The shoreline along the Dungeness foreshore predominately consists of bare sand leading up to a band of dead mangroves and mangrove debris in the intertidal zone that is up to 10 m wide. Landward of this band of dead mangroves there are some sparse mangroves for approximately 10 m, with density increasing landward (Figure 10 and Figure 11).

Figure 10: Mangrove dieback on the Dungeness Foreshore

Figure 11: Mangrove dieback on the Dungeness Foreshore with scattered living mangroves.

Mangrove species in the vicinity of the Project include:

- yellow mangroves (*Ceriops tagal* and *Ceriops decandra)*

- orange mangrove (*Bruguiera gymnorrhiza*)
- grey mangrove (*Avicennia marina* subsp. *eucalyptifolia*), and
- stilted mangroves (*Rhizophora* sp.)

Yellow and orange mangroves dominated mangrove communities along the shoreline in the proposed rock wall area with stilted and sparse grey mangroves also present.

No areas of saltmarsh, samphire flats, forblands or saltpans were observed near the proposed works (frc environmental 2021).

Recent tropical cyclones have damaged the mangroves, and in recent years extensive mangrove habitat on Dungeness Spit was lost due to severe erosion. Shoreline erosion and mangrove loss between 2023 and 2024 is illustrated in Figure 12 and is indicative of ongoing erosion in this area.

Figure 12: Shoreline erosion and mangrove loss along the foreshore

4.4 Rocky and Shellfish Reefs

Historical and archaeological evidence indicates there were abundant reef forming shellfish along the Great Barrier Reef (GBR) coasts and estuaries prior to European settlement. The major reef forming species included the coral rock oyster (*Saccostrea cucullata*) the black-lipped oyster (*Saccostrea echinata*), the Sydney rock oyster (*Saccostrea glomerata*) and the rounded toothed pearl shell (*Isognomon ephippium*). These species may have formed mixed-species reefs possibly also including hairy mussels (*Trichomya hirsuta*) and pearl oysters (*Pinctada* sp.) (Mcleod et al. 2015).

These ecosystems contain unique biological communities and vary in physical nature from consolidated structures with a high vertical profile (reefs) to low profile structures with little differentiation in relief from their surrounds (aggregations or beds) and also include shell-rich muddy bottoms.

Overfishing and destructive fishing practices, water pollution, changing substrates, and water movement as a result of land-use changes, have reduced the extent of these reefs globally, and in the GBR.

A number of extensive shellfish reefs have been recorded in the Hinchinbrook Channel, but none in the vicinity of the Dungeness Enterprise Channel (M. Sheaves pers. comm. 2019).

4.4.1 Field Surveys

There are a number of artificial rocky/shellfish reefs, including:

- a rocky retaining wall along the beach, on the boundary of a leased property that forms an artificial rocky/shellfish reef. The retaining wall was in the intertidal zone and was surrounded by bare sand and isolated rocky debris (Figure 13 and Figure 14)
- a rocky retaining wall near the mouth of the channel (Figure 15), and
- jetty pylons near the mouth of the channel (Figure 16).

The community structure in these areas was dominated by oysters and barnacles with denser cover on the retaining wall in the channel than on the beach.

Figure 13: Aerial view of retaining wall on the Dungeness Foreshore.

Figure 14: Retaining wall on the Dungeness Foreshore.

Figure 15: Retaining wall in Dungeness Enterprise Channel.

Figure 16: Shellfish community covering retaining wall and pylons.

4.5 Unvegetated Soft Sediment

Much of the subtidal area surrounding the Project area is unvegetated soft sediment. Benthic infauna communities in these sediments are likely to be relatively diverse and include eunicid and capitellid polychaetes, brittle stars, tanaid micro-crustaceans, amphipods and callianassid shrimps, as found at the nearby Hinchinbrook Channel (frc environmental 2008). Benthic epifauna is likely to be relatively sparse and species poor. Benthic epifauna is likely to include taxa recorded in nearby areas, such as sea pens (*Pteroeides* sp. and *Virgularia* sp.), sponges, tube anemones (Cerianthidae) ascidians (*Cnemidocarpa* sp.), and sea whips (*Junceella* sp.) (frc environmental 2008).

4.5.1 Field Survey

The proposed dredge area and all of Dungeness Enterprise Channel up to the mouth of the Herbert River is dominated by unvegetated bare sand. A patch of bare sand also extended oceanward from the small tidal creek on the Dungeness Foreshore (Figure 17).

Benthic invertebrate taxa and abundance were sampled in the beach replenishment area and near the boat ramp. Benthic invertebrate communities at these sites were typical of sandy sediment habitats, with low abundance and taxonomic richness (frc environmental 2019a). These communities were generally dominated by marine worms (class Polychaeta), with 8 species recorded. Species of Lingulidae (phylum Brachiopoda), brittle stars (class Ophiuroidea) and bivalves (family Veneridae) were collected in the beach renourishment area, where taxonomic richness was higher than in the dredge area. There were also some crab holes along the Dungeness Foreshore.

Figure 17: Bare sand near a small creek outlet on the Dungeness Foreshore.

5.0 Matters of National Environmental Significance (MNES)

5.1 Protected Matters Search

The Protected Matters Search Tool, the Australian Marine Spatial Information System (AMSIS 2026) and Wildnet were used to assist in determining whether MNES were likely to occur in the area potentially impacted by the proposed works (Appendix A; Appendix B). The search area included a buffer of 5 km from the proposed works.

The following MNES that may potentially be impacted by the proposed works were listed in the searches:

- Great Barrier Reef Marine Park
- World Heritage Areas: Great Barrier Reef
- National Heritage Places: Great Barrier Reef
- threatened ecological communities
- threatened species
- migratory species (protected under international agreements).

While the Wet Tropics Queensland WHA and NHP were also listed in the search, they are distant from the proposed works and will not be impacted by them.

5.2 Great Barrier Reef Marine Park

The seaward end of the proposed dredging and the breakwater is in the Great Barrier Reef Marine Park (GBRMP) in a Habitat Protection Zone. The replenishment area is not in the Marine Park (Figure 18).

Habitat Protection Zones provide for the conservation of areas of the Great Barrier Reef Marine Park by protecting and managing sensitive habitats and ensuring they are generally free from potentially damaging activities.

5.2.1 Ecological Values

The key values of the GBRMP are defined in Table 1. The ecological values of the GBRMP that may potentially be impacted by the proposed works comprise:

- **Biodiversity of GBR habitats** including beaches and coastlines, and mangrove forests.
- **Biodiversity of species** including, macroalgae, benthic macroalgae, other invertebrates, plankton and microbes, bony fish, sharks and rays, marine turtles, estuarine crocodiles, shorebirds, dolphins, and dugongs.
- **Key environmental processes** including nutrient cycling, microbial processes, particle feeding, primary production, herbivory, predation, symbiosis, competition, and recruitment.

Table 1: Key Values of the GBRMP (GBRMPA 2021b)

Key value	Attributes	Ecological attributes in the Study Area that are in the GBRMP
Biodiversity – GBR habitats	Islands, beaches and coastlines, mangrove forests, seagrass meadows, coral reefs (<30 m), deeper reefs (>30 m), lagoon floor, shoals, *Halimeda* banks, continental slope, and open waters	Seagrass meadows
Biodiversity – terrestrial habitats that support the GBR	Saltmarshes, freshwater wetlands, forested floodplain, heath and shrublands, grass and sedgelands, woodlands, forests, rainforests, and connecting water bodies	These habitats are not in the part of the Study Area that is in the GBRMP.
Biodiversity – species	Mangroves, seagrasses, macroalgae, benthic microalgae, corals, other invertebrates, plankton and microbes, bony fish, sharks and rays, sea snakes, marine turtles, estuarine crocodiles, seabirds, shorebirds, whales, dolphins, and dugongs	Seagrass, macroalgae, benthic microalgae, other invertebrates, plankton and microbes, bony fish, sharks and rays, sea snakes, marine turtles, estuarine crocodiles, shorebirds, whales (rarely), dolphins, and dugongs.
Geomorphological features	Coral reefs, islands and shorelines, channels and canyons, river deltas, *Halimeda* banks, seagrass meadows	Seagrass meadows.
Aboriginal and Torres Strait Islander heritage	• cultural practices, observances, customs and lore • sacred sites, sites of particular significance, places important for cultural tradition • stories, songlines, totems and languages • indigenous structures, technology, tools and archaeology	Aboriginal and Torres Strait Islander heritage as it relates to the Project is not addressed in this report.
Historic heritage	Places of historic significance: historic shipwrecks World War II features and sites light stations research stations, expedition sites iconic sites	Historic heritage as it relates to the Project is not addressed in this report.
Community benefits of the environment	Income, employment, understanding, appreciation, enjoyment, access to Reef resources, personal connection, health benefits, aesthetics	Community benefits of the environment as it relates to the Project is not addressed in this report.
Key environmental processes	Waves, currents and tides, wind, sedimentation, sea level, sea temperature, light, nutrient cycling, ocean acidity, freshwater inflow and salinity, microbial processes, particle feeding, primary production, herbivory, predation, symbiosis, competition, connectivity, recruitment, and reef building	Waves, currents and tides, wind, sedimentation, sea level, sea temperature, light, nutrient cycling, ocean acidity, freshwater inflow and salinity, microbial processes, particle feeding, primary production, herbivory, predation, symbiosis, competition, connectivity, recruitment, and reef building.

5.2.2 Pressures

Climate change is the single biggest threat to the GBR, and to the key ecological values of the GBRMP (State of Queensland 2018). Climate change is predicted to increase the intensity of rainfall, floods and tropical cyclones which can severely impact marine water quality and ecosystems. An increase in the intensity of extreme weather events will cause more large-scale flood events, which will contribute significant volumes of freshwater to the marine environment, bringing additional sediment, nutrients and pesticides to the Reef. In addition, increasing sea temperatures can make water pollutants more toxic (State of Queensland 2018).

Climate change will also affect the GBRMP through rising sea levels, ocean acidification, and warmer waters. Warmer water causes corals to bleach and impacts the community composition of fauna and flora (State of Queensland 2018). Frequent and / or severe bleaching can cause coral death of less resilient corals. While some corals may recolonise, severe and frequent events can prevent the recovery of slower growing and less resilient corals, leading to changes in community composition.

Poor water quality including sediments, nutrients and pesticides flowing into the GBR from activities such as coastal and urban developments are also a major threat. Excessive sediments can increase turbidity and reduce water clarity. As photosynthetic organisms, corals and seagrass are highly sensitive to changes in water clarity, with reduced clarity levels leading to reduced coral biodiversity and decreasing the depth limit and changing the community composition, and stability of seagrass meadows. Fine sediments are of most concern for areas with shallow seagrass meadows and inshore coral reefs as they are lighter, remain suspended for longer, travel further and are resuspended with winds and tides. Excessive amounts of nutrients can upset the natural balance of the reef systems, and pesticides can affect reef organisms such as seagrass by inhibiting photosynthesis and are likely to impact coral fertility and reproduction (State of Queensland 2018). Catchment modelling indicates moderate progress towards meeting nutrient reduction targets and suspended sediment reduction targets (DES 2022).

Changes in freshwater inflow can have significant impacts on coastal habitats by changing the quantity, water quality, and the timing and volume of seasonal fluctuations to the receiving environment (Olsen et al. 2018). Freshwater inflow changes to coastal environments can result in die-off of flora and fauna adapted to saline conditions, disrupt migration cues, change the effective size of the estuary, change sediment loads, or natural nutrient input that in turn may affect productivity (Olsen et al. 2018).

Other pressures to the GBRMP include impacts from agriculture, recreation and fishing, crown-of-thorns starfish (which may be a result of increased nutrients), and physical disturbance (e.g. from boat anchoring) and marine debris (GBRMPA 2021b).

Good water quality increases the resilience of the Reef to pressures from climate change and reduces the Reef's recovery time following catastrophic events (State of Queensland 2018). Consequently, maintaining and improving water quality is integral to maintaining the values of the GBRMP.

Climate change and water quality are the major pressures on the key ecological values of the GBRMP in the Study Area.

5.3 World Heritage Properties: Great Barrier Reef World Heritage Area

The Great Barrier Reef World Heritage Area (GBRWHA) (Figure 18) covers approximately 348 000 km^2. As one of Australia's first World Heritage Areas, it was inscribed on the World Heritage List in recognition of its outstanding natural universal values. Most of the proposed

dredge channel and most of the breakwater are within the GBRWHA, the replenishment area is not within the GBRWHA.

The EPBC Act provides an overarching mechanism for protecting the World Heritage values from inappropriate development, including actions taken inside or outside the area (UNESCO 2021).

The primary purpose of management of natural heritage and cultural heritage of a declared World Heritage property must be, in accordance with Australia's obligations under the World Heritage Convention (2020), to identify, protect, conserve, present, transmit to future generations and, if appropriate, rehabilitate the World Heritage values of the property.

The Great Barrier Reef was inscribed on the World Heritage List in 1981 as it met all four World Heritage Criteria in place at the time of listing, as well as having integrity (DoE 2013). These four criteria were that it is:

- an outstanding example representing the major stages in the earth's evolutionary history
- an outstanding example representing significant ongoing ecological and biological processes
- an example of superlative natural phenomena, and it
- contains important and significant habitats for in situ conservation of biological diversity (DCCEEW 2021a).

While the definition of the natural criteria has changed, the GBRWHA still meets all four natural criteria (**Table 2**).

The Statement of Outstanding Universal Value is the official statement adopted by the World Heritage Committee. The primary purpose of this document is to provide the basis for future protection and management of the property by indicating the types of attributes that need to be protected to maintain its Outstanding Universal Value.

Table 2: Statement of Outstanding Universal Value for the GBRWHA against current criteria (Lucas et al. 1997).

World Heritage Criteria	Description
vii) contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance	The GBR is of superlative natural beauty above and below the water and provides some of the most spectacular scenery on earth. It is one of a few living structures visible from space, appearing as a complex string of reefal structures along Australia's northeast coast. From the air, the vast mosaic patterns of reefs, islands and coral cays produce an unparalleled aerial panorama of seascapes comprising diverse shapes and sizes. The Whitsunday Islands provide a magnificent vista of green vegetated islands and spectacular sandy beaches spread over azure waters. This contrasts with the vast mangrove forests in Hinchinbrook Channel, and the rugged vegetated mountains and lush rainforest gullies that are periodically cloud-covered on Hinchinbrook Island. On many of the cays there are spectacular and globally important breeding colonies of seabirds and marine turtles, and Raine Island is the world's largest green turtle breeding area. On some continental islands, large aggregations of over-wintering butterflies periodically occur. Beneath the ocean surface, there is an abundance and diversity of shapes, sizes and colours; for example, spectacular coral assemblages of hard and soft corals, and thousands of species of reef fish provide a myriad of brilliant colours, shapes and sizes. The internationally renowned Cod Hole near Lizard Island is one of many significant tourist attractions. Other superlative natural phenomena include the annual coral spawning, migrating whales, nesting turtles, and significant spawning aggregations of many fish species.

World Heritage Criteria	Description
viii) be outstanding examples representing major stages of earth's history, including the record of life, significant on-going geological processes in the development of landforms, or significant geomorphic or physiographic features	The GBR, extending 2,000 km along Queensland's coast, is a globally outstanding example of an ecosystem that has evolved over millennia. The area has been exposed and flooded by at least four glacial and interglacial cycles, and over the past 15,000 years reefs have grown on the continental shelf. During glacial periods, sea levels dropped, exposing the reefs as flat-topped hills of eroded limestone. Large rivers meandered between these hills and the coastline extended further east. During interglacial periods, rising sea levels caused the formation of continental islands, coral cays and new phases of coral growth. This environmental history can be seen in cores of old massive corals. Today the GBR forms the world's largest coral reef ecosystem, ranging from inshore fringing reefs to mid-shelf reefs, and exposed outer reefs, including examples of all stages of reef development. The processes of geological and geomorphological evolution are well represented, linking continental islands, coral cays and reefs. The varied seascapes and landscapes that occur today have been moulded by changing climates and sea levels, and the erosive power of wind and water, over long time periods. One-third of the GBR lies beyond the seaward edge of the shallower reefs; this area comprises continental slope and deep oceanic waters and abyssal plains.
ix) be outstanding examples representing significant on-going ecological and biological processes in the evolution and development of terrestrial, fresh water, coastal and marine ecosystems and communities of plants and animals	The globally significant diversity of reef and island morphologies reflects ongoing geomorphic, oceanographic and environmental processes. The complex cross-shelf, longshore and vertical connectivity is influenced by dynamic oceanic currents and ongoing ecological processes such as upwellings, larval dispersal and migration. Ongoing erosion and accretion of coral reefs, sand banks and coral cays combine with similar processes along the coast and around continental islands. Extensive beds of Halimeda algae represent active calcification and accretion over thousands of years. Biologically the unique diversity of the GBR reflects the maturity of an ecosystem that has evolved over millennia; evidence exists for the evolution of hard corals and other fauna. Globally significant marine faunal groups include over 4,000 species of molluscs, over 1,500 species of fish, plus a great diversity of sponges, anemones, marine worms, crustaceans, and many others. The establishment of vegetation on the cays and continental islands exemplifies the important role of birds, such as the Pied Imperial Pigeon, in processes such as seed dispersal and plant colonisation. Human interaction with the natural environment is illustrated by strong ongoing links between Aboriginal and Torres Strait Islander peoples and their sea-country and includes numerous shell deposits (middens) and fish traps, plus the application of story places and marine totems.
x) to contain the most important and significant natural habitats for in-situ conservation of biological diversity, including those containing threatened species of Outstanding Universal Value from the point of view of science or conservation	The enormous size and diversity of the GBR means it is one of the richest and most complex natural ecosystems on earth, and one of the most significant for biodiversity conservation. The amazing diversity supports tens of thousands of marine and terrestrial species, many of which are of global conservation significance. As the world's most complex expanse of coral reefs, the reefs contain some 400 species of corals in 60 genera. There are also large ecologically important inter-reefal areas. The shallower marine areas support half the world's diversity of mangroves and many seagrass species. The waters also provide major feeding grounds for one of the world's largest populations of the threatened dugong. At least 30 species of whales and dolphins occur here, and it is a significant area for humpback whale calving. Six of the world's seven species of marine turtle occur in the GBR. As well as the world's largest green turtle breeding site at Raine Island, the GBR also includes many regionally important marine turtle rookeries. Some 242 species of birds have been recorded in the GBR. Twenty-two seabird species breed on cays and some continental islands, and some of these breeding sites are globally significant; other seabird species also use the area. The continental islands support thousands of plant species, while the coral cays also have their own distinct flora and fauna.

The world heritage values and examples of attributes that the Study Area contributes to are summarised in Table 3 (based on attributes listed in DoE 2013; Lucas et al. 1997), which predominantly comprise:

- Habitats for threatened species
- Many species of macroalgae, crustaceans, polychaetes, molluscs, fish, seabirds, mammal and reptiles.

Table 3: Examples of attributes of Outstanding Universal Values that the Study Area contributes to.

World Heritage Criteria	Examples of Attributes that the Study Area Contributes to
• vii) contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance	• near the vast mangrove forests of the Hinchinbrook Channel and Hinchinbrook Island • significant spawning aggregations of many fish species
• viii) be outstanding examples representing major stages of earth's history, including the record of life, significant on-going geological processes in the development of landforms, or significant geomorphic or physiographic features	• unique and varied seascapes and landscapes • ongoing erosion and accretion of sand banks • diversity of marine fauna
• ix) be outstanding examples representing significant on-going ecological and biological processes in the evolution and development of terrestrial, fresh water, coastal and marine ecosystems and communities of plants and animals	• longshore and vertical connectivity • other fauna, including microfauna • important role of birds in processes such as seed dispersal and plant colonisation.
• x) to contain the most important and significant natural habitats for in-situ conservation of biological diversity, including those containing threatened species of Outstanding Universal Value from the point of view of science or conservation	• diversity supporting marine and terrestrial species (global conservation significance) • seagrass • near extensive mangrove forests • dugong • species of dolphins • marine turtle • diversity of birds

5.3.1 Pressures

Climate change and water quality are the major pressures on the key ecological values of the GBRWHA in the Study Area.

5.4 Great Barrier Reef National Heritage Place

National Heritage places are places with outstanding natural, Indigenous, or historic heritage value to the nation (DCCEEW 2021a), which have been listed on the National Heritage List under the provisions of the EPBC Act and EPBC regulations. In May 2007, the GBRWHA was placed on the National Heritage list (DAWE 2022).

The objective in managing National Heritage places is to identify, protect, conserve, present and transmit, to all generations, their National Heritage values.

The official National Heritage Values of this National Heritage Place are (DCCEEW 2021a):

- Criterion A: Events Processes, as this place meets World Heritage criteria vii, viii, ix and x
- Criterion B: Rarity, as this place meets World Heritage criteria x
- Criterion C: Research, as this place meets World Heritage criteria viii, ix and x
- Criterion D: Principal characteristics of a class of places, as this place meets World Heritage criteria viii, ix and x, and
- Criterion E: Aesthetic characteristics, as this place meets World Heritage criteria vii.

The Great Barrier Reef National Heritage Place (GBRNHP) (Figure 18) has the same boundary as the World Heritage Area, and consequently most of the proposed dredge channel and most of the breakwater are within the GBRNHP, the replenishment area is not within the GBRNHP.

5.4.1 Pressures

Climate change and water quality are the major pressures on the key ecological values of the GBRNHP in the Study Area.

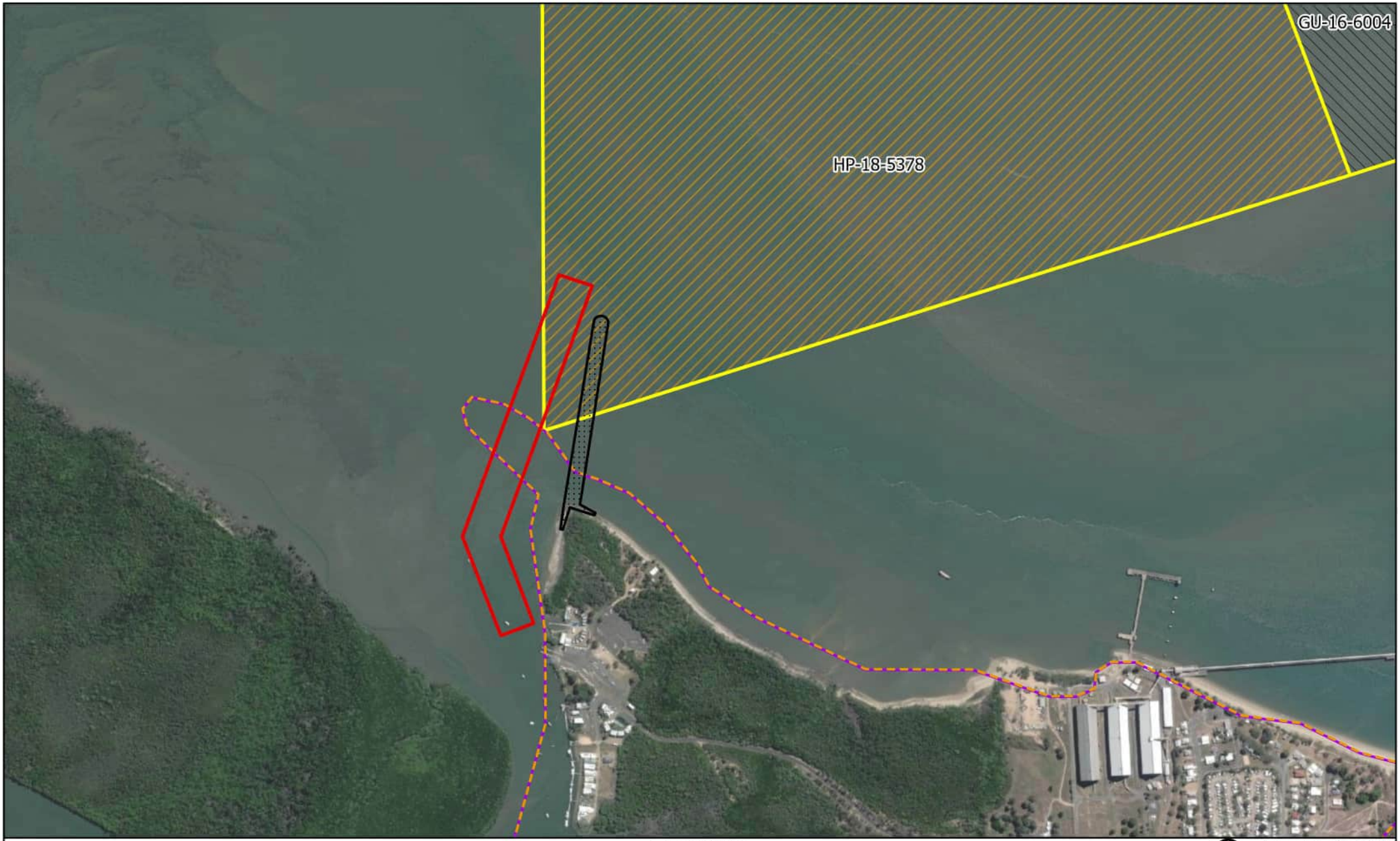


Figure 18: GBRMP, GBRWHA & GBRNHP boundaries and zones

5.5 Threatened Ecological Communities

Three threatened ecological communities were listed in the PMST search as within 5 km of the proposed works.

- Broad leaf tea-tree (*Melaleuca viridiflora*) woodlands in high rainfall coastal north Queensland (In buffer area only)
- Littoral Rainforest and Coastal Vine Thickets of Eastern Australia
- Lowland tropical rainforest of the Wet Tropics

Queensland Regional Ecosystem (RE) mapping indicates none of these communities are in the area likely to be impacted by the proposed works. Mapped RE in the foreshore in the vicinity of the proposed works consist of RE 7.1.1 (mangroves), with a small area of RE 7.2.3a (*Corymbia* and *Melaleuca dealbata* forest)

5.6 Threatened and Migratory Aquatic Species

The likelihood of threatened and migratory aquatic species being present in the area that may be impacted by the proposed works was assessed using the criteria in Figure 21).

Table 4, and is presented in Table 5. The area that may be impacted by the proposed works (the Study Area) is based on the potential impacts in Section 6.0, and varies with the nature of the impact. Potential impacts to species that had a very low or low likelihood of occurrence in the Study Area were not assessed further.

The only Biologically Important Areas (BIA) of regionally significant marine non-avian species in the area potentially impacted by the proposed works are BIA for humpback whale (reproduction), Indo Pacific / Australian humpback dolphin (reproduction), Indo-Pacific / spotted bottle nose dolphin (reproduction) (Figure 19 to Figure 21).

Table 4: Criteria used to assess the likelihood of occurrence of species.

Likelihood of Occurrence	Definition
Very low	The species has not been recorded in the Study Area, and is considered to have a very low or no likelihood of occurring in the Study Area.
Low	The species is considered to have a low likelihood of occurring in the Study Area, or occurrence is infrequent and transient. Existing database records are considered historic, invalid or based on predictive habitat modelling. The habitat does not exist for the species, or the species is considered locally extinct. Despite a low likelihood based on the above criteria, the species cannot be totally ruled out of occurring within the Study Area.
Moderate	There is habitat for the species; however, it is either marginal or not particularly abundant. The species is known from the wider region and could potentially occur in the Study Area.
High	There is core habitat for the species within the Study Area, and the species is highly likely to occur within or in the immediate vicinity of the Study Area sometimes to frequently.
Very high	The species is known, or is almost certain, to occur within the Study Area frequently.

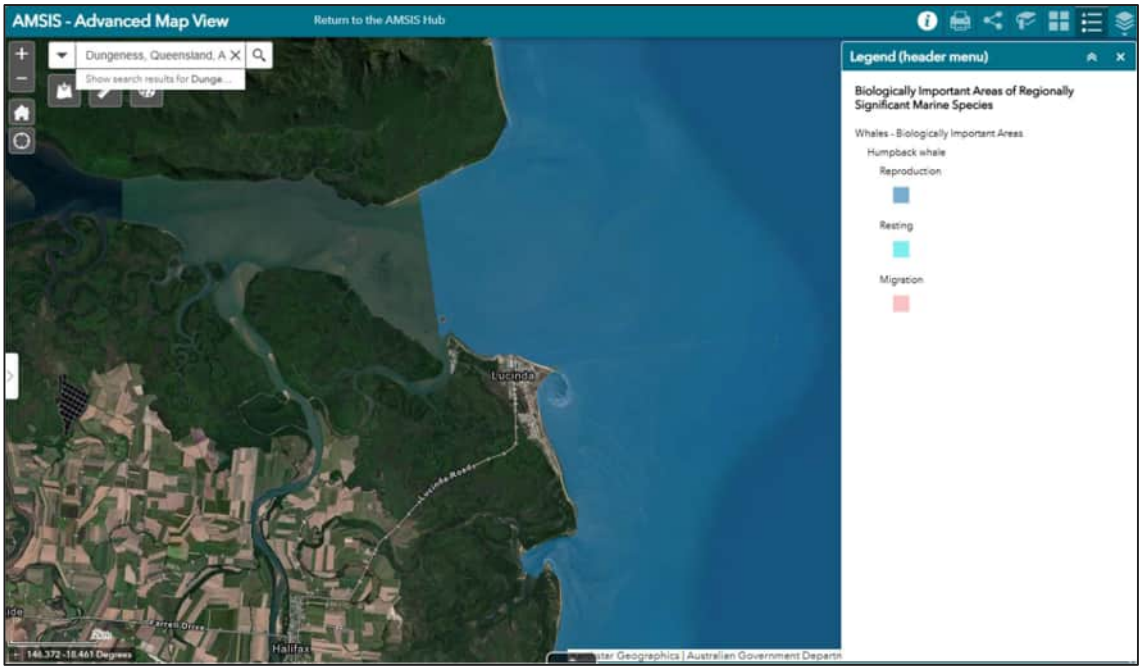


Figure 19: BIA for humpback whale (reproduction) in the vicinity of the proposed works

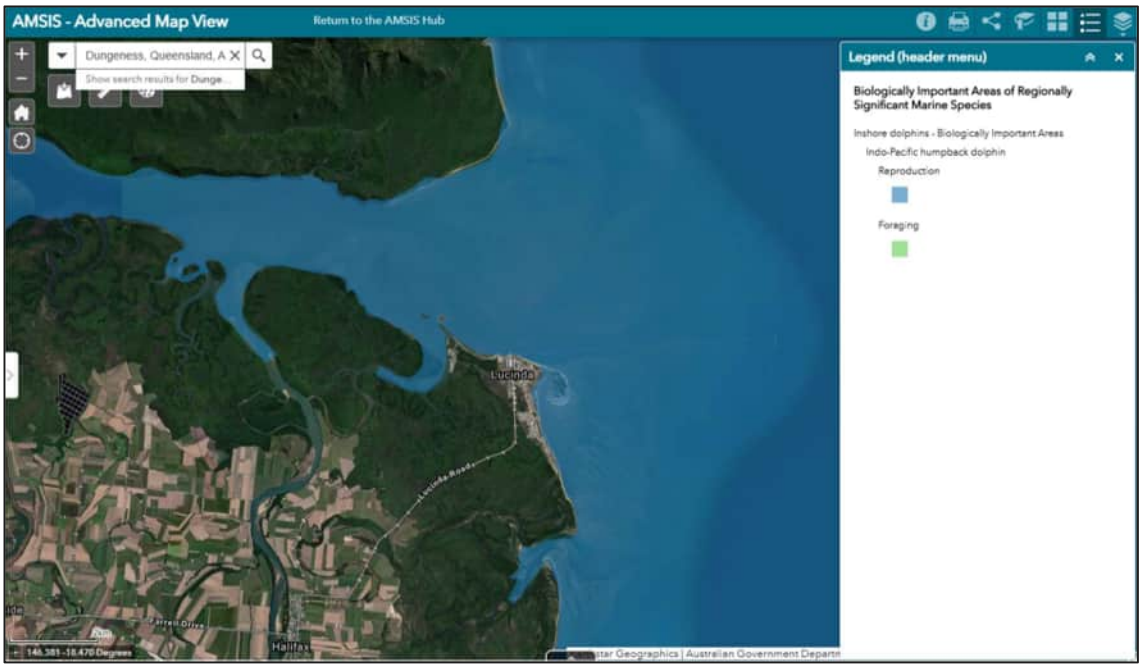


Figure 20: BIA for Indo-Pacific / Australian humpback dolphin (reproduction) in the vicinity of the proposed works.

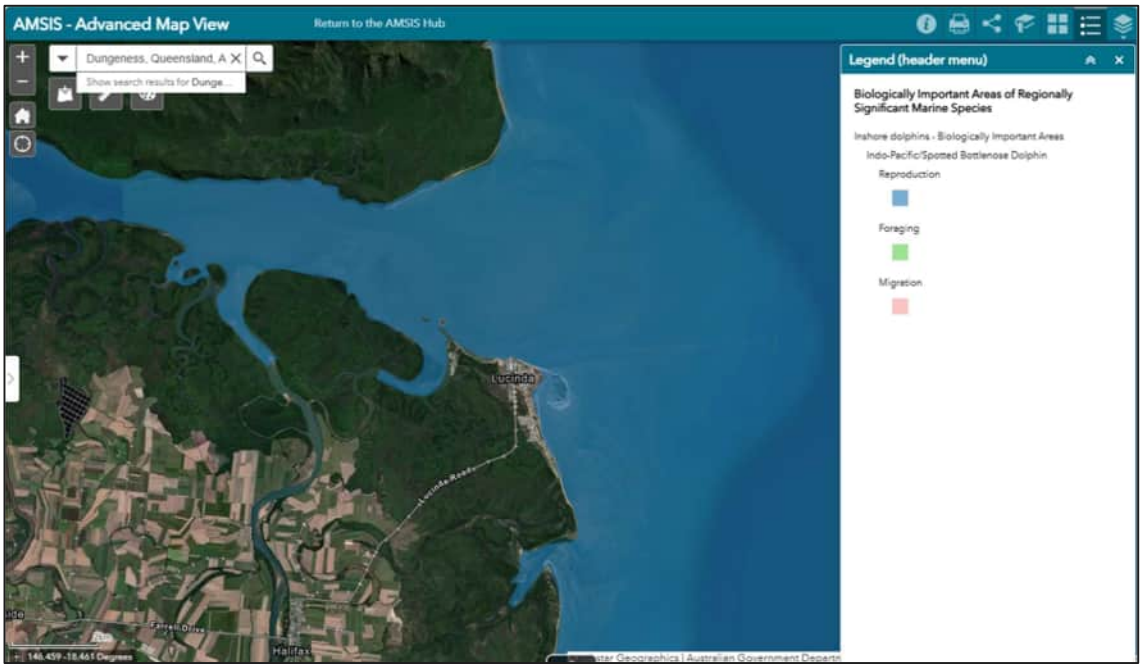


Figure 21: BIA for Indo-Pacific spotted bottle nose dolphin (reproduction) in the vicinity of the proposed works.

Table 5: Aquatic threatened and migratory species that are listed within 5 km of the Study Area, and their likelihood of occurrence in the area potentially impacted by the works.

Species	Common Name	EPBC Act Status	Likelihood of Occurrence in Study Area	Comments
Balaenoptera musculus	blue whale	E, M	Very low	Blue whales, including calves, may migrate along the coast near the Study Area; however, this area is not considered to be core habitat for this species and would not be considered to support important populations or offer habitat critical to the survival of this species.
Balaenoptera edeni	Bryde's whale	M	Very low	Bryde's whales occur in both temperate and tropical waters, oceanic and inshore, bounded by latitudes 40°N and 40°S (Bannister et al. 1996), mostly swimming alone or in pairs. The Study Area does not provide significant or key habitat for this species.
Balaenoptera omurai	Omura's whale	M	Very low	Omura's whale is a recently described species with a global distribution covering the Pacific, Indian and Atlantic waters, considered to predominantly reside in neritic and coastal waters (Cerchio et al. 2019). Scientific understanding of the species is low. The study area does not provide significant or key habitat for this species.
Megaptera novaeangliae	humpback whale	M	Moderate	Humpback whales, including calves, have been observed migrating along the coast, and the area offshore of Dungeness beach is a listed Biologically Important Area for breeding and calving..
Dugong dugon	dugong	M	Very high	Dugongs feed almost exclusively on seagrass, particularly *H. uninervis, H. ovalis* and *H. spinulosa*, and principally inhabit seagrass meadows (Lanyon & Morris 1997; Preen 1992; Preen et al. 1995). Their dependence on seagrass for food generally limits them to waters within 20 km of the coast, although individuals have been sighted further from the coast during aerial surveys (e.g. Marsh & Lawler 2002) and they have been observed feeding in deep-water (water depth of more than 20 m) seagrass (Lee Long et al. 1997). Dugongs prefer shallow and protected areas with seagrass meadows, however they can be highly migratory due to their search for suitable seagrass or warmer waters (Marsh et al. 2002) and are known to travel several hundreds of kilometres. Dugongs have evolved to cope with the

Species	Common Name	EPBC Act Status	Likelihood of Occurrence in Study Area	Comments
				inherently unpredictable and patchy nature of seagrass meadows by moving to alternative areas known to support seagrass in the past. Dugong may feed on the seagrass flats offshore of the mouth of the Dungeness Enterprise Channel, although this is not likely to provide a highly significant habitat for them, in that there are other areas of seagrass in the area. Dugongs have been recorded in the area.
Orcaella heinsohni[1]	Australian snubfin dolphin	V, M	Moderate	The Australian snubfin dolphin appears to be the rarest dolphin in Queensland (Parra et al. 2002). Coastal, estuarine and riverine areas are important for Orcaella species in other regions; however, only marine populations are evident in Australia. They appear to inhabit shallow waters <15 m deep within 10 km of the coast and 20 km of a river mouth. Their association with near-shore and estuarine tropical waters is likely related to the productivity of these waters and their diet consisting of a wide variety of coastal, estuarine and near-shore fishes (Parra et al. 2006). Records of the species in the area are over 25 km from the site, and all are pre the year 2000 (Atlas of Living Australia 2026). Australian snub fin dolphin may occasionally use the area in the vicinity of the proposed work; however, it is unlikely to provide highly significant habitat for them.
Sousa sahulensis as Sousa chinensis	Australian humpback dolphin	V, M	High	The Australian humpback dolphin is found in the northern waters of Australia, extending from Exmouth Gulf in Western Australia to the Queensland – New South Wales border on the east coast (Corkeron et al. 1997; DCCEEW 2024a). The distribution of Australian humpback dolphins appears to be continuous along the east coast of Queensland (Corkeron et al. 1997). The Australian humpback dolphin usually inhabits shallow coastal waters in association with rivers or creeks, estuaries, enclosed bays, and coastal lagoons (Hale et al. 1998; Parra 2006). Surveys conducted in the far northern section of the GBRMP showed that most sightings of Australian

[1] Previously considered to be, and listed under the EPBC Act as *Orcaella brevirostris* (Irrawaddy dolphin); the Australian snubfin dolphin was formally recognised as a separate species in 2005

Species	Common Name	EPBC Act Status	Likelihood of Occurrence in Study Area	Comments
				humpback dolphins occurred in waters less than 5 km from land, 20 km from the nearest river mouth, and in waters less than 15 m deep (Parra et al. 2006). Moreton Bay is the southern-most reach of this species range (DRA 2020).
Orcinus orca	killer whale	M	Very low	Killer whales occur in all oceans and contiguous seas from equatorial regions to polar pack ice zones and may even ascend rivers. They are most numerous in coastal waters and cooler regions where productivity is high (Dalhlheim & Heyning 1999), and more commonly found around seal colonies.
Xeromys myoides	water mouse	V	Moderate	There are credible records of this species from the Hinchinbrook Channel. This species inhabits intertidal and supratidal areas, and subcoastal brackish to freshwater wetlands and flood plains, including mangrove areas (DCCEEW 2023)
Reptiles				
Caretta caretta	loggerhead turtle	E, M	High	Known from the area. Loggerhead turtles are primarily found around coral and rocky reefs, seagrass beds and muddy bays throughout eastern, northern, and western Australia (DCCEEW 2023a; Limpus 1995; Limpus et al. 1992; Prince 1994). Mon Repos, in the Wide Bay Burnett Region of QLD, has the most significant loggerhead turtle nesting population in the South Pacific region (Limpus 2008a).
Chelonia mydas	green turtle	V, M	High	While the PMST indicates that breeding occurs in the area, habitat critical to the survival of this species is defined as major nesting areas with Mon Repos being the closest, approximately 1,000 km to the south of the Study Area (DCCEEW 2024b). Immature green turtles are carnivorous (Brand-Gardner et al. 1999), while adults are generally herbivorous, feeding mostly on algae and seagrass. Adults will occasionally eat other items such as mangrove leaves and propagules, sponges, and jellyfish (DCCEEW 2024d).
Dermochelys coriacea	leatherback turtle	E, M	Low	While the PMST indicates that breeding may occur in the area, There are no large leatherback turtle rookeries in Australia, however, leatherback turtles occasionally nest within the GBR, with nesting recorded at Wreck Rock and adjacent beaches near Bundaberg (one to three nests per annum)

Species	Common Name	EPBC Act Status	Likelihood of Occurrence in Study Area	Comments
				(DCCEEW 2024d). As the most pelagic of all marine turtles, the leatherback turtle spends most of its time in the open ocean, coming close to shore mainly during the nesting season (Benson et al. 2007; Lutz & Musick 1996).
Eretmochelys imbricata	hawksbill turtle	V, M	High	Known from the area. There are no known populations or key nesting habitats in the Wet Tropics region for hawkbill turtles. Hawksbill turtles are heavily reliant on coral reef and rocky habitats, where they forage mainly on sponges but also seagrass, algae, squid, gastropods, sea cucumber, soft corals and jellyfish (DCCEEW 2021b).
Lepidochelys olivacea	olive ridley turtle	E, M	Moderate	The PMST indicates that breeding likely to occur in the area. In Northern Australia nesting occurs all year round, although most nesting occurs during the dry season from April to June. Hatchlings emerge from the nests about two months after laying. In Australia, this species is found in soft-bottomed, shallow, protected waters from the Joseph Bonaparte Gulf in Western Australia to southern Queensland (DCCEEW 2024c). They typically inhabit shallow soft-bottomed habitats of protected waters with some inshore records (22–55 m deep), however individuals can occasionally be found in open waters (Limpus 2008b). The multiple habitats and geographical localities used by this species vary throughout its lifecycle. Little is known about the olive ridley turtle in Australia, mainly because of the remoteness of their nesting beaches in northern Australia (Whiting et al. 2005). The olive ridley turtle is carnivorous, feeding mostly on shellfish and small crabs.
Natator depressus	flatback turtle	V, M	Moderate	The PMST indicates that breeding is known in the area however habitat critical to the survival of this species is defined as major nesting areas with Avoid Island being the closest, over 500 km to the south of the Study Area (DCCEEW 2024d). The flatback turtles tends to forage in shallow continental shelf waters with soft substrates, feeding on a variety of soft bodied animals, including soft corals, sea pens, sea creatures and jellyfish (Limpus 2007).

Species	Common Name	EPBC Act Status	Likelihood of Occurrence in Study Area	Comments
Crocodylus porosus	saltwater crocodile	M	High	This species is known from the area. The species occurs in tidal and non-tidal rivers and creeks, and move along the coast between rivers, including offshore island. Breeding and recruitment are in the wet season in freshwater swamps in rivers with significant freshwater input. Salt-water crocodiles are territorial and typically feed within their home range. The primary food source of small salt-water crocodiles is crustaceans and insects, whereas larger crocodiles feed less often and on bigger prey including mud crabs, birds, sea turtles, fish, flying foxes, dingoes, cats, dogs, pigs, buffalo, cattle and horses. They are also known to be cannibalistic (DF 2012)
Sharks and Rays				
Carcharodon carcharias	white shark	V, M	Low	Great white sharks occur in coastal, shelf, and continental slope waters around Australia from the Montebello Islands in north-western Western Australia, south around the coast to at least as far north as central Queensland (CSIRO 2021). Great white sharks eat a variety of prey including fish, sharks and rays, marine mammals, squid, crustaceans and seabirds (DCCEEW 2024d). Feeding aggregations can occur in areas around food sources such as sea lion and fur seal colonies (DCCEEW 2024d). Great white sharks may pass through the near-shore waters adjacent to the Study Area. While this species has been recorded near the Study Area, it is infrequent and transient. The Study Area does not provide critical habitat for its survival, and there is not an important population of this species here.
Carcharhinus longimanus	oceanic whitetip shark	M	Very low	Oceanic whitetip sharks are found in pelagic waters throughout the topics and subtropics. Within Australian waters, it is found in from Cape Leeuwin (Western Australia) through parts of the Northern Territory, down the east coast of Queensland and New South Wales to Sydney (Last and Stevens 2009). Any occurrence in the vicinity of the Proposed works would be infrequent and transient.
Carcharias taurus	grey nurse shark	M	Low	Grey nurse sharks tend to be found in groups at specific locations (Otway et al., 2003). Grey nurse sharks are often observed aggregating around inshore rocky reefs or islands. At these locations they are typically found

Species	Common Name	EPBC Act Status	Likelihood of Occurrence in Study Area	Comments
				near the sea bed (at depths of 10–40 m) in deep sandy or gravel filled gutters, or in rocky caves (Last and Stevens 2009). The east coast population of grey nurse shark is distributed along coastal waters from Fraser Island in the north to Montague Island in the south. Grey nurse sharks individuals are typically found in groups of 5 or more at or migrating between key aggregation sites. As there are no key aggregation sites within the vicinity of the Study Area and the closest ALA record is more than 8000 km there is a very low likelihood of grey nurse sharks being present in the Study Area. Any occurrence in the vicinity of the Proposed works would be infrequent and transient.
Pristis pristis	freshwater sawfish	E, M	Low	The majority of records for freshwater sawfish in Australia are of juvenile and sub-adult animals from rivers (DoE 2015). They have been recorded in numerous drainage systems in northern Australia, predominantly from the Fitzroy River in Western Australia to the eastern side of Cape York Peninsula (DoE 2015). In Queensland, there are few historical records south of Cape York Peninsula (Science in Public 2022), with a single observation record in 2017 west of Cooktown. The historical range in Queensland has recently been extended down to Brisbane with the discovery of two records from 1938 and the 1950-60s (Hudgins et al. 2020). Although the Wet Tropics region is within the freshwater sawfish's distribution area, the species has not been reported in the Study Area. There is not an important population of the species in the vicinity of the Study Area..
Pristis zijsron	green sawfish	V, M	Moderate	The PMST indicates this species may breed in the area. The green sawfish inhabits inshore marine waters, estuaries and river mouths with both sandy and muddy bottom habitats (Allen 1997; Peverell et al. 2004; Stevens et al. 2005) but does not penetrate into freshwater (DoE 2015). Green sawfish have been recorded offshore in relatively deep water (DoE 2015). While there are no records for this species in the Study Area, there is suitable habitat.

Species	Common Name	EPBC Act Status	Likelihood of Occurrence in Study Area	Comments
Anoxypristis cuspidata	narrow sawfish	M	Moderate	Narrow sawfish is a bentho-pelagic species, occupying estuarine, inshore and coastal waters across northern Australian from the Pilbara coast in Western Australia to Rockhampton, central Queensland. Juveniles are found in lower reaches of rivers and estuaries as well as large coastal mud and sand flats often over intertidal areas, whereas adults are primarily offshore. Unlike other sawfish, this species has been captured in mid-water gillnets targeting pelagic fish and sharks (Kyne & Pillans 2014; DCCEEW 2024d). Sawfish feed on fishes and benthic invertebrates. They are relatively active on the mud and sand flats on a moving tide, presumably feeding (DCCEEW 2024d).
Rhincodon typus	whale shark	V, M	Low	Whale sharks are found in all oceanic and coastal waters around Australia but is most seen in waters off northern Western Australia, Northern Territory and Queensland (Compagno 1984; Last & Stevens 2009), as far down as North Stradbroke Island in southeast Queensland (van Vonderen 2016). Whale sharks primarily feed on planktonic and nektonic prey using suction filter feeding techniques (Compagno 1984). The whale shark aggregate seasonally in response to a pulse surge of prey in the areas around Ningaloo Reef, Christmas Island and the Coral Sea (DCCEEW 2024d). ALA records indicate whale sharks are rarely within the vicinity of the Study Area; however, they may pass through the near-shore waters. However, the Study Area does not provide critical habitat for this species and there is not an important population of this species here.
Sphyrna lewini	scalloped hammerhead	CD	Low	The scalloped hammerhead is a large pelagic species with a global distribution in tropical and sub-tropical waters. In Australia, the species extends from southern Western Australia around northern Australia down to Wollongong. Scalloped hammerheads generally occur in deeper waters near the edge of the continental shelf (TSSC 2018). Scalloped hammerhead may pass through the near-shore waters adjacent to the Study Area. However, the Study Area does not provide critical habitat for this species and there is not an important population of this species here.

Species	Common Name	EPBC Act Status	Likelihood of Occurrence in Study Area	Comments
Lamna nasus	mackerel shark / porbeagle	M	Low	The mackerel shark is a wide ranging coastal and oceanic species found in temperate and cold-temperate waters worldwide, preferring water temperatures below 18°C (Stevens et al. 2006). In Australia, this species occurs from southern Queensland to south-west Australia (Last & Stevens 2009). They typically occur in oceanic waters off the continental shelf, although they occasionally enter coastal waters (Francis et al. 2002). Mackerel sharks are thought to be reasonably flexible in the types of habitats used for foraging (Pade et al. 2009). It is unlikely to frequently use the Study Area.
Mobula alfredi	reef manta ray	M	Low	Of the two giant manta ray species, the most likely species to occur near the coastline is *M. alfredi*. This species shows high site affinity that is likely to be related to feeding areas, cleaning stations, reproductive sites, and migratory landmarks (Couturier et al. 2011). Manta rays feeds on plankton and can be encountered in large numbers along productive coastlines with regular upwelling, oceanic island groups and particularly offshore pinnacles and seamounts (Marshall 2008; Marshall et al. 2009). They can also be encountered on shallow reefs while being cleaned or feeding at the surface inshore and offshore. In inshore areas, they can occasionally be observed in sandy bottom areas and seagrass beds (Marshall 2008; Marshall et al. 2009). The Study Area does not provide critical habitat for this species and there is not an important population of this species here.
Mobula birostris	giant manta ray	M	Very low	This is a predominantly oceanic species found in cooler waters and is unlikely to occur within the Study Area.
Fish				
Stiphodon semoni	opal cling goby	CE	Low	Within Australia, this species is currently distributed from the Mulgrave and Russel rivers to the Daintree River on the Cape York Peninsula (DCCEEW 2024d), i.e. to the north of the Study Area. The opal cling goby is confined to pristine rainforest streams, with significant flow and easy access to marine

Species	Common Name	EPBC Act Status	Likelihood of Occurrence in Study Area	Comments
				habitats (Thuesen et al. 2009). In Australia, the biology of the species is unknown, however other studies in close countries indicate that females spawn in rainforest streams, with hatchlings migrating to the sea and return once they are juveniles to mature into adults.
Plants				
Myrmecodia beccarii	ant plant	V	Moderate	The ant plant occurs in the coastal woodlands and mangrove communities between Cooktown to Ingham (DCCEEW 2024d). While it has not been recorded in the Study Area, it may be present.

CE critically endangered
E endangered
V vulnerable
CD conservation dependent
M migratory species
– no listing

5.7 Threatened and Migratory Avian Species

The likelihood of threatened and migratory avian species being present in the area that may be impacted by the proposed works was assessed using the criteria in Figure 21).

Table 4, and is presented in Table 6Table 5. The area that may be impacted by the proposed works (the Study Area) is based on the potential impacts in Section 6.0, and varies with the nature of the impact. Potential impacts to species that had a very low or low likelihood of occurrence in the Study Area were not assessed further.

While Hinchinbrook Channel has been monitored for shorebirds, there are knowledge gaps about their distribution and activity in this area. There are large areas of mangroves and sub tidal seagrass beds in the vicinity of the proposed works, however feeding areas for shorebirds are likely to be limited. Shorebird roosts have been recorded around Lucinda Point, to the south of the Enterprise Channel (DETSI 2017). While shorebirds may feed on the intertidal flats near the proposed works, the available habitat is low, and is likely similar to other intertidal areas in the vicinity, and unlikely to be significant for these species (M. Sheaves pers comm. 2019).

The only Biologically Important Areas (BIA) of regionally significant marine avian species in the area potentially impacted by the proposed works is the BIA for black-naped tern, which is not currently listed as an MNES under the EPBC Act (Figure 22).

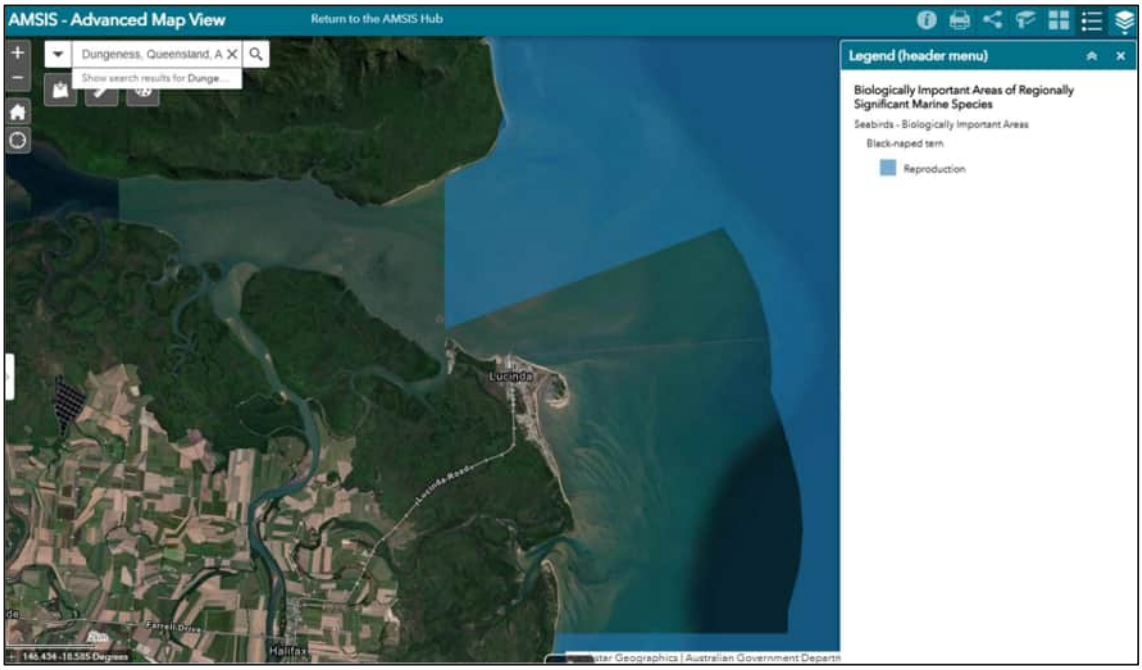


Figure 22: BIA for black-naped tern (reproduction) in the vicinity of the proposed works.

Table 6: Threatened and migratory marine and wetland bird species that are listed within 5 km of the Study Area, and their likelihood of occurrence in the area potentially impacted by the works.

Species	Common Name	EPBC Act Status	Likelihood of Occurrence	Comments
Threatened Bird Species				
Arenaria interpres	ruddy turnstone	V, M	Moderate	During the non-breeding season, the ruddy turnstone occurs throughout Australia in coastal, and occasionally inland, regions. The species prefers rocky shores where there are large amounts of rotting seaweed. The species typically roosts also shelves of rock or gravel beaches with tidal pools nearby. In north Australia, they typically occur on mudflats and in southern Australia, they prefer rocky coastlines and sometimes large embayments (DCCEEW 2026b). There are three records of this species around the nearby town of Lucinda.
Botaurus poiciloptilus	Australasian bittern	E	Low	The Australasian bittern is a secretive, stocky, heron-like bird, living in wetlands where it forages. Bitterns are very well camouflaged and can be difficult to spot in the reeds and rushes. The preferred habitat of this species is not present in the vicinity of the proposed work.
Calidris acuminata	sharp-tailed sandpiper	V, M	Low	Occurs along the coastline of Queensland, New South Wales, and Victoria, with scattered records inland and in other states. The species occurs in freshwater/brackish wetlands that have muddy edges with sedges, grass, saltmarsh, or other low vegetation. They can be attracted to aquatic vegetation such as algae mats and water weeds. The species spends the non-breeding season (spring and summer) in Australia (DCCEEW 2026b). The preferred habitat of this species is not present in the vicinity of the proposed work.
Calidris canutus	red knot	V, M	High	Red knots occur around the Australian coast. They mainly inhabit intertidal mudflats, sandflats and sandy beaches of sheltered coasts, in estuaries, bays, inlets, lagoons and harbours; sometimes on sandy ocean beaches or shallow pools on exposed wave-cut rock platforms or coral reefs. They are occasionally seen on terrestrial saline wetlands near the coast, such as lakes, lagoons, pools and pans, and recorded on sewage ponds and saltworks, but rarely use freshwater swamps. They rarely use inland lakes or swamps. Roosting mainly occurs in intertidal mudflats in sheltered areas and nesting occurs in shallow depressions on open ground (DCCEEW 2026b). There are multiple records of the species in vicinity of the proposed work.

Species	Common Name	EPBC Act Status	Likelihood of Occurrence	Comments
Calidris ferruginea	curlew sandpiper	CE, M	Moderate	Occurs around the coasts of Australia and is widespread inland in smaller numbers. In Queensland there are scattered records occurring in the Gulf of Carpentaria, with widespread records along the coast south of Cairns. Habitat generally consists of intertidal mudflats in sheltered coastal areas, though is known to occur around non-tidal swamps, lakes, and ephemeral water bodies. The Curlew Sandpiper roosts on beaches, sandspits, islets and occasionally dunes. The Curlew Sandpiper spends the non-breeding season (spring and summer) in Australia (DCCEEW 2026b).
Calidris tenuirostris	great knot	V, M	High	The great knot has been recorded around the entirety of the Australian coast, with a few scattered records inland. In Australasia, the species typically prefers sheltered coastal habitats, with large intertidal mudflats or sandflats. This includes inlets, bays, harbours, estuaries and lagoons. There are multiple records of the species in the vicinity of the proposed work.
Casuarius casuarius	Southern cassowary	E	Low	Southern cassowary's are large tropical rainforest birds. There are no records of the species near the proposed work, nor suitable habitat.
Charadrius leschenaultii	greater sand plover	V, M	Moderate	Occurs around the entire Australian coast in littoral and estuarine habitats. These include muddy, sandy, and shelly sheltered beaches with large intertidal zones, estuaries, reefs, and rocky zones. The species spends the non-breeding season (spring and summer) in Australia (DCCEEW 2026b). There are multiple records of the species in the vicinity of the proposed work.
Charadrius mongolus	lesser sand plover	E, M	Moderate	Within Australia, the lesser sand-plover is widespread in coastal regions, and has been recorded in all states. In non-breeding grounds in Australia, this species usually occurs in coastal littoral and estuarine environments. It inhabits large intertidal sandflats or mudflats in sheltered bays, harbours and estuaries, and occasionally sandy ocean beaches, coral reefs, wave-cut rock platforms and rocky outcrops. It also sometime occurs in short saltmarsh or among mangroves. There are multiple records of the species in the vicinity of the proposed work.
Erythrotriorchis	red goshawk	E	Low	Occurs from the Cape York Peninsula in Queensland to the Kimberly in Western Australia, with records in south-east Queensland becoming increasingly scant since 2010. The species occurs in wooded and forested lands of tropical and warm temperate Australia. The vegetation the red goshawk prefers includes open forest, tall open forest, eucalypt woodland, gallery rainforest, rainforest margins, and

Species	Common Name	EPBC Act Status	Likelihood of Occurrence	Comments
				swamp sclerophyll forests. There is no preferred habitat of this species in the area likely to be impacted by the proposed works.
Falco hypoleucos	grey falcon	V	Low	The grey flacon is a species generally found in the arid and semi-arid zone in lightly wooded habitats. There is no preferred habitat of this species in the area likely to be impacted by the proposed works.
Fregetta grallaria grallaria	white-bellied storm-petrel	V	Low	This species breeds on small islets and rocks in the Lord Howe Island group. It has been recorded north and east of its breeding island to the tropics including the coral sea. This species has been recorded over near-shore waters off the Queensland coast (DCCEEW 2026b). There is no preferred habitat of this species in the area likely to be impacted by the proposed works.
Gallinago hardwickii	Latham's snipe	V, M	Low	Occurs from the Cape York Peninsula in Queensland south to South Australia, and inland west of the Great Dividing Range. They inhabit various wetlands, permanent and ephemeral, of varying salinity, though they prefer freshwater with low, dense vegetation. The species spends the non-breeding season (spring and summer) in Australia (DCCEEW 2026b). There is no preferred habitat of this species in the area likely to be impacted by the proposed works.
Harundapus caudacutus	white-throated needletail	V, M	Low	Occurs from northern Queensland through to south-eastern Australia and inland to the west of the Great Dividing Range, and in Tasmania. The species is nearly exclusively aerial. They are found above a variety of ecosystems, though there appears to be preference for open forests, rainforest, and heathlands, and less often over woodland and treeless areas. The species spends the non-breeding season (spring and summer) in Australia (DCCEEW 2026b). There is no preferred habitat of this species in the area likely to be impacted by the proposed works.
Limosa lapponica baueri	nunivak bar-tailed godwit	E	Low	The bar-tailed godwit (both subspecies combined) has been recorded in the coastal areas of all Australian states (DCCEEW 2026b). It is widespread in the Torres Strait and along the east and south-east coasts of Queensland, New South Wales (NSW) and Victoria. The migratory Bar-tailed Godwit (western Alaskan) does not breed in Australia. Occurs mainly in coastal habitats in coastal habitats which include large intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons and bays. It also has been recorded in coastal sewage farms and saltworks, saltlakes and brackish wetlands near coasts, sandy ocean beaches, rock platforms and coral

Species	Common Name	EPBC Act Status	Likelihood of Occurrence	Comments
				reef-flats. Records of this species, alongside potential habitat, are in the vicinity of the Site.
Numenius madagascariensis	Eastern curlew	CE, M	Moderate	The eastern curlew has a coastal distribution and can be found in all states. The eastern curlew can be seen in Australia throughout the non-breeding season on sheltered coasts, especially bays, harbours, estuaries, inlets and coastal lagoons, with intertidal mudflats/sandflats and often beds of seagrass. The species roosts during high tide on islets, sandbars, sandy spits particularly among vegetation and near the high-water mark. Foraging typically occurs during the non-breeding season on sheltered mudflats or sandflats (DCCEEW 2026b). There are multiple records of the species in the vicinity of the proposed work.
Pluvialis squatarola	grey plover	V, M	Moderate	In non-breeding grounds in Australia, Grey Plovers occur almost entirely in coastal areas, where they usually inhabit sheltered embayments, estuaries and lagoons with mudflats and sandflats, and occasionally on rocky coasts with wave-cut platforms or reef-flats, or on reefs within muddy lagoons (DCCEEW 2026b). There are multiple records of the species in the vicinity of the proposed work.
Peophila cincta cincta	Southern black-throated finch	E	Low	Occurs in grassy woodlands of north-east Australia. There are no records of the species in the likely area of impact, nor is there habitat suitable for the species.
Rostratula australis	Australian painted snipe	E	Low	Occurs across Australia though is more common in eastern Australia. They inhabit permanent and ephemeral wetlands, preferably freshwater though occasionally brackish, that typically have emergent, fringing vegetation. They will sometimes use areas lined with trees. Required breeding habitat is shallow freshwater wetlands (often islands within wetlands) with wet mud, dense low cover, and upper and canopy cover nearby (DCCEEW 2026b). There are no records of the species in the likely area of impact, nor habitat suitable.
Sternula albifrons	little tern	V, M	Moderate	There are two major subpopulations of little terns that breed in Australia (DCCEEW, 2025). One extends from the Gulf of Carpentaria and eastern Cape York Peninsula through the Northern Territory to Broome in Western Australia, and another the breeds along the eastern coast of the mainland, northern and eastern Tasmania (DCCEEW, 2025). This species inhabits coastal environments including estuaries, lagoons, deltas, bays, lakes, river mouths, inlets, harbours particularly those with exposed ocean beaches, sand-pits, sandbanks (DCCEEW 2026b). There are multiple records of the species in the vicinity of the proposed work.

Species	Common Name	EPBC Act Status	Likelihood of Occurrence	Comments
Tringa nebularia	common greenshank	E, M	Low	Occurs along most of the Australian coastline and sporadically inland, in all types of wetlands. They prefer wetlands with muddy or clay edges, occasionally sand, with either bare, emergent, or fringing vegetation. The species spends the non-breeding season (spring and summer) in Australia (DCCEEW 2026b). There is no preferred habitat of this species in the area likely to be impacted by the proposed works.
Tyto novaehollandiae Kimberli	masked owl	V	Low	In northern Australia, the masked owl has been recorded from riparian forest, rainforest, open forest, Melaleuca swamps and the edges of mangroves, as well as along the margins of sugar cane fields (DCCEEW 2026b). There are no records in the vicinity of the proposed work.
Xenus cinereus	terek sandpiper	V	Moderate	The terek sandpiper mostly forages in the open, on soft wet intertidal mudflats or in sheltered estuaries, embayments, harbours or lagoons. The species has also been recorded on islets, mudbanks, sandbanks and spits, and near mangroves and occasionally in samphire (*Halosarcia* spp.). Birds are seldom near the edge of water, however, birds may wade into the water (DCCEEW 2026b). The species has been recorded in the vicinity of the proposed works.
Migratory Marine Birds not listed as Threatened				
Anous stolidus	common noddy	M	Low	The common noddy mainly occurs of the Queensland coast. However, also occurs along the Western Australia coast and Northern Territory. During breeding season, this species occurs near or on islands, on rocky islets and stacks, or on shoals or cays of coral/sand. The birds can nest in saltbush, bushes, other low vegetation, on grass, on top of rocks, among coral rubble, on shingle beaches or in sand close to grassy areas. There is no preferred habitat of this species in the area likely to be impacted by the proposed works.
Apus pacificus	fork-tailed swift	M	Low	The fork-tailed swift can occur in all states and territories of Australia. In Queensland, there have been records of the species in the Gulf Country, Cape York Peninsula, east of the Great Divide, near Cooktown and south to Townsville (DOTE, 2024). They primarily occur over inland plains but can also sometimes occur in coastal areas or above foothills. This species mostly occurs over dry open habitat including low shrub, saltmarsh, heathland, or riparian woodland (DCCEEW 2026b). There is no preferred habitat of this species in the area likely to be impacted by the proposed works.

Species	Common Name	EPBC Act Status	Likelihood of Occurrence	Comments
Fregata ariel	lesser frigatebird	M	Moderate	This species can be found along coastal areas of the northern parts of Australia, in Queensland, the Northern Territory, and Western Australia. The species breeds on small subtropical and tropical islands, in bushes or mangroves and sometimes on bare ground. This species has been recorded in the vicinity of the proposed works.
Fregata minor	great frigatebird	M	Low	This species has non-breeding individuals that disperse throughout the tropical seas and can be found in the northern coastal parts of Queensland and the Northern Territory. The species breeds on subtropical and tropical islands, in bushes or mangroves and sometimes bare ground. There is no preferred habitat of this species in the area likely to be impacted by the proposed works.
Phaethon lepturus	white-tailed tropicbird	M	Low	The white-tailed tropicbird breeds on the Cocos-Keeling Islands in the main atoll, at Ashmore Reef, and Rowley Shoals of the north coast of Western Australia. The birds can be found over pelagic waters and the coasts of subtropical and tropical seas. There is no preferred habitat of this species in the area likely to be impacted by the proposed works.
Phaethon rubricauda	red-tailed tropicbird	M	Low	The red-tailed tropic bird is found in regions of the Indian and Pacific Ocean, with nesting restricted to oceanic islands. The species feeds mainly upon flying fish and squid, which they acquire through diving into the water. There is no preferred habitat of this species in the area likely to be impacted by the proposed works.
Migratory Wetland Birds not listed as Threatened				
Actitis hypoleucos	common sandpiper	M	Low	The common sandpiper is found the coastlines of Australia but highly concentrated in northern and western Australia. In Queensland, the species is found on the Cairns Foreshore and the south-eastern Gulf of Carpentaria (DCCEEW 2026b). The species inhabits coastal wetlands and some inland wetlands, and is mostly found around rocky shores or muddy margins. There is no preferred habitat of this species in the area likely to be impacted by the proposed works.
Calidris melanotos	pectoral sandpiper	M	Low	In Australasia, the pectoral sandpiper prefers shallow fresh to saline wetlands. The species is found at coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands. The species is usually found in coastal or near coastal habitat but occasionally found further inland. It prefers wetlands that have open fringing mudflats and low, emergent or fringing vegetation, such as grass or samphire. The species has also been recorded in swamp overgrown with lignum. They forage in shallow water or soft

Species	Common Name	EPBC Act Status	Likelihood of Occurrence	Comments
				mud at the edge of wetlands (DCCEEW 2026b). There is no preferred habitat of this species in the area likely to be impacted by the proposed works.
Calidris ruficollis	red-necked stint	M	Low	Red-necked stint is a small migratory wader that forage in intertidal mudflats and muddy margins of freshwater lakes. The species breeds in low altitude tundra of the Northern hemisphere. There is no preferred habitat of this species in the area likely to be impacted by the proposed works.
Gallinago megala	Swinhoe's snipe	M	Low	Few definite records exist for Swinhoe's snipe in Australia. During the non-breeding season Swinhoe's snipe occurs at the edges of wetlands, such as wet paddy fields, swamps and freshwater streams. The species is also known to occur in grasslands, drier cultivated areas (DCCEEW 2026b). Due to the species rarity, and the lack of preferred habitat at, Swinhoe's snipe is unlikely to occur in the area potentially impacted by the proposed works.
Gallinago stenura	pin-tailed snipe	M	Low	During non-breeding period the pin-tailed snipe occurs most often in or at the edges of shallow freshwater swamps, ponds and lakes with emergent, sparse to dense cover of grass/sedge or other vegetation. The species is also found in drier, more open wetlands such as claypans in more arid parts of species' range. It is also commonly seen at sewage ponds; not normally in saline or inter-tidal wetlands (DCCEEW 2026b). There is no preferred habitat of this species in the area likely to be impacted by the proposed works.
Limosa lapponica	bar-tailed godwit	M	Moderate	The bar-tailed godwit (both subspecies combined) has been recorded in the coastal areas of all Australian states. It is widespread in the Torres Strait and along the east and south-east coasts of Queensland, NSW and Victoria. The migratory bar-tailed godwit (western Alaskan) does not breed in Australia. It occurs mainly in coastal habitats in coastal habitats which include large intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons and bays (DCCEEW 2026b). There are multiple records in the vicinity of the proposed works, and habitat suitable for the species.
Limosa limosa	black-tailed godwit	E	Moderate	The black-tailed godwit is found in all states and territories of Australia, preferring coastal regions, of which the largest populations are found on the north coast between Darwin and Weipa. It is generally found in small numbers elsewhere and there are scattered inland records (DCCEEW 2026b). There are records of the

Species	Common Name	EPBC Act Status	Likelihood of Occurrence	Comments
				species from the nearby town of Lucinda, but no records in the area potentially impacted by the proposed works
Numenius minutus	little curlew	M	Moderate	The little curlew is most often found feeding in short, dry grassland and sedgeland, including dry floodplains and blacksoil plains, which have scattered, shallow freshwater pools or areas seasonally inundated. Open woodlands with a grassy or burnt understorey, dry saltmarshes, coastal swamps, mudflats or sandflats of estuaries or beaches on sheltered coasts, mown lawns, gardens, recreational areas, ovals, racecourses and verges of roads and airstrips are also used (DCCEEW 2026b). The species has been recorded in the immediate vicinity of the proposed works.
Numenius phaeopus	whimbrel	M	Moderate	The whimbrel is often found on the intertidal mudflats of sheltered coasts. It is also found in harbours, lagoons, estuaries and river deltas, often those with mangroves, but also open, unvegetated mudflats. It is occasionally found on sandy or rocky beaches, on coral or rocky islets, or on intertidal reefs and platforms (DCCEEW 2026b). The species has been recorded in the immediate vicinity of the proposed works.
Pandion haliaetus	osprey	M	Moderate	The osprey has a distribution that extends around the north coast of Australia. The species inhabits the areas around shallow waters and persists in suburban and urban environments. They are frequently observed in wetland habitats including reefs, coastal cliffs, mangrove swamps, reservoirs, bays, beaches, lakes and waterholes. They prefer coastal cliffs and elevated islands but may also inhabit muddy, sandy or rocky shores and over coral cays.
Pluvialis fulva	Pacific golden plover	M	Moderate	In non-breeding grounds in Australia this species usually inhabits coastal habitats, though it occasionally occurs around inland wetlands. Pacific golden plovers usually occur on beaches, mudflats and sandflats (sometimes in vegetation such as mangroves, low saltmarsh such as *Sarcocornia*, or beds of seagrass) in sheltered areas including harbours, estuaries and lagoons, and also in evaporation ponds in saltworks (DCCEEW 2026b). The species has been recorded in the immediate vicinity of the proposed works..
Tringa brevipes	grey-tailed tattler	M	Low	The grey-tailed tattler usually forages in shallow water, on hard intertidal substrates, such as reefs and rock platforms, in rock pools and among rocks and coral rubble, over which water may surge. It has also been recorded foraging on exposed intertidal mudflats, especially with mangroves and possibly seagrass nearby.

Species	Common Name	EPBC Act Status	Likelihood of Occurrence	Comments
				Occasionally it forages on intertidal sandflats, around banks of seaweed or protruding rocks or lumps of coral (DCCEEW 2026b). There is no preferred habitat of this species in the area likely to be impacted by the proposed works.
Tringa stagnatilis	marsh sandpiper	M	Low	The marsh sandpiper lives in permanent or ephemeral wetlands of varying salinity, including swamps, lagoons, billabongs, saltpans, saltmarshes, estuaries, pools on inundated floodplains, and intertidal mudflats and also regularly at sewage farms and saltworks. They are recorded less often at reservoirs, waterholes, soaks, bore-drain swamps and flooded inland lakes. They are found infrequently around mangroves (DCCEEW 2026b). The species has been near the proposed works, however there is no preferred habitat in the area likely to be impacted by the proposed works.

6.0 Potential Impacts and Mitigation

6.1 Direct Impacts

Potential direct impacts of the proposed works (Figure 24) comprise impacts from:

- construction of the breakwater
- dredging
- placement of the pipeline
- the access track
- placement of the dredge material, and
- boat anchoring.

Prior to works commencing marine plants in the area will be remapped so that the placement of the pipeline and dredge material can avoid any areas of marine plants.

It is anticipated mangroves and seagrass will recolonise in the areas where they have been temporarily disturbed, given the abundant source of nearby propagules. To expedite this process, once works are completed, the ground level will be returned to pre-disturbance height, so the pre-existing pattern of tidal inundation is re-established. Seagrass species in the area are opportunistic and colonisers, that are typically fast growing, short-lived and flower prolifically, which means that they can rapidly recover from disturbance.

6.1.1 The Breakwater

Construction of the breakwater will result in permanent disturbance of a small areas of bare sediment, seagrass and mangroves (Figure 24; Table 7), and the creation of approximately 1.8505 ha of intertidal and shallow subtidal rocky reef habitat, that will be colonised by a variety of species including macro-algae oysters and barnacles.

6.1.2 Dredging

Dredging of the Dungeness Enterprise Channel will result in the disturbance of non-vegetated[2] soft sediments, the associated macrobenthos. There are no marine plants in the proposed dredge channel. Given that the estuarine and marine areas adjacent to the areas of disturbance are typical of the region, and that the area is likely to be recolonised by similar fauna, this temporary disturbance is not likely to have a measurable ecological impact beyond the Project footprint.

6.1.3 Pipeline Placement

Dredged material will be pumped through a temporary pipeline that runs along the edge of the breakwater and along Dungeness Beach to the placement area. Along the edge of the breakwater this is likely to result in the temporary disturbance of a small area of seagrass (Figure 24; Table 7).

6.1.4 Access Tracks

Access tracks (5m wide) and temporary construction zones (3m from works) are included to allow for impacts from construction, while minimising impacts to marine plants (Figure 24;

3 Devoid of flora; benthic microalgae are expected to be associated with the surface sediments

Table 7). These areas of disturbance are considered to be the maximum area that would be disturbed by the proposed works. These impacts are considered temporary, and marine plants will be restored in accordance with steps outlined in Section 6.1.7.

6.1.5 Placement of Dredge Material

The distribution of marine plants will be mapped prior to placement of dredged material and areas of marine plants will be avoided.

Table 7 Estimated area of mangrove, seagrass and mangrove debris directly disturbed by construction of the breakwater, placement of the pipeline and access tracks.

Marine Plant Community	Permanent Impact (ha)	Temporary Impact (ha)
Seagrass (2018 & 2021)[a]	0.026[b]	0.006[c]
Mangrove[a]	0.005[b]	0.016[d]
Mangrove debris[a]	0.034[b]	0.032[d]

[a] The distribution of marine plants will be mapped prior to the commencement of works. Dredge spoil will be placed to avoid marine plants and consequently impacts from dredge spoil placement have not been included in the calculation of the area of potential temporary impact.

[b] Permanent impacts from the proposed breakwater and associated training walls.

[c] Temporary impacts to seagrass from the dredge pipeline will be avoided where practical, however there may be an unavoidable small area of temporary impact near the breakwater.

[d] Temporary impacts to mangroves and mangrove debris are from the proposed access tracks and construction works zone only.

6.1.6 Boat Anchoring

Boat anchoring has the potential to disturb benthic communities, including seagrass beds

6.1.7 Proposed Mitigation and Effectiveness

The 0.065 ha of marine plants permanently removed by the proposed works will be offset according to the Queensland *Environmental Offsets Act 2014*. Tidal land profiles that are temporarily disturbed will restored to pre-works heights, and the 0.048 ha of mangroves temporarily disturbed by the proposed works will be rehabilitated (SARA Decision Notice 2025).

Direct impacts to mangroves will be avoided by ensuring dredge spoil is not placed in the high intertidal area.

Direct impacts to seagrass from boat anchoring will be avoided by ensuring that during the proposed works, boats are not anchored over seagrass beds.

Sediment placed in the nourishment area will be sand, not finer than the upper beach sand at the site, and will be free of contaminants and not contain any building waste or rock (SARA change application decision 2025).

Environmental / vegetation exclusion zone fencing will be erected along the edge of undisturbed vegetation for the duration of construction. No un-authorised access will be permitted in these zones by the contractors. Fencing will be specified during detailed design with a minimum requirement of high visibility bunting tied to stakes. Fencing will be installed so that there is no impact to marine plants, with no fencing attached directly to vegetation.

Mangrove debris removed from the impacted areas will be stockpiled (avoiding impacts to existing vegetation) and be used as part of the restoration works. This debris will provide structure for sediment stabilisation, refuge for fauna while mangroves recruit and establish

and breakdown over time contributing to the food web and fisheries value of the area. Stockpiled debris will be stored above HAT and exclusion fencing will be placed around stockpile until ready for restoration works.

To prevent damage from vehicular and foot traffic, bollards will be installed along all landward edges of temporary disturbance to mangroves and mangrove debris (elevation greater than HAT). Bollard design will be in accordance with relevant Hinchinbrook Regional Council standards or City of Townsville standard drawing SD-654 Fencing – Open Space Bollard and will be installed without damage to any marine plants. Signs will be erected to indicate marine plants are regenerating in the area and to explain why the area cannot be accessed.

Once the temporary disturbance to the areas of mangrove debris is completed, the stockpiled mangrove debris will be placed in these areas. As the wave action and water velocities in these areas are expected to be low, anchoring is not required.

Further, once the works are completed, each area of temporary mangrove disturbance will be inspected by appropriately qualified marine plant ecologists, to determine whether conditions are suitable for re-colonisation. Where conditions are not suitable (e.g. the sediment has been compacted by machinery and will not support marine plant growth) they will be rectified, without further damage to marine plants.

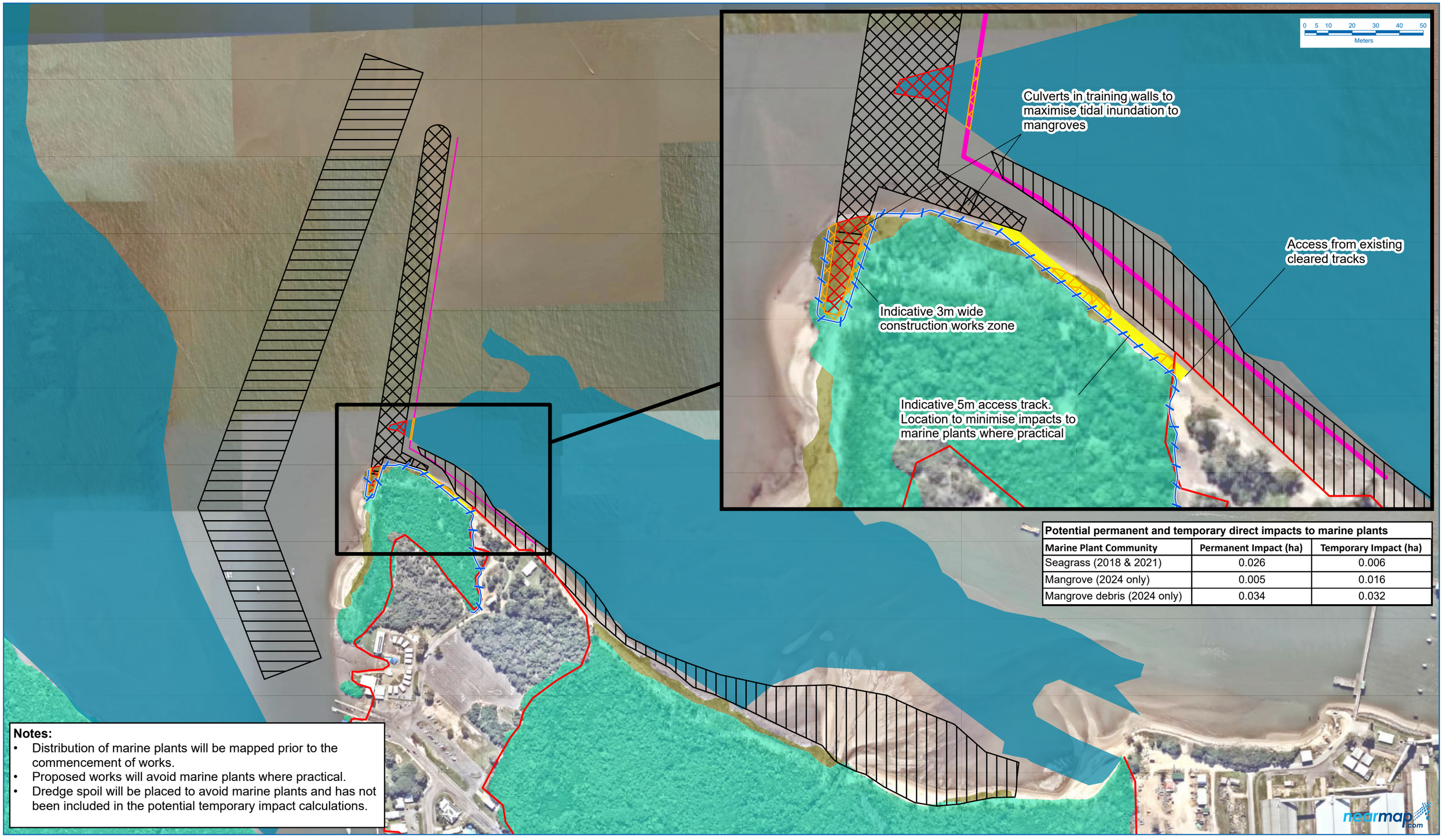
To assist the natural regeneration of mangroves, proprietary biodegradable devices (such as “bamboo traps”; Mangroves.au 2026; Figure 23) will be installed to manufacture’s specifications. These devices enhance soil stabilisation while providing low velocity areas for mangrove propagules to naturally recruit.

Figure 23: Bamboo traps with established naturally recruited seedlings.

Each area of temporary mangrove disturbance will be monitored annually, and after 19 months. If there is no natural recruitment of mangroves after 18 months, regeneration will be assisted with supplementary planting, under the supervision of an appropriately qualified marine ecologist. Supplementary planting will comprise endemic native mangroves that are known to occur in the area (Section 4.3), with dominant species as per the surrounding area. Mangrove species will be planted at the appropriate tidal height, based on observations of the surrounding mangrove forests.

The distribution of seagrass in the works area is dynamic, and as disturbance to seagrass is likely to be very low, restoration of these habitats is not recommended. The proposed work will stabilise the shoreline, creating more habitat for marine plants. Potential impacts during construction are predominantly temporary, and small compared to the likely increase in area of marine plants. As such the proposed works are not considered to create any significant residual impacts, nor require any environmental offsets.

The design includes culverts through the training walls to ensure tidal inundation of marine plants is maintained.



Potential permanent and temporary direct impacts to marine plants

Marine Plant Community	Permanent Impact (ha)	Temporary Impact (ha)
Seagrass (2018 & 2021)	0.026	0.006
Mangrove (2024 only)	0.005	0.016
Mangrove debris (2024 only)	0.034	0.032

Notes:

- Distribution of marine plants will be mapped prior to the commencement of works.
- Proposed works will avoid marine plants where practical.
- Dredge spoil will be placed to avoid marine plants and has not been included in the potential temporary impact calculations.

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PO Box 2363
Wellington Point
Q 4160 Australia

P 07 3286 3850
E info@frcenv.com.au
www.frcenv.com.au

Dungeness Enterprise Proposed Dredge and Coastal Structure Works

Figure 24: Potential Direct Impacts to Marine Plants

SOURCES

Document Path: C:\Users\josh.arthy\OneDrive - SLR Consulting\Documents - FRC Utility\Mapping\Projects\2024\240308_WT_Dungeness\240308_WT_Dungeness\240308_WT_Dungeness.aprx

LEGEND

- Modelled highest astronomical tide (HAT; 2024)

Proposed works

- Coastal structure
- Channel
- Indicative placement of dredge spoil (placement will avoid marine plants)
- Indicative access track
- Indicative dredge pipeline
- Exclusion zone fencing

Distribution of marine plants (frc environmental)

- Seagrass (2018 & 2021)
- Mangroves (2024)
- Mangrove debris (2024)

Impact assessment

- Permanent impact
- Temporary impact

N

SCALE

0 20 40 80 120 160 200
Meters

Scale: 1:5,000 @ A3

PROJECTION
Coordinate System: GDA2020 MGA Zone 55
Projection: Transverse Mercator
Datum: GDA2020

DATE
2025-01-30

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VERSION
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Figure 25: Mangroves on the headland that would be disturbed by the breakwater.

6.2 Erosion and Sedimentation

The proposed works may result in indirect impacts to marine plants as a result of changes to erosion and accretion rates. The assessment of these impacts is based on the results of modelling of three scenarios: baseline; dredging; dredging and coastal infrastructure (Water Technology 2024b).

Critically, due to ongoing coastal processes, the baseline scenario predicts changes to the existing state, including erosion of the shoreline. Construction of the coastal structure (the break water) decreases the rate of erosion (Water Technology 2024b). Potential indirect impacts of erosion and sedimentation baseline (no dredging or coastal structure), dredging and coastal structure scenarios are summarised in Table 8 to Table 11; illustrated in Maps 5 to 8 in Appendix B, and summarised in the text below. The thresholds used were a decrease in sediment height of over 20 mm per annum and an increase in sediment height of over 50 mm per annum, a conservative assessment of what may impact mangroves and seagrass.

Table 8: Potential indirect impacts to marine plants in La Nina conditions, due to sediment deposition and erosion above the thresholds (hectares).

		Base		Dredge		Coastal Structure	
Zone	Marine Plant	Deposition	Erosion	Deposition	Erosion	Deposition	Erosion
1	Mangrove	0.000	1.782	0.000	1.721	0.022	0.768
2	Mangrove	0.000	0.049	0.000	0.044	0.002	0.110
2	Seagrass	0.621	4.037	0.608	4.128	0.000	0.000
4	Mangrove	0.006	0.183	0.006	0.166	0.000	0.000

4	Seagrass	0.000	0.025	0.000	0.025	0.000	0.000
7	Mangrove	0.000	0.968	0.000	0.963	0.000	0.000
8	Mangrove	0.000	0.135	0.000	0.072	0.079	0.146
9	Mangrove	0.000	0.462	0.000	0.403	0.000	0.296
9	Seagrass	4.175	2.142	3.870	2.383	3.093	1.067
10	Seagrass	0.013	0.005	0.013	0.005	0.013	0.005
12	Seagrass	0.000	0.079	0.000	0.079	0.007	0.024

Table 9: Difference in areas of potential erosion and deposition above the thresholds of dredge and coastal structure scenarios compared to the baseline scenario in La Nina conditions (hectares).

		Dredge			Coastal Structure		
Zone	**Marine Plant**	**Deposition**	**Erosion**	**Overall Improvement in Stability**	**Deposition**	**Erosion**	**Overall Improvement in Stability**
1	Mangrove	0	-0.061	0.061	0.022	-1.014	0.992
2	Mangrove	0	-0.005	0.005	0.002	0.061	-0.063
2	Seagrass	-0.013	0.091	-0.078	-0.621	-4.037	4.658
4	Mangrove	0	-0.017	0.017	-0.006	-0.183	0.189
4	Seagrass	0	0	0	0	-0.025	0.025
7	Mangrove	0	-0.005	0.005	0	-0.968	0.968
8	Mangrove	0	-0.063	0.063	0.079	0.011	-0.09
9	Mangrove	0	-0.059	0.059	0	-0.166	0.166
9	Seagrass	-0.305	0.241	0.064	-1.082	-1.075	2.157
10	Seagrass	0	0	0	0	0	0
12	Seagrass	0	0	0	0.007	-0.055	0.048
Potential Total Area of Improved Condition							
Seagrass				**-0.014**			**6.888**
Mangroves				**0.21**			**2.162**

Table 10: Potential indirect impacts to marine plants in El Nino conditions, due to sediment deposition and erosion (hectares).

		Base		Dredge		Coastal Structure	
Zone	**Marine Plant**	**Deposition**	**Erosion**	**Deposition**	**Erosion**	**Deposition**	**Erosion**
1	Mangrove	0.000	0.781	0.000	0.791	0.000	0.795
2	Mangrove	0.000	0.092	0.000	0.097	0.000	0.111
2	Seagrass	0.382	0.005	0.430	0.012	0.000	0.000

3	Mangrove	0.000	0.002	0.000	0.005	0.000	0.000
4	Mangrove	0.000	0.104	0.000	0.089	0.000	0.000
4	Seagrass	0.000	0.042	0.000	0.036	0.000	0.000
7	Mangrove	0.000	0.916	0.000	0.883	0.000	0.000
8	Mangrove	0.025	0.126	0.012	0.034	0.000	0.036
9	Mangrove	0.002	0.416	0.000	0.399	0.000	0.280
9	Seagrass	2.852	1.953	2.697	2.025	3.372	1.072
10	Seagrass	0.013	0.005	0.013	0.005	0.013	0.005
12	Seagrass	0.000	0.068	0.000	0.066	0.007	0.018

Table 11: Difference in areas of potential erosion and deposition above the thresholds of dredge and coastal structure scenarios compared to the baseline scenario in El Nino conditions (hectares).

		Dredge			Coastal Structure		
Zone	**Marine Plant**	**Deposition**	**Erosion**	**Overall Improvement in Stability**	**Deposition**	**Erosion**	**Overall Improvement in Stability**
1	Mangrove	0	0.01	-0.01	0	0.014	-0.014
2	Mangrove	0	0.005	-0.005	0	0.019	-0.019
2	Seagrass	0.048	0.007	-0.055	-0.382	-0.005	0.387
3	Mangrove	0	0.003	-0.003	0	-0.002	0.002
4	Mangrove	0	-0.015	0.015	0	-0.104	0.104
4	Seagrass	0	-0.006	0.006	0	-0.042	0.042
7	Mangrove	0	-0.033	0.033	0	-0.916	0.916
8	Mangrove	-0.013	-0.092	0.105	-0.025	-0.09	0.115
9	Mangrove	-0.002	-0.017	0.019	-0.002	-0.136	0.138
9	Seagrass	-0.155	0.072	0.083	0.52	-0.881	0.361
10	Seagrass	0	0	0	0	0	0
12	Seagrass	0	-0.002	0.002	0.007	-0.05	0.043
Potential Total Area of Improved Condition							
Seagrass				**0.036**			**0.833**
Mangroves				**0.102**			**1.627**

6.2.1.1 Zone 1, along the Western Foreshore of West Island.

- This Zone is a mangrove forest, with spare seagrass offshore in Zone 2 (frc environmental 2019).
- This Zone is currently relatively stable, with some minor bank erosion, particularly in La Niña periods, with erosion likely to continue at a slow rate.

- With dredging the channel, modelling indicates this Zone would become more stable in La Niña periods, and erode more in El Niño periods (Table 12).
- In the dredging and the coastal structure scenario the modelling indicates there would be a reduction in erosion compared to the baseline scenario (Table 12).
- Modelling of erosion and deposition thresholds indicates that with dredging the Channel (Appendix B: Maps 5 & 7; Table 8Table 9 to Table 11)
    - in La Nina and El Nino conditions the area of mangroves over the erosion threshold would slightly decrease
- Modelling of erosion and deposition thresholds indicates that with dredging the Channel and the Coastal Infrastructure (Appendix B: Maps 6 & 8; Table 8Table 9 to Table 11)
    - in La Nina conditions there would be less erosion in the mangroves, with an increase in deposition in some small areas – overall an improvement in stability (0.992 ha)
    - in El Nino conditions there would be a small increase in the area over the erosion threshold (0.014 ha).
- That is, with dredging only, there would be less erosion of the mangrove lined foreshore. With dredging and coastal infrastructure this foreshore would become much more stable in La Nina conditions. While there may be some slight erosion in El Nino conditions, overall, the area would be more stable, and there would be a slight net benefit to the mangrove forest.

Table 12: Zone 1: Modelled deposition (-ve) / accretion (+ve) of sediment in each scenario (m^3).

	BASELINE	DREDGING ONLY	DREDGING & COASTAL STRUCTURE
La Niña	-600	-900	-900
El Niño	+60	+100	+300

6.2.1.2 Zone 2, the broad intertidal area extending seaward of Zone 1.

- This Zone is dominated by sparse seagrass beds (<5% cover) in the west and bare sand near the channel (frc environmental 2019), with mangroves along the foreshore (extending out from Zone 1).
- This Zone generally acts as a sediment sink, with shoals increasing in size. This is likely to be due to sediment input from the Herbert River, with the modelling indicating the accumulation of sediment of approximately 20,000 m^3 / year on the shoals in this Zone.
- With dredging the channel, modelling indicates that there would be slightly less accretion in this Zone (Table 13).
- With dredging and the coastal structure, the modelling indicates there would be a higher rate of accretion in this Zone than in the baseline (Table 13).
- Time series sites 1 and 2 are in this Zone (Appendix A). These sites are over a sparse seagrass bed.
- At site 1 there is less change in the bed level in the dredge and coastal structure scenario than in the other two scenarios.

- At site 2, on the outer edge of the seagrass bed, in a El Niño period there is likely to be more sediment accretion in the dredge and coastal structure scenario than in the other two scenarios, with bed level changing from approximately -1.18 m AHD to approximately -1.14 m AHD over a 5-year period, i.e. 8 mm per year. Seagrasses are likely to be able to withstand this gradual accretion, and it is likely to promote lateral growth (Benham et al. 2019).
- At site 2 in a La Niña period, after 5 years there is similar sediment accretion in all three scenarios, however the accretion in the dredge and coastal structure scenario is more gradual. The seagrass is unlikely to be negatively impacted by this gradual accretion, with growth promoted by burial of 2.5 mm (Benham et al. 2019). While the rapid accretion modelled for the baseline and dredge only scenarios in the final year of the La Niña period at this site may negatively impact seagrass growth, these species are likely to rapidly recolonise.
- Modelling of erosion and deposition thresholds indicates that with dredging the Channel (Table 8Table 9 to Table 11; Appendix B: Maps 5 & 7):
    - in La Nina conditions there would be a smaller area of mangroves, and a slightly larger area of seagrass potentially impacted by erosion and a slightly smaller area potentially impacted by deposition, and in
    - El Nino conditions there would be slightly larger areas of seagrass potentially impacted by both deposition and erosion.
- Modelling of erosion and deposition thresholds indicates that with dredging the Channel and the Coastal Infrastructure (Table 8Table 9 to Table 11; Appendix B: Maps 6 & 8; in both La Nina and El Nino conditions there would be less erosion and deposition potentially impacting the seagrass than in baseline conditions, however there may be slightly more erosion of the mangroves.
- While the distribution of seagrass was not mapped in the western part of this zone, the areas of change above the sediment and erosion thresholds in the unmapped area do not change.

That is, in the dredging only scenario this sparse seagrass bed is likely to become slightly more stable. In the dredging and coastal structure scenario, there are unlikely to be any negative impacts to the seagrass, as the area will become more stable.

Table 13: Zone 2: Modelled deposition (-ve) / accretion (+ve) of sediment in each scenario (m^3).

	BASELINE	DREDGING ONLY	DREDGING & COASTAL STRUCTURE
La Niña	+20,000	+19,000	+27,000
El Niño	+15,000	+13,000	+25,000

6.2.1.3 Zone 3, the south-western peninsula of West Island.

- This Zone is a mangrove forest (frc environmental 2019), and is an area of deposition, with excess sediment from Zone 2 pushed into this area by tidal flows.
- This part of the Western Island has grown substantially from the 1950s to the early 2000s. Based on aerial imagery showing minimal growth, this area has stabilised in the last 10 – 15 years.

- The model suggests that over the 5-year morphological model run, the bank slowly accretes with more accretion in La Niña than El Niño periods ().
- Of note, there is no strong sediment pathway from the Spit and Dungeness Beach (Zones 7, 8 and 9) to the West Island area (Zones 1, 2 and 3).
- With dredging the channel, modelling indicate there would not be a significant impact to Zone 3 (Table 14)
- In the dredging and the coastal structure scenario, the modelling indicates there would be less deposition in this area (Table 14).
- Modelling of erosion and deposition thresholds indicates that in both development scenarios and in both La Nina or El Nino conditions there will be no impact to marine plants (Table 8Table 9 to Table 11; Appendix B: Maps 5 to 8).

Table 14: Zone 3: Modelled deposition (-ve) / accretion (+ve) of sediment in each scenario (m^3).

	BASELINE	DREDGING ONLY	DREDGING & COASTAL STRUCTURE
La Niña	+400	+400	+30
El Niño	+100	+100	+10

That is, neither of the proposed development scenarios are likely to have a significant impact on the mangroves in this Zone.

6.2.1.4 Zone 4, Enterprise Channel.

- The Enterprise Channel, where dredging is proposed, acts as a sediment sink between Dungeness Beach and the Western Island shoals (Zone 2 and 9). It is infilling at a rate of approximately 12,000 m^3 /year, predominantly driven by sediment coming from the east (the near shore Zone of Dungeness Beach).
- This Zone is predominantly bare sand, with a small area of mangroves associated with Zone 7, and a small area of seagrass associated with Zone 9 extending into this Zone.
- In both La Nina and El Nino conditions the area will be more stable with both proposed development scenarios, and the mangrove shoreline less likely to erode (Table 8Table 9 to Table 11; Appendix B Maps 5 to 8).

That is, there are unlikely to be any negative impacts to marine plants in this Zone, and there is likely to be positive impacts to mangroves.

6.2.1.5 Zones 5 and 6 on the eastern bank of the Enterprise Channel upstream of the spit.

- These Zones are relatively stable and partially armoured with a seawall.
- There is a large mangrove forest here, with mangroves lining the channel where there is no seawall.
- With dredging the channel, and with dredging the channel and installing a coastal structure there is no change compared to the baseline scenario for these Zones.

That is there are unlikely to be any impacts to marine plants in this Zone in either of the developed scenarios.

6.2.1.6 Zone 7, Dungeness Beach Spit.

- The Spit has rapidly eroded over the past 70 years, with major cyclones a major contribution to this erosion.
- The mangroves in this Zone are eroding, with a band of bare sand with mangrove debris along the foreshore, and sparse mangroves behind.

In both development scenarios, and in La Nina and El Nino conditions, the area above the erosion threshold in will decrease (Table 8 to Table 11). That is, the dredge and coastal structure scenario would result in less erosion of the mangroves, a positive outcome.

6.2.1.7 Zone 8, Dungeness Beach foreshore from the spit to the ramp and carpark.

- The shoreline along the Dungeness foreshore predominately consists of bare sand leading up to a band of dead mangroves and mangrove debris in the intertidal Zone that is up to 10 m wide. To landward of this band of dead mangroves there are some sparse mangroves for approximately 10 m, with density increasing landward.
- Along Dungeness Beach (Zones 8, 9 and 10) the morphology is more driven by tides rather than waves.
- The Dungeness beach foreshore is eroding, despite beach nourishment from the boat ramp.
- The modelling indicates that with dredging there would be slightly higher rates of erosion in this Zone (Table 15).
- Modelling indicates erosion is reduced in this Zone in the dredging and coastal infrastructure scenario (Table 15).

Modelling of erosion and deposition thresholds indicates that in La Nina and El Nino conditions in the dredge scenario the mangroves become more stable, and also in El Nino conditions with the Coastal Structure. However there would be a slight increase in deposition in La Nina conditions with the Coastal Structure (Table 8Table 9 to Table 11; Appendix B: Maps 5 to 7). That is, there would be less erosion of the mangrove lined foreshore, and consequent loss of mangroves:- a positive impact to marine plants.

Table 15: Zone 8: Modelled deposition (-ve) / accretion (+ve) of sediment in each scenario (m^3).

	BASELINE	DREDGING ONLY	DREDGING & COASTAL STRUCTURE
La Niña	-3,400	-3,500	-2,300
El Niño	-2,700	-2,700	-2,800

6.2.1.8 Zone 9

- Zones 9 and 10, and the intertidal area to the east of Zone 8, have net accretion, likely a result of the influx of sediment from the east, with sand regularly building up on the boat ramp in Zone 10. Approximately 5000 t per year are removed from the ramp, with

excavation up to 3 times per week. The sand is stockpiled next to the ramp and returned to the system upstream at Dungeness Beach (Water Technology 2024a).

- Shoals in this area continue to grow.
- In 2021, *Halodule uninervis* was the dominant species in Zone 9, in both monospecific and mixed species communities. Other seagrass species included *Nanozostera muelleri* and *Halophila decipiens*.
- In the previous survey in 2019 there was a slightly greater area of seagrass, in this Zone. However, fluctuations in the cover of seagrass cover in this area are expected due to the location of these beds on the mouth of the Dungeness Enterprise Channel, where there is sediment movement and significant fluctuations in turbidity.
- There is a small area of mangroves in zone 9, extending in from the mangrove lined shore in Zones 7 and 8.
- Modelling indicates there is a slight increase in deposition in the dredge only scenario, and a more significant increase in the dredge and coastal infrastructure scenario (Table 16).

Table 16 Zone 9: Modelled deposition (-ve) / accretion (+ve) of sediment in each scenario (m^3).

	BASELINE	DREDGING ONLY	DREDGING & COASTAL STRUCTURE
La Niña	+6,600	+6,500	+6,400
El Niño	+6,200	+6,100	+6,400

- Time series sites 3, 4, 5, 6, 7 and 8 are in this Zone (Appendix A). Sites 4 and 5 were in sparse seagrass. Site 3 was in sparse seagrass in 2019, but this area was bare in 2021 (Map 3 Appendix B). Sites 6, 7 and 8 were on bare substrate.
- At sites 3 and 4, the time series graphs indicate there is little difference between the base and dredge only scenarios.
- The time series graphs indicate that at site 3 the sediment bed level is far more stable in the dredge plus coastal structure scenario, than the other two scenarios and consequently seagrass is more likely to form a stable habitat in this scenario. Similarly at sites 4 and 5 the bed level is more stable in this scenario, and consequently provides a more stable habitat for seagrass growth.
- That is, the proposed dredging and coastal structure will stabilise sediment in this Zone, and consequently the seagrass beds are likely to become more stable. Although there is some accretion, the shoals remain within the appropriate depth range for seagrass growth. No negative impacts to seagrass are anticipated based on tis modelling.
- Time series sites 6, 7 and 8 are in the area where dredge sediment is modelled as being deposited, and consequently there is an increase bed level here. The area of marine plants in this area will be remapped prior to dredging, and no dredge spoil will be placed on marine plants. Modelling indicates that the dredge spoil material is stable, and moves very little, and consequently it will not pose a risk to marine plants.
- Modelling of erosion and deposition thresholds indicates that with dredging the Channel and with the Coastal Infrastructure there would be an overall improvement in the stability of the seagrass beds (Table 8Table 9 to Table 11; Appendix B: Maps 5 & 7).

6.2.1.9 Zone 10.

- A small area of seagrass extends into Zone 10 from Zone 9. The foreshore of Zone 10 appears to be a rock wall, with no mangroves.
- The modelling indicates that with dredging there would be slightly higher rates of erosion in Zone 10, with this erosion decreasing with distance from the dredge channel, with very little change in Zone 10 compared to the baseline.
- In Zone 10 there is little difference to the base scenario, however the coastal structure reduces sediment transport along Dungeness beach, reducing erosion and increasing accretion.
- In La Nina conditions in both scenarios, there is no change in the area above the erosion or deposition thresholds in the seagrass area. In El Nino conditions there is an improvement in the stability of the beds (Table 8 to Table 11; Appendix B Map 6).

6.2.1.10 Zone 11, inshore intertidal area further to the east.

- This Zone is not as protected as Zones 9 and 10. It has high sediment transport from east to west, with net erosion. The shoreline in this area has been eroding, with a seawall built along part of its length. There are no mangroves along this shoreline.
- This Zone is in the active coastal zone, and the morphology is driven by wave action.
- There do not appear to be any mangroves along the foreshore of this zone.
- The modelling indicates that with dredging there would be very little change compared to the baseline.
- Modelling indicates erosion is reduced in this Zone in the dredging and coastal infrastructure scenario. If there is any seagrass in this area, this more stable substrate would be beneficial to it.

6.2.1.11 Zone 12, the Hinchinbrook Channel.

- The Hinchinbrook Channel is subject to extreme variation in bed level. The area between Lucinda and Hinchinbrook Island is subject to higher wave energy than the rest of the area, and has a significantly higher tidal prism than that flowing through the Enterprise Channel. This results in ongoing movement of the shoals.
- There is a very small area of seagrass in this Zone, extending out from Zone 9.
- This Zone is in the active coastal Zone and the morphology driven by wave action.
- Modelling indicates there would be some impact in the channel with dredging, and some impact in the immediate vicinity of the coastal infrastructure in the dredging and coastal infrastructure scenario.
- Time series site 9 is in this Zone. There is very little difference in deposition and accretion rates for each scenario in this Zone in El Niño periods (Appendix A). In La Niña periods, there is less accretion in the dredging and coastal structure scenario than in the two other scenarios.
- Modelling of the thresholds indicate that overall the area of seagrass would become more stable (Table 8 to Table 11)

6.2.1.12 Summary of Indirect Impacts of Erosion and Sedimentation

In summary, the modelling indicates that the dredging and coastal structure would:

- significantly decrease the rate of deposition in the Enterprise Channel, resulting in less frequent dredging, and less requirement to dispose of the dredge material
- significantly increase the stability of both mangrove and seagrass sediments, decreasing the rate of mangrove loss, and likely resulting in increase in the area of seagrass.

6.2.2 Proposed Mitigation and Effectiveness

As the risks of sedimentation and erosion are considered to below, no mitigation is proposed. However, the marine plant communities will be monitored to confirm there are no long-term impacts (Section 12.4).

6.3 Increased Suspended Sediment

6.3.1 Potential Impact

Potential impacts of increased turbidity / sediment suspension and smothering on local communities may include:

- reduced growth of marine plants by limiting light for photosynthesis
- reduced respiration and feeding of benthic invertebrate communities leading to a reduction in abundance and biodiversity, and
- traumatization of fish gill tissues affecting growth and survival.

The effect of increased suspended solid concentrations and sediment deposition on marine vertebrate communities is likely to be minimal, primarily because mobile organisms tend to avoid unfavourable environments. While some marine vertebrates will avoid areas of high turbidity, these waters may attract a range of fishes, particularly juveniles, as it confers a greater degree of protection from predators. While there may be some impacts to the soft sediment benthic invertebrate communities, these are likely to be short term, and within the range of impacts already experienced by these communities.

The effects of increased suspended solids and sedimentation resulting from excavation, construction of the rock wall, and beach replenishment are highly variable and will depend on both the techniques used and the season. Sediment in the area to be dredged is predominantly medium grain sand, with some fine material (Water Technology 2024b). Coarse sediments, such as medium grained sand, settle from the water column quickly and are less likely to move away from the excavation site. Fine sediments remain suspended longer and may be carried further before settling and consequently, are more likely to smother marine organisms.

Hydrodynamic and sediment transport modelling indicates that the proposed dredging works will have minimal, short term and localised water quality impacts as (Water Technology 2019):

- the spatial extent of the dredge-generated sediment surface plume above 10mg/L was less than 4.6 km^2 in area, never extending more than 4.3 km northwest and 3.5 km east from the dredge (Figure 26). Compared to the naturally-variable concentration of total suspended solids in the region (measured median of approximately 40mg/L), this plume would not be visible
- suspended sediment plume concentrations above 100mg/L extended a maximum distance of 600m from the dredged zone
- the duration of maximum suspended sediment values generally lasted less than 6 hours, and
- sediment deposition was low, due to high shear stresses and strong current velocities

The maximum concentration of suspended sediment from dredging, predicted at the Boat Ramp ranged between 80mg/L (bottom) and 88mg/L (surface), whilst 2.5km upstream on the Dungeness Channel the maximum predicted suspended sediment concentration was less than 50mg/L, with a well-mixed water column. Further afield at the Herbert River mouth, the maximum predicted suspended sediment concentrations were around 8mg/L, less than one tenth the modelled concentrations at the boat ramp (Water Technology 2019).

For the modelling exercise, the dredging operation was assumed to run from Monday to Friday, over a 19-day period, with a dredge rate of 125m^3/hour.

Figure 26: Maximum concentration of suspended sediments due to dredging in surface waters, during typical dry season conditions and existing shoreline configuration.

Modelling indicates the concentration of suspended sediments due to dredging will increase over nearby seagrass beds during dredging, with a maximum increase of up to approximately 50 mg/L (Figure 26; Water Technology 2019).

Background turbidity measured for the modelling is shown in Table 17, along with conversion to total suspended solids (TSS).

The maximum amount that median turbidity (and consequently light reduction) is likely to increase is roughly equivalent to the 75th percentile. These periods of maximum turbidity will be relatively short (< 6 hours), and the entire dredging operation is likely to take less than 20 days, with the concentration of suspended sediment due to dredging returning to background once dredging ceases (Water Technology 2019).

Table 17: Turbidity percentiles measured in the dredge channel, and conversion to TSS (Water Technology 2019).

Percentiles	Turbidity (NTU)	Converted TSS (mg/L)
5th	4.9	9.3
25th	10.6	20.0
50th (median)	20.7	39.2
75th	52.1	98.5
95th	143.5	271.3

Seagrasses have adapted to a highly variable light environment and are tolerant to short-term reductions in light (Collier et al. 2012). Species of *Halodule* and *Halophila*, while susceptible to low light levels, produce large quantities of seeds, and are likely to rapidly recolonise following negative impacts (Collier et al. 2012). These species can stabilise the substrate and form the basis for later recolonisation by other species. The seagrass *Nanozostera muelleri* is also tolerant of short-term reductions in light availability such as those predicted by the modelling. For example, in experimental conditions, while shoot density decreased, this species survived a 66% decrease in light availability for over 60 days (Collier et al. 2012), and in Gladstone, very low light levels over two weeks had little impact on the health of this species (Chartrand et al 2012). Further, this species is dominant in estuarine environments where exposure to low light events through runoff and wind-driven resuspension are common, and it can recover in a matter of years from intense disturbances (Campbell and McKenzie 2004).

That is, while decreases in light availability due to dredging has the potential to negatively impact growth and survival of seagrass, the predicted impacts to light availability during the dredging operation are low to moderate, are of short duration, the total period of potential impact is relatively short, and the seagrass species growing in the area have adaptations to survive short term decreases in light availability. Consequently, the proposed dredging is unlikely to have a long-term indirect impact on the seagrass in the area.

6.3.2 Proposed Mitigation and Effectiveness

As sediment to be dredge is predominantly coarse, and likely to settle quickly, the risk of increased suspended sediment is low.

Risks will be further reduced via implementation of an Construction Management Plan for the proposed works which will include management measures to minimise the suspension of fine sediment, including:

- remapping the distribution of marine plant communities prior to works starting, and avoiding placing material in these areas
- ensuring dredging and beach replenishment is within the approved areas only by reference to electronic navigation aids and visual marks as required.
- maintaining pipeline and connectors to ensure there are no leaks
- monitoring dredge and placement plumes, and ceasing work when plumes exceed an appropriate trigger level (compared to background levels)

Dredging will only be conducted between 1 February and 31 October, to minimise impacts on seagrass flowering and fish migration and spawning (SARA Decision Notice 2025).

6.4 Disturbance of Acid Sulfate Soils (ASS) or Potential Acid Sulfate Soils (PASS)

6.4.1 Potential Impact

Disturbance of sediments during the proposed works may expose acid sulfate potential sediments to oxidising (acidifying) conditions that result in the release of acids to the ambient water.

Potential impacts of acidification include the:

- dissolution of clay minerals and the release of soluble aluminium, which is highly toxic to gilled animals (including fish, molluscs and crustacea) and aquatic plants
- release of soluble iron, also toxic to aquatic life in high concentration, and
- oxidation of ferrous iron causing large decreases in dissolved oxygen

While most of the sediment in the area to be dredged is dominated by sand with appreciable amounts of potential acidity, they also have sufficient Acid Neutralising Capacity (ANC) to neutralise any acidity formed on oxidation (Jacobs 2018).

However, there are minor intermittent layers in the main dredge channel, that are Acid Sulphate Soils with insufficient Acid Neutralising Capacity (ANC) to buffer any acidity generated on exposure to oxygen (Jacobs 2018).

6.4.2 Proposed Mitigation and Effectiveness

Risks will be further reduced via implementation of an Construction Management Plan for the proposed works which will include management measures to minimise impacts from ASS. In the event the works cause disturbance or oxidisation of acid sulfate sediments, the affected soil will be treated and thereafter managed (until the affected soil has been neutralised or contained) in accordance with the most recent Queensland and National Acid Sulfate Soil management guidelines, and certified by a suitably qualified person(s), confirming that the affected sediment has been neutralised or contained, in accordance with these guidelines.

6.5 Spills of Hydrocarbons and Other Contaminants

6.5.1 Potential Impact

Spills of hydrocarbons or other contaminants from the dredging vessel and / or other equipment may impact the local estuarine and marine ecosystems. Where the spill is a ‘once-off’, recovery is likely.

Hydrocarbons, heavy metals and other contaminants can have major impacts on estuarine communities, and can impact growth, morphology, reproduction and development of estuarine flora and fauna. The biological effects of toxicant discharge are usually greatest in low energy environments (such as within estuaries), where accumulation and retention in fine sediments occur (Gundlach & Hayes 1978; Jackson et al. 1989). Low energy, sheltered beaches show a much higher initial mortality, with the possible elimination of some species. Here, microbial degradation, rather than wave action is the principal force for breakdown and removal.

6.5.2 Proposed Mitigation and Effectiveness

Risks will be reduced via implementation of an Construction Management Plan for the proposed works which will include best-practice vessel management. Risks associated with

the spillage of fuels and other contaminants will be substantially reduced, if not eliminated, by:

- Storage of fuels, oils and batteries within safe areas that are designed and constructed in accordance with Australian Standards.
- Minimising the quantities of hazardous substances, fuel, oil and chemicals stored onboard.
- Banning smoking within 5 m of dangerous goods storage areas.
- Having and using appropriate spill containment kits including equipment for clean-up of spills on land and infrastructure (i.e. on the deck of the vessel) and spills to water (such as floating booms).
- Washing down dredge deck, dredge head/bucket and/or barge only within designated areas that minimise risks to the aquatic environment.
- Only releasing dredge material as a result of dredge/barge washing activities (i.e. no release of oil or other contaminants).
- Sweeping deck in preference to washing where possible.

Where these measures are implemented, the risk of impact due to spills of hydrocarbons or other contaminants to aquatic flora, fauna and environmental values is low.

6.6 Light

6.6.1 Potential Impact

Artificial light at night (ALAN) introduces light of an intensity and spectral composition that does not correspond to natural nocturnal light and that may alter natural light environment. ALAN may directly affect the behaviour of wildlife, and biological (circadian) rhythms with a variety of physiological effects, through interference with nocturnal melatonin production (Le Tallec et al. 2013). The increasing use of energy efficient lighting technology rich in short-wavelength light, poses significant ecological concerns for wildlife. In addition to intensity and spectral composition, the timing and duration of light exposure also influences the suppression of melatonin. Sensitivity to ALAN is likely to differ between taxa, although little scientific investigation has been conducted in this regard. ALAN may be manifested as direct light spill or sky glow (the diffraction and reflection of light in the atmosphere.

Artificial light can impact female turtle nest site selection and hatchling success due to disorientation and dispersal behaviour through direct light-spill, increased sky-glow and altered light horizons (DES 2021b). Densely vegetated dunes may serve as a buffer between the beach and sources of direct light-spill, aiding in successful nesting of female marine turtles. Turtle hatchlings prefer to move towards low and bright horizons and move away from horizons which are dark and elevated. Once in the water, hatchlings actively swim for 24 – 48 hrs to reach the offshore currents that are important for dispersal. They use various cues including light to orient seaward (Limpus & Kamrowski 2013).

Marine and estuarine fish have evolved with natural lighting cycles, and while research into the impacts of ALAN on marine fish is limited, research suggested that alterations to natural lighting disrupts behaviour, physiology and ecology of marine fishes (Becker et al. 2013; Schligler et al. 2021). Studies where estuarine fish were exposed to ALAN increased shoaling behaviour in the vicinity of the light source, as well as increasing the occurrence of large bodied piscivorous predators. Consequently, exposure to ALAN has the potential to increase predation on small-bodied fishes and create unnatural top-down trophic pressures on fish populations. Exposure to ALAN has also been shown to decrease survival and growth in coral reef fish, with long-term exposure to artificial light reducing both growth and

survival in juvenile fish. While ALAN may provide a predatory advantage for large-bodied predatory fish, it has a generally negative impact on juvenile and small-bodied fish and has the potential to influence the trophic structure of fish communities.

6.6.2 Proposed Mitigation and Effectiveness

Risks from light resulting from the proposed works are considered to be low, given the species that use the area, and the low requirements for lighting. Any impacts from lighting will be effectively mitigated through the adoption of best practice lighting design as set-out in the National Light Pollution Guidelines, which is based on six principles:

- Start with natural darkness, adding light only for specific purposes
- Use adaptive light controls to manage timing, intensity and colour
- Light only the area intended – keep lights close to the ground, directed and shielded to avoid light spill
- Use the lowest intensity lighting appropriate to the task
- Use non-reflective, dark coloured surfaces, and
- Use lights with reduced blue, violet and UV wavelengths.

Construction phase indirect impacts from ALAN on any listed species of aquatic fauna is expected to be negligible, as construction works will predominantly be limited to daylight hours. Further, use of external vessel lighting will be minimised, and limited to lighting required for safety.

Operational phase impacts will be negligible as any lighting associated with the proposed development will comply with the National Light Pollution Guidelines.

6.7 Noise, Air and Vibration Emissions

6.7.1 Potential Impact

While the area in the vicinity of the proposed works, is unlikely to be a high use area for threatened species, construction activities and improving boat access may increase the risk of impacts of emissions of air and vibration on marine fauna.

These potential impacts include (but are not limited to):

- Avoidance of the area due to excessive noise and vibration levels
- Changes in water quality from the settling of air pollutants impacting on nearby marine ecosystems
- Excessive vibrations causing damage to the health of marine organisms, such as impacts to their swim bladder.

6.7.2 Proposed Mitigation and Effectiveness

To minimise the potential impacts from noise, air, and vibration emissions, the following management measures will be implemented, and documented in the Construction Management Plan for the proposed works:

- Noise
    - Maintain all noise generating plant/equipment as per manufacturers' specifications and fit with standard noise control equipment (e.g. original mufflers, engine covers and attenuators).

  - Routine maintenance and inspection of all noise-generating equipment (including vessel engines) to reduce unnecessary increases in noise levels from the equipment
  - Where practical, engines, thrusters and auxiliary plant are not left on standby or running mode
  - Inform dredge crew to minimise noise where possible when the dredge is operating in a particularly noise sensitive environment.
  - No unnecessary use of horns or other audible signals on mobile plant/equipment.
  - Conduct maintenance dredging activities during daytime so that noise will travel a shorter distance and be less noticeable compared to background noise.
  - Avoid early morning and night works.
  - Ensure that there are periods during the day when activities cease, even for a short period (e.g. lunch, morning tea, afternoon tea).
  - Limit the idle time of equipment / vehicles at the operation.
- Air quality
  - Maintain all combustion plant, particularly engines and generators as per manufacturers' specifications.
  - Adjust trim and ballast appropriately to ensure effective operation.
  - Vibration
  - Maintain all plant/equipment as per manufacturers' specifications.

6.8 Boat Strike

6.8.1 Potential Impact

While the area in the vicinity of the proposed works, is unlikely to be a high use area for threatened species, construction activities and improving the boat access may increase the risk of impacts of boat strike on marine fauna.

6.8.2 Proposed Mitigation and Effectiveness

These risks are considered to be low, and will be reduced further by including a Fauna Management Plan in the Construction Management Plan that is consistent with the most recent version of the National Strategy for Reducing Vessel Strike on Cetaceans and Other Marine Megafauna (DEE 2017). Measures to minimise potential impacts to marine fauna during construction include:

- vessel crew will maintain a look out for marine mammals and turtles during all operations
- if prior to works, a marine mammal or turtle is identified within 150 metres, then works do not commence until the animal has passed
- if after works have commenced, a marine mammal or sea turtle is observed within 100 m of the noise emitting source, then works cease until the animal has passed
- if a marine mammal or turtle is sighted in the pre-defined observation and exclusion zones, project vessels operating in the area are notified and work ceases until the animal has passed
- site inductions for all vessel crew covering procedures to minimise disturbance to marine fauna

- training of all vessel crew in the identification of marine mammals and turtles
- adherence to speed limits of all vessels involved in construction, and
- movement restrictions including:
    - if a vessel in transit approaches a marine mammal or turtle (or vice versa), the vessel will take all care to avoid collisions, including stopping, slowing down, and/ or steering away
    - vessels will not intercept the path of travel, either behind or ahead of the animal, or approach head on, and will not pursue marine mammals or turtles
    - vessels will keep clear of the no approach zone
    - vessels will have a maximum speed of 5 knots in the caution zone
    - vessels will not change speed or course suddenly in the caution zone
- vessels will not enter the caution zone if animals are stranded, entangled or in distress Figure 27), and
    - vessels will avoid separation of adult and young marine mammals.

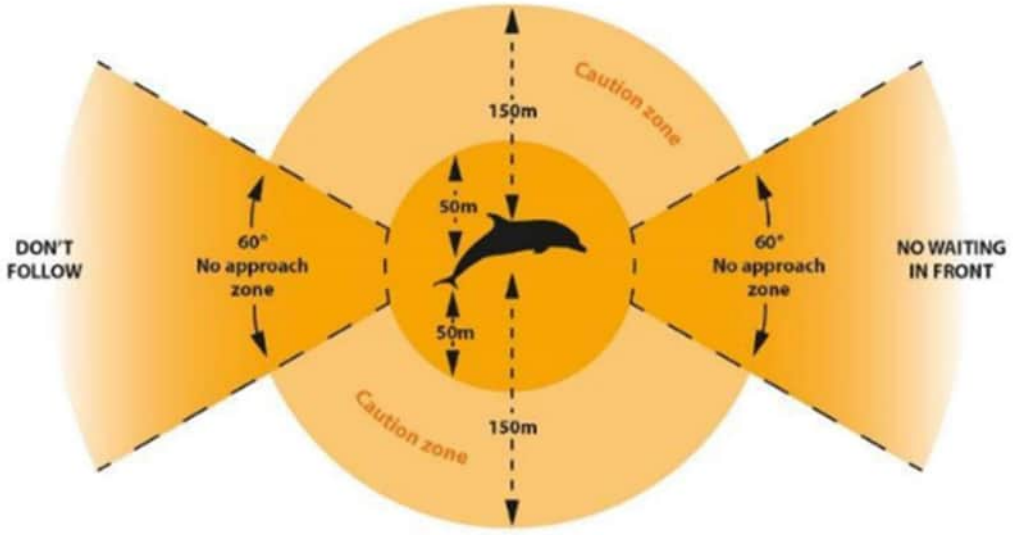

Figure 27: Caution and no approach zones for dolphins and turtles (DEE 2017).

Any distressed or damaged marine mammals or turtles will be reported to RSPCA QLD on 1300 284625 (the designated call centre for Queensland National Parks and Wildlife Service for marine mammal and turtles strandings).

A record of sighted animals will be maintained, including actions taken. Any incident involving the injured or killed animals will be immediately reported to the Supervisor, and appropriate emergency responses implemented.

With the implementation of these measures the risk of boat strike on marine fauna during construction is low.

During the operational phase, risk to marine fauna from boat strike can be minimised by the implementation of low-speed zones in the dredge channel and over the seagrass beds in the vicinity of the proposed works.

6.9 Increase in Litter

6.9.1 Potential Impact

Marine debris is a serious threats to coastal areas. Direct impacts include entanglement of marine fauna (including turtles, dugong, seabirds, dolphins, sharks, fish, crabs and sea snakes), and ingestion of large pieces of plastic (fishing gear, plastic bags, food wrapping) and micro plastics. Further, harmful chemicals accumulate on plastic debris increasing risk when ingested, and floating plastic debris can accelerate the spread of invasive species.

Works during construction and improved boating access may lead to an increase in the amount of litter entering the marine environment.

6.9.2 Proposed Mitigation and Effectiveness

The risks associated with increased litter during construction and dredging will be mitigated by addressing objectives in the Commonwealth Threat Abatement Plan for the impacts of marine debris on the vertebrate wildlife of Australia's coasts and oceans (Commonwealth of Australia 2018), and will include:

- educational signage, explicitly stating the risk to wildlife of disposing rubbish in the water
- daily inspection and removal of litter from the site and waterways, potentially through a funded community ranger program
- provision of appropriate and sufficient containers for litter, including specific bins for the disposal of damaged fishing line and tackle at land based recreational fishing locations within the Project footprint
- regular collection and maintenance of litter containers
- waste storage facilities secured to avoid removal of waste either unintentionally or through vandalism
- use of devices to prevent litter entering the water such as sediment fences and trash racks
- banning single use plastic items on site, and
- removal of unwanted material off site.

Risks in the operational phase due to increased activity in the area, will be minimised by:

- educational signage, explicitly stating the risk to wildlife of disposing rubbish in the water
- inspection and removal of litter from the site and waterways
- provision of appropriate and sufficient containers for litter, including specific bins for the disposal of damaged fishing line and tackle
- regular collection and maintenance of litter containers
- waste storage facilities secured to avoid removal of waste either unintentionally or through vandalism, and
- use of devices to prevent litter entering the water such as sediment fences and trash racks.

6.10 Pest Species

6.10.1 Potential Impact

The introduction of aquatic pest species by construction vessels may also be of concern. Where vessels and equipment are appropriately maintained under a construction management plan in accordance with Commonwealth and State Guidelines, this is considered to be a low risk.

6.10.2 Proposed Mitigation and Effectiveness

Preventative measures will include:

- Ballast water will be managed in accordance with the *Biosecurity Act 2015.*
- Retain ballast tanks filled with freshwaters without treatment.
- If discharge of ballast tanks holding seawater is required for safety purposes, exchange any ballast tanks prior to arrival with seawaters at a location as distant from the coastline or other shallow (<100m) areas as possible, but not less than 12nm.
- Use of local (Qld) boats where available.
- Inspecting and cleaning all equipment and gear that may get wet (Australian Government 2018).
- Only washdown dredge deck, dredge head/bucket and/or barge in the designated area (e.g. adjacent to the unload location).
- Release only dredge material as a result of dredge/barge washing activities (i.e. no release of oil or other contaminants).
- Conduct sweeping of deck in preference to washing where possible.
- Take reasonable steps to prevent the introduction of marine pests into the GBRMP and the transfer of pests between locations within the GBRMP.
- Summary of potential marine pests (including photographs and descriptions) to be compiled and, referred to in start-up meetings by Dredge Contractor and kept on board vessels for reference.
- Ensuring vessels have an appropriate in-service, approved anti-fouling coating.
- Cleaning vessels between locations – in a drydock or slipway, or in the water (if allowed by the relevant authority).
- Monitor visually for presence of marine pests in water and at washdown locations.
- Conduct regular reviews of the log and implementation of the washdown and ballast/de-ballasting operations.

Vessel operators photograph, where possible collect a sample, and report suspected marine pests, and sick or diseased marine animals to Biosecurity Queensland on 13 25 23 (QLD Government and Australian Government 2018).

7.0 Assessment of Potential Impacts to Marine Threatened and Migratory Species

7.1.1 Critically Endangered Species

No critically endangered marine species are likely to use the area potentially impacted by the proposed works.

7.1.2 Endangered Species

The following endangered marine species may use the area potentially impacted by the proposed works:

- loggerhead turtle (*Caretta caretta*), and
- olive ridley turtle (*Lepidochelys olivacea*).

It is unlikely the proposed works will have a significant residual impact on these species (Table 18).

Table 18 Significant impact criteria and assessment for marine species listed as Endangered with moderate to very high likelihood of occurrence at the Study Area.

Significant Impact Criteria	Assessment	Significant Impact Likelihood
An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:		
***Caretta caretta* – Loggerhead Turtle**		
Lead to a long-term decrease in the size of the population	Loggerhead turtles may feed on the seagrass beds in the Study Area, and pass through the surrounding areas and channel. Due to extensive seagrass beds in the area, and the loggerheads nature as a highly mobile species, it is not likely that the small area of seagrass that will be directly impacted by the Project will have any impact on the population. Overall, the area of seagrass is likely to increase as a result of the proposed works. No BIA's (Biologically Important Areas), are in, or in the vicinity of, the Study Area for this species (Geoscience Australia 2026).	Not likely
Reduce the area of occupancy of the species	Due to extensive seagrass habitat in the surrounding areas of the Study Area, the mobile nature of loggerhead turtles, and the minimal extent and duration of impact on the seagrass community of the Study Area, the proposed works are unlikely to impact on the area of occupancy for the species.	Not likely
Fragment an existing population into two or more populations	The works will not directly or indirectly physically or otherwise fragment or separate a loggerhead turtle population, with records generally located along the eastern coastline.	Not likely
Adversely affect habitat critical to the survival of the species	There is no habitat critical to the survival of the species that has the potential to be impacted by the Project.	Not likely
Disrupt the breeding cycle on the population	The Study Area is not within a known or important loggerhead turtle breeding site (DEECCW 2017).	Not likely
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The Study Area is not considered to be important habitat of loggerhead turtles. The small amount of seagrass that will be permanently impacted is not considered to have any potential for impact on the species; furthermore, the stabilization of the area as a	Not likely

Significant Impact Criteria	Assessment	Significant Impact Likelihood
	result of the works has the potential for increasing available habitat for this species.	
Result in invasive species that are harmful to a critically endangered species becoming established in the endangered or critically endangered species habitat	The Project is unlikely to facilitate the spread or increase proliferation of pest species at the Study Area as marine vessels are likely to be of local origin and pest species will be managed in accordance with standard procedures.	Not likely
Introduce disease that may cause the species to decline	The Project is unlikely to facilitate the spread or increase proliferation of diseases at the Study Area as marine vessels are likely to be of local origin and maintained in accordance with standard procedures.	Not likely
Interfere with the recovery of the species	The Project, and associated indirect impacts, are unlikely to interfere with the recovery of the loggerhead turtle as: • the Study Area does not include habitat critical to the survival of the species, or any BIAs. • impact on seagrass is considered to be minor, with potential for a net increase as the area stabilizes post-works	Not likely
***Lepidochelys olivacea* – Olive Ridley Turtle**		
Lead to a long-term decrease in the size of the population	Olive ridley turtles may pass through the surrounding areas and channel, however there are unlikely to be large numbers in the area. The potential impacts will not lead to a long-term decrease in the size of the population. No BIA's (Biologically Important Areas), are in, or in the vicinity of, the Study Area for this species (Geoscience Australia 2026).	Not likely
Reduce the area of occupancy of the species	Due to the mobile nature of olive ridley turtles, and the minimal extent and duration of potential impacts the proposed works are unlikely to impact on the area of occupancy for the species.	Not likely
Fragment an existing population into two or more populations	The works will not directly or indirectly physically or otherwise fragment or separate a population of this species.	Not likely
Adversely affect habitat critical to the survival of the species	There is no habitat critical to the survival of the species that has the potential to be impacted by the Project.	Not likely
Disrupt the breeding cycle on the population	While the PMST notes breeding is likely in the area, nesting is unlikely in the vicinity of the proposed works as the foreshore is rapidly eroding and covered in large marine debris.	Not likely

Significant Impact Criteria	Assessment	Significant Impact Likelihood
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The Study Area is not considered to be important habitat for this species.	Not likely
Result in invasive species that are harmful to a critically endangered species becoming established in the endangered or critically endangered species habitat	The Project is unlikely to facilitate the spread or increase proliferation of pest species at the Study Area as marine vessels are likely to be of local origin and pest species will be managed in accordance with standard procedures.	Not likely
Introduce disease that may cause the species to decline	The Project is unlikely to facilitate the spread or increase proliferation of diseases at the Study Area as marine vessels are likely to be of local origin and maintained in accordance with standard procedures.	Not likely
Interfere with the recovery of the species	The Project, and associated indirect impacts, are unlikely to interfere with the recovery of the olive ridely turtle as: the Study Area does not include habitat critical to the survival of the species, or any BIAs, and as potential impacts to potential habitat are minor.	Not likely

7.1.3 Vulnerable Species

The following vulnerable marine species may occur in the area potentially impacted by the proposed works:

- Australian snubfin dolphin (*Orcaella heinsohni*)
- Australian humpback dolphin (*Sousa sahulensis*)
- green turtle (*Chelonia mydas*)
- hawksbill turtle (*Eretmochelys imbricata*)
- flatback turtle (*Natator depressus*), and
- green sawfish (*Pristis zijsron*)
- water mouse (*Xeromys myoides*)
- ant plant (*Myrmecodia beccari*).

It is unlikely the proposed works will have a significant residual impact on these species (Table 19).

Table 19: Significant impact criteria and assessment for marine species listed as Vulnerable with moderate to very high likelihood of occurrence at the Study Area

Significant Impact Criteria	Assessment	Significant Impact Likelihood
An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:		
***Sousa sahulensis* (Australian humpback dolphin) and *Orcaella heinsohni* (Australian snubfin dolphin)**		
Lead to a long-term decrease in the size of an important population of the species	For the Australian snubfin dolphin, no BIA's are present in the area of the Study Area (Geoscience Australia 2026). The Study Area is considered a BIA in regard to breeding area for the Australian humpback dolphin (Geoscience Australia 2026). Although both of these dolphin species have the potential to use habitat within and surrounding the area of the Study Area, the works are not considered to have the potential to impact the size of the population of these species.	Not likely
Reduce the area of occupancy of an important population	Due to extensive comparable habitat in the surrounding areas of the Study Area, the mobile nature of these dolphin species, and the minimal extent and duration of impact on habitat features of the Study Area, the proposed works are unlikely to impact on the area of occupancy for the species.	Not likely
Fragment an existing population into two or more populations	The works will not directly or indirectly physically or otherwise fragment or separate populations of these dolphin species.	Not likely
Adversely affect habitat critical to the survival of the species	There is no habitat critical to the survival of the species that has the potential to be impacted by the Project.	Not likely
Disrupt the breeding cycle of important populations.	The Study Area is not within a known important area for an important population of Australian snubfin dolphin; hence the works are not considered to have the potential for impacting the breeding cycle of this species. The Study Area is within a BIA for reproduction for the Australian humpback dolphin. This BIA, is one of a number of BIA for this species along the Queensland coast, with other BIA east of Cape York, Rockhampton and Gladstone, and from Hervey Bay to the NSW border. The BIA the Study Area is in, is approximately 500 km long by 10 to 60 km wide. That is the area of potential impact from the proposed works is less than 0.05% of this BIA. The mitigation, including ceasing work when a marine mammal is sighted, control of noise emissions, and the relatively brief nature of the work, will ensure there are no significant impacts to breeding. While small subpopulation sizes coupled with low reproductive rates makes the species vulnerable to even low rates of anthropogenic mortality, there are no recorded important populations of this species in this	Not likely

Significant Impact Criteria	Assessment	Significant Impact Likelihood
	area (DCCEEW 2025). The proposed works are unlikely to impact the breeding cycle of an important population of this species.	
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The Study Area is not considered to be important habitat of Australian snubfin dolphins. The potential impact to the BIA for Australian humpback dolphin is very small, mitigation will minimise any potential impact, the proposed works are likely to increase the area of seagrass, which may indirectly benefit this species. That is the proposed woks are unlikely to impact this species such that it is likely to decline.	Not likely
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species habitat	The works are unlikely to facilitate the spread or increase proliferation of pest species at the Study Area as marine vessels are likely to be of local origin and pest species will be managed in accordance with standard procedures.	Not likely
Introduce disease that may cause the species to decline	The works are unlikely to facilitate the spread or increase proliferation of diseases at the Study Area as marine vessels are likely to be of local origin and maintained in accordance with standard procedures.	Not likely
Interfere substantially with the recovery of the species	The proposed works, and associated indirect impacts, are unlikely to interfere with the recovery of these dolphin species as the Study Area does not include habitat critical to the survival of the species, with the exception of the BIA for reproduction of the Australian humpback dolphin, of which the impact will be irrelevant in comparison to the large extent of habitat available to this species locally.	Not likely
***Chelonia mydas* – Green Turtle, *Eretmochelys imbricata* – Hawkesbill Turtle and *Natator depressus* – Flatback Turtle**		
Lead to a long-term decrease in the size of an important population of the species	These turtles may use the seagrass beds around the Study Area and pass through the surrounding areas and channel. Due to extensive habitat available in the area, and the highly mobile nature of these species, it is not likely that the potential impacts of the proposed works will have any impact on these populations. No BIA's are present for these species in, or in the vicinity of, the Study Area (Geoscience Australia, 2026).	Not likely
Reduce the area of occupancy of an important population	Due to extensive habitat available in the area, the highly mobile nature of these species, and the minimal extent and duration of potential impacts, the proposed works are unlikely to impact on the area of occupancy of these species.	Not likely
Fragment an existing population into two or more populations	The works will not directly or indirectly physically or otherwise fragment or separate populations of these species.	Not likely

Significant Impact Criteria	Assessment	Significant Impact Likelihood
Adversely affect habitat critical to the survival of the species	There is no habitat critical to the survival of these species that has the potential to be impacted by the Project.	Not likely
Disrupt the breeding cycle of important populations	The Study Area is not within known or important breeding sites(DEECCW, 2017).	Not likely
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The Study Area is not considered to be important habitat for these species, and the potential impact to aquatic habitats is minimal. The small amount of seagrass that will be permanently impacted is not considered to have any potential for impact on these species; furthermore, the stabilization of the area as a result of the works has the potential for increasing available habitat for these species.	Not likely
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species habitat	The works are unlikely to facilitate the spread or increase proliferation of pest species at the Study Area as marine vessels are likely to be of local origin and pest species will be managed in accordance with standard procedures.	Not likely
Introduce disease that may cause the species to decline	The works are unlikely to facilitate the spread or increase proliferation of diseases at the Study Area as marine vessels are likely to be of local origin and maintained in accordance with standard procedures.	Not likely
Interfere substantially with the recovery of the species	The proposed works, and associated indirect impacts, is unlikely to interfere with the recovery of these species as: • the Study Area does not include habitat critical to the survival of these species, or any BIAs. • impact on habitat, including seagrass is minor, with potential for a net increase as the area stabilizes post-works.	Not likely
***Pristis zijsron* – Green Sawfish**		
Lead to a long-term decrease in the size of an important population of the species	Due to extensive habitat available in the area, it is not likely that the potential impacts of the proposed works will have any impact on an important population of this species. No BIA's are present for these species in, or in the vicinity of, the Study Area (Geoscience Australia, 2026).	Not likely
Reduce the area of occupancy of an important population	Due to extensive habitat available in the area, and the minimal extent and duration of potential impacts, the proposed works are unlikely to impact on the area of occupancy of this species.	Not likely
Fragment an existing population into two or more populations	The works will not directly or indirectly physically or otherwise fragment or separate populations of this species.	Not likely
Adversely affect habitat critical to the survival of the species	There is no habitat critical to the survival of this species that has the potential to be impacted by the Project.	Not likely

Significant Impact Criteria	Assessment	Significant Impact Likelihood
Disrupt the breeding cycle of important populations	The Study Area is not within known or important breeding sites of an important population of this species (DEECCW, 2017).	Not likely
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The Study Area is not considered to be important habitat for this species, and the potential impact to aquatic habitats is minimal, and will not result in a decline of this species.	Not likely
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species habitat	The works are unlikely to facilitate the spread or increase proliferation of pest species at the Study Area as marine vessels are likely to be of local origin and pest species will be managed in accordance with standard procedures.	Not likely
Introduce disease that may cause the species to decline	The works are unlikely to facilitate the spread or increase proliferation of diseases at the Study Area as marine vessels are likely to be of local origin and maintained in accordance with standard procedures.	Not likely
Interfere substantially with the recovery of the species	The proposed works, and associated indirect impacts, are unlikely to interfere with the recovery of this species as: • the Study Area does not include habitat critical to the survival of this species, or any BIAs. • impact on habitat is minor.	Not likely
***Xeromys myoides* – Water Mouse**		
Lead to a long-term decrease in the size of an important population of the species	Water mouse may be associated with the mangroves along the shoreline. However there is extensive similar habitat available in the area, and the impact to mangrove habitat is very minor.	Not likely
Reduce the area of occupancy of an important population	Due to extensive habitat available in the area, and the minimal extent of potential impacts, the proposed works are unlikely to impact on the area of occupancy of this species.	Not likely
Fragment an existing population into two or more populations	The works will not directly or indirectly physically or otherwise fragment or separate populations of this species.	Not likely
Adversely affect habitat critical to the survival of the species	There is no habitat critical to the survival of this species that has the potential to be impacted by the Project.	Not likely
Disrupt the breeding cycle of important populations	The Study Area is not within known or important breeding sites(DEECCW, 2017).	Not likely
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The Study Area is not considered to be important habitat for this species, the direct loss of mangrove habitat is minimal, and is likely to be offset by the stabilisation of mangroves as a result of the proposed work (i.e. the proposed work will reduce the current loss of mangroves due to erosion).	Not likely

Significant Impact Criteria	Assessment	Significant Impact Likelihood
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species habitat	The works are unlikely to facilitate the spread or increase proliferation of pest species at the Study Area as marine vessels are likely to be of local origin and pest species will be managed in accordance with standard procedures.	Not likely
Introduce disease that may cause the species to decline	The works are unlikely to facilitate the spread or increase proliferation of diseases at the Study Area as marine vessels are likely to be of local origin and maintained in accordance with standard procedures.	Not likely
Interfere substantially with the recovery of the species	The proposed works, and associated indirect impacts, are unlikely to interfere with the recovery of these species as: • the Study Area does not include habitat critical to the survival of these species. • impact on habitat is minor, with potential for a net increase as the area stabilizes post-works.	Not likely
***Myrmecodia beccarii* – Ant Plant**		
Lead to a long-term decrease in the size of an important population of the species	Ant plants may be associated with the mangroves along the shoreline. However, there is extensive similar habitat available in the area, and the impact to mangrove habitat is very minor. Marine plants will be survey prior to the works commencing, and any ant plants that would be directly impacted by the works will be translocated to suitable habitat in the nearby area.	Not likely
Reduce the area of occupancy of an important population	Due to extensive habitat available in the area, and the minimal extent of potential impacts, the proposed works are unlikely to impact on the area of occupancy of this species.	Not likely
Fragment an existing population into two or more populations	The works will not directly or indirectly physically or otherwise fragment or separate populations of this species.	Not likely
Adversely affect habitat critical to the survival of the species	There is no habitat critical to the survival of this species that has the potential to be impacted by the Project.	Not likely
Disrupt the breeding cycle of important populations	The proposed work will not disrupt the breeding cycle of this plant.	Not likely
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The Study Area is not considered to be important habitat for this species, the direct loss of mangrove habitat is minimal, and is likely to be offset by the stabilisation of mangroves as a result of the proposed work (i.e. the proposed work will reduce the current loss of mangroves due to erosion).	Not likely
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species habitat	The works are unlikely to facilitate the spread or increase proliferation of pest species at the Study Area as marine vessels are likely to be of local origin and pest species will be managed in accordance with standard procedures.	Not likely

Significant Impact Criteria	Assessment	Significant Impact Likelihood
Introduce disease that may cause the species to decline	The works are unlikely to facilitate the spread or increase proliferation of diseases at the Study Area as marine vessels are likely to be of local origin and maintained in accordance with standard procedures.	Not likely
Interfere substantially with the recovery of the species	The proposed works, and associated indirect impacts, are unlikely to interfere with the recovery of these species as: • the Study Area does not include habitat critical to the survival of these species. • impact on habitat is minor, with potential for a net increase as the area stabilizes post-works.	Not likely

7.1.4 Migratory Species

The following marine migratory species are likely to use the area potentially impacted by the proposed works:

- humpback whale (*Megaptera novaeangliae*)
- Australian snubfin dolphin (*Orcaella heinsohni*)
- Australian humpback dolphin (*Sousa sahulensis*)
- dugong (*Dugong dugon*)
- loggerhead turtle (*Caretta caretta*)
- green turtle (*Chelonia mydas*)
- hawksbill turtle (*Eretmochelys imbricata*)
- olive ridley turtle (*Lepidochelys olivacea*)
- flatback turtle (*Natator depressus*)
- estuarine crocodile (*Crocodylus porosus*)
- green sawfish (*Pristis zijsron*)
- narrow sawfish (*Anoxypristis cuspidate*)

There is unlikely to be a significant residual impact on any of these species (Table 20).

Table 20: Significant impact criteria and assessment for species listed as Migratory, with moderate to very high likelihood of occurrence in the Study Area

Significant Impact Criteria	Assessment	Significant Impact Likelihood
An action is likely to have a significant impact on a migratory species if there is a real chance or possibility that it will:		
Humpback Whale, Australian Humpback Dolphin, Australian Snubfin Dolphin, Marine Turtles, Dugong, Salt-Water Crocodiles, Green Sawfish and Narrow Sawfish		
Substantially modify (including fragmenting, altering fire regimes, altering nutrient cycles or altering	The proposed work will not substantially modify important habitat for populations of humpback whale, Australian humpback and	Not likely

Significant Impact Criteria	Assessment	Significant Impact Likelihood
hydrological cycles), destroy or isolate an area of important habitat for a migratory species	snubfin dolphin, marine turtles, dugong, salt-water crocodiles, green sawfish or narrow sawfish.	
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species	The works are unlikely to facilitate the spread or increase proliferation of pest species in the Study Area as marine vessels are likely to be of local origin and pest species will be managed in accordance with standard procedures.	Not likely
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species	While the area in the vicinity of the proposed work is listed as a BIA for breeding for Australian humpback dolphin, potential impacts from the proposed works are minimal and highly unlikely to disrupt breeding activities of this species (Table 19). The area in the vicinity of the proposed work is also a BIA for breeding for humpback whales. This BIA stretches from Cape York to approximately Bundaberg, and ranges in width from approximately 100 to 600 km. The area of potential impact from the proposed works is a very small component of this. The proposed mitigation, The proposed works are unlikely to disrupt the lifecycle of an ecologically significant proportion of the population of any listed migratory species.	Not likely

8.0 Assessment of Potential Impacts to Avian Threatened and Migratory Species

8.1 Critically Endangered Species

The curlew sandpiper and Eastern curlew, listed as critically endangered, are moderately likely to use the area potentially impacted by the proposed works.

It is unlikely the proposed works will have a significant impact on these species (**Table 21**).

Table 21: Significant impact criteria and assessment for avian species listed as Endangered with moderate to very high likelihood of occurrence at the Study Area.

Significant Impact Criteria	Assessment	Significant Impact Likelihood
An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:		
***Calidris ferruginea* – Curlew Sandpiper and *Numenius madagascariensis* – Eastern Curlew**		

Significant Impact Criteria	Assessment	Significant Impact Likelihood
Lead to a long-term decrease in the size of the population	The potential impact to habitat for these species is very minor, and they are unlikely to be impacted in any other way by the proposed works.	Not likely
Reduce the area of occupancy of the species	The proposed works will not impact on the area of occupancy for the species.	Not likely
Fragment an existing population into two or more populations	The works will not directly or indirectly physically or otherwise fragment or separate populations of these species.	Not likely
Adversely affect habitat critical to the survival of the species	There is no habitat critical to the survival of these species that has the potential to be impacted by the Project.	Not likely
Disrupt the breeding cycle on the population	The Study Area is not within a known or important breeding area for these species.	Not likely
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The potential impact to habitat for these species is very minor, and there is extensive available habitat in the region.	Not likely
Result in invasive species that are harmful to a critically endangered species becoming established in the endangered or critically endangered species habitat	The Project is unlikely to facilitate the spread or increase proliferation of pest species at the Study Area as marine vessels are likely to be of local origin and pest species will be managed in accordance with standard procedures.	Not likely
Introduce disease that may cause the species to decline	The Project is unlikely to facilitate the spread or increase proliferation of diseases at the Study Area as marine vessels are likely to be of local origin and maintained in accordance with standard procedures.	Not likely
Interfere with the recovery of the species	The Project, and associated indirect impacts, are unlikely to interfere with the recovery of these species as: • the Study Area does not include habitat critical to the survival of the species • any potential impacts to habitat for these species are very minor.	Not likely

8.2 Endangered Species

Charadrius mongolus (lesser sand plover) is the only endangered avian species that may use the area potentially impacted by the proposed works:

It is unlikely the proposed works will have a significant impact on this species (**Table 22**).

Table 22: Significant impact criteria and assessment for avian species listed as Endangered with moderate to very high likelihood of occurrence at the Study Area.

Significant Impact Criteria	Assessment	Significant Impact Likelihood
An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:		
***Charadrius mongolus* – Lesser Sand Plover**		
Lead to a long-term decrease in the size of the population	The potential impact to habitat for this species is very minor, and they are unlikely to be impacted in any other way by the proposed works.	Not likely
Reduce the area of occupancy of the species	The proposed works will not impact on the area of occupancy for the species.	Not likely
Fragment an existing population into two or more populations	The works will not directly or indirectly physically or otherwise fragment or separate populations of this species.	Not likely
Adversely affect habitat critical to the survival of the species	There is no habitat critical to the survival of this species that has the potential to be impacted by the Project.	Not likely
Disrupt the breeding cycle on the population	The Study Area is not within a known or important breeding area for this species.	Not likely
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The potential impact to habitat for this species is very minor, and there is extensive available habitat in the region.	Not likely
Result in invasive species that are harmful to a critically endangered species becoming established in the endangered or critically endangered species habitat	The Project is unlikely to facilitate the spread or increase proliferation of pest species at the Study Area as marine vessels are likely to be of local origin and pest species will be managed in accordance with standard procedures.	Not likely
Introduce disease that may cause the species to decline	The Project is unlikely to facilitate the spread or increase proliferation of diseases at the Study Area as marine vessels are likely to be of local origin and maintained in accordance with standard procedures.	Not likely
Interfere with the recovery of the species	The Project, and associated indirect impacts, are unlikely to interfere with the recovery of this species as: • the Study Area does not include habitat critical to the survival of the species	Not likely

Significant Impact Criteria	Assessment	Significant Impact Likelihood
	• any potential impacts to habitat for these species are very minor.	

8.3 Vulnerable Species

The following vulnerable avian species may occur in the area potentially impacted by the proposed works:

- ruddy turnstone
- red knot
- great knot
- greater sand plover
- grey plover
- little tern
- terek sandpiper

It is unlikely the proposed works will have a significant impact on these species (**Table 23**).

Table 23: Significant impact criteria and assessment for avian species listed as Vulnerable with moderate to very high likelihood of occurrence at the Study Area

Significant Impact Criteria	Assessment	Significant Impact Likelihood
An action is likely to have a significant impact on a critically vulnerable species if there is a real chance or possibility that it will:		
Lead to a long-term decrease in the size of an important population of the species	The potential impacts to these species and to their habitat are very minor or nil, and consequently there will not be an impact on an important population of these species.	Not likely
Reduce the area of occupancy of an important population	The impacts to habitat are very minor and will not reduce the area of occupancy for an important population of these species.	Not likely
Fragment an existing population into two or more populations	The works will not directly or indirectly physically or otherwise fragment or separate populations of these species.	Not likely
Adversely affect habitat critical to the survival of the species	There is no habitat critical to the survival of these species that has the potential to be impacted by the Project.	Not likely
Disrupt the breeding cycle of important populations.	The Study Area is not within a breeding site for an important population of any of these species, and consequently the proposed works will not disrupt the breeding cycle of an important population.	Not likely
Modify, destroy, remove, isolate or decrease the availability or quality of	The potential impacts to the habitat of these species are very minor or nil, and will not result in the decline of any of these species.	Not likely

Significant Impact Criteria	Assessment	Significant Impact Likelihood
habitat to the extent that the species is likely to decline		
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species habitat	The works are unlikely to facilitate the spread or increase proliferation of pest species at the Study Area as marine vessels are likely to be of local origin and pest species will be managed in accordance with standard procedures.	Not likely
Introduce disease that may cause the species to decline	The works are unlikely to facilitate the spread or increase proliferation of diseases at the Study Area as marine vessels are likely to be of local origin and maintained in accordance with standard procedures.	Not likely
Interfere substantially with the recovery of the species	The proposed works, and associated indirect impacts, are unlikely to interfere with the recovery of these species as the Study Area does not include habitat critical to the survival of these species.	Not likely

8.4 Migratory Species

Avian migratory species are likely to use the area potentially impacted by the proposed works. None of these species are likely to be significantly impacted by the proposed work (**Table 24**).

Table 24: Significant impact criteria and assessment for avian species listed as Migratory, with moderate to very high likelihood of occurrence in the Study Area

Significant Impact Criteria	Assessment	Significant Impact Likelihood
An action is likely to have a significant impact on a migratory species if there is a real chance or possibility that it will:		
Substantially modify (including fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	The proposed work will not substantially modify important habitat for these species.	Not likely
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species	The works are unlikely to facilitate the spread or increase proliferation of pest species at the Study Area as marine vessels are likely to be of local origin and pest species will be managed in accordance with standard procedures.	Not likely
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species	Potential impacts from the proposed works are minimal and highly unlikely to disrupt breeding activities of these species	Not likely

9.0 Assessment of Potential Significant Impacts to Great Barrier Reef Marine Park

9.1 Impact Assessment

The seaward end of the proposed dredging and the breakwater is in the Great Barrier Reef Marine Park (GBRMP) in a Habitat Protection Zone. The replenishment area is not in the Marine Park (Figure 18).

Potential direct and indirect impacts from the Project and the proposed mitigation measures are described in Section 6.0. However, the design footprint within the GBRMP consists only of areas composed of sandy substrate, with no marine plants present.

In summary, potential impacts to the GBRMP consist of:

- direct impacts to marine habitat within the GBRMP are very minor, consisting of the outer portion of the dredge channel and of the breakwater
- modelling indicates sedimentation as a result of dredging is likely to be low and short lived (Water Technology 2024a and b), and consequently there is unlikely to be a significant long-term impacts on marine habitats as a result of dredging
- impacts to water quality are likely to be low. Turbidity will be monitored, and dredging will cease where it exceeds agreed thresholds based on background levels
- risk of impacts from ASS are low, as any ASS will be managed according to National and State Guidelines
- hydrocarbon and other contaminants spills may occur due to the requirement to refuel and maintain heavy vehicles. However, is expected to be managed through the DMP, DMPF and suitable contaminant storage
- risks of contaminant spills will be managed via a Construction Management Plan
- risks from light are considered to be low and the works and operation of the facility will comply with the National Light Pollution Guidelines
- marine fauna will be monitored prior to and during any works
- risks from noise, air and vibration emissions are considered to be low and will be managed via the Construction Management Plan
- risk from boat strike is low, and will be managed via a Construction Management Plan
- risks from increased litter will be addressed in accordance with the Commonwealth Threat Abatement Plan for the impacts of marine debris on the vertebrate wildlife of Australia's coasts and oceans
- will be no increase in the risk of spread of pest species or diseases, with local vessels used and ballast water / vessel wash downs to be managed in accordance with the Biosecurity Act.

9.2 Avoidance, Mitigation and Management

Potential impacts on the GBRMP will be mitigated and managed using the approaches listed in Section 6.0.

9.3 Statutory Requirements

As there will be no significant impact to the ecological values of the GBRMP, the action will be consistent with:

- The Reef 2050 Long-Term Sustainability Plan (2018)
- Reef 2050 Water Quality Improvement Plan 2017-2022 (2018)
- Cumulative Impact Management Policy (2018)
- Net Benefit Policy (2018)
- Great Barrier Reef Strategic Assessment Reports
- Great Barrier Reef Outlook Reports
- Threat abatement plan for the impacts of marine debris on the vertebrate wildlife of Australia's costs and oceans (2018), and the
- Recovery plan for marine turtles in Australia (2018).

9.4 Significant Impact Assessment

The likelihood that the Project will have a significant residual impact on the GBRMP was assessed using the MNES significant impact criteria (DoE 2013) in Table 25.

Table 25: Significant impact criteria and assessment for the GBRMP within the Study Area.

Significant Residual Impact Criteria	Assessment	Significant Residual Impact Likelihood
An action is likely to have a significant impact on the environment of the GBRMP if there is a real chance or possibility that the action will:		
Modify, destroy, fragment, isolate or disturb an important, substantial, sensitive or vulnerable area of habitat or ecosystem component such that an adverse impact on marine ecosystem health, functioning or integrity in the GBRMP results.	The Project will have no direct, indirect or facilitative impacts that have a real chance or possibility of impacting important, substantial, sensitive or vulnerable areas of habitat or ecosystems within the GBRMP, such that an adverse impact on marine ecosystem health, functioning or integrity results.	Not likely
Have a substantial adverse effect on a population of a species or cetacean including its life cycle (for example, breeding, feeding, migration behaviour, life expectancy) and spatial distribution.	The Project will have no substantial adverse effect on the life cycle or spatial distribution of populations within the GBRMP.	Not likely
Result in a substantial change in air quality or water quality (including temperature) which may adversely impact on biodiversity, ecological health or integrity or social amenity or human health.	The Project has a very low likelihood of causing a substantial change in air or water quality.	Not likely
Result in a known or potential pest species being introduced or becoming established in the GBRMP.	The Project is unlikely to introduce or increase proliferation of pest species within the GBRMP.	Not likely

Significant Residual Impact Criteria	Assessment	Significant Residual Impact Likelihood
Result in persistent organic chemicals, heavy metals, or other potentially harmful chemicals accumulating in the marine environment such that biodiversity, ecological integrity, or social amenity or human health may be adversely affected.	The Project is unlikely to result in accumulation of persistent organic chemicals, heavy metals or other potentially harmful chemicals.	Not likely
Have a substantial adverse impact on heritage values of the Great Barrier Reef Marine Park, including damage or destruction of an historic shipwreck.	The Project will have no direct, indirect or facilitative impact on the heritage values of the GBRMP.	Not likely

The Project is not likely to have a significant direct, indirect or cumulative residual impact to the GBRMP values, or on the environment or any protected matters within the GBRMP.

10.0 Assessment of Potential Significant Impacts to Great Barrier Reef World Heritage Properties

10.1 Impact Assessment

Potential risks to the GBRWHA are the same as those to the GBRMP (Section 9.0), with the exception that most of the proposed works are within the GBRWHA (Figure 18). Further, modelling indicates the proposed works are likely to result in the area of seagrass, and a reduction in mangrove loss in the GRRWHA.

As such, the Project and associated facilitated impacts are unlikely to lose, degrade or notably alter:

- values associated with the geology or landscape of the GBRWHA (i.e. natural water quality and coastal landforms)
- biological and ecological values (e.g. plant or animal populations, diversity or composition of plant and animal communities)
- wilderness, natural beauty or rare or unique EVs (e.g. structures or changes that impact on the natural aesthetics of the GBRWHA (i.e., coral habitats))

The potential for the Project to have a significant residual impact on the GBRWHA was assessed using the MNES significant impact criteria (DoE 2013) and is provided in Section 10.4.

10.2 Avoidance Mitigation and Management

Potential impacts on the GBRWHA will be mitigated and managed using the approaches listed in Section 6.0.

10.3 Statutory Requirements

The EPBC Act provides an overarching mechanism for protecting the World Heritage values from inappropriate development, including actions taken inside or outside the area (UNESCO 2021). The primary purpose of management of natural heritage and cultural

heritage of a declared World Heritage property must be, in accordance with Australia's obligations under the World Heritage Convention, to identify, protect, conserve, present, transmit to future generations and, if appropriate, rehabilitate the World Heritage values of the property.

As any potential impact to the values and/or integrity of the GBRWHA is not likely to be significant, the Project will be consistent with:

- Australia's obligations under the World Heritage Convention.
- the Australian World Heritage management principles,
- the Reef 2050 Plan, including key documents delivered under the plan (such as Water Quality Improvement Plan, Net Benefit Policy, Great Barrier Reef (GBR) Strategic assessment reports and GBR outlook reports.

As there will be no significant impact to the values and/or integrity of the GBRWHA, the action will consequently be consistent with:

- Australia's obligations under the World Heritage Convention
- the Australian World Heritage management principles
- the Reef 2050 Plan, including key documents delivered under the plan.

10.3.1 Australia's Obligation Under the World Heritage Convention

The World Heritage Convention was adopted by the United Nations Educational, Scientific and Cultural Organisation (UNESCO) General Conference at its 17th session in Paris on 16 November 1972. The Convention came into force in 1975, with Australia ratifying the Convention in August 1974. The aims of the World Heritage Convention is to promote cooperation among nations to protect heritage around the world that is of such outstanding universal value that its conservation is important for current and future generations. As part of these aims, countries that have ratified the Convention (such as Australia) agree, amongst other things, as far as possible to:

- adopt a general policy that aims to give the cultural and natural heritage a function in the life of the community and to integrate the protection of that heritage into comprehensive planning programs'
- undertake 'appropriate legal, scientific, technical, administrative and financial measures necessary for the identification, protection, conservation, presentation and rehabilitation of this heritage'
- refrain from 'any deliberate measures which might damage, directly or indirectly, the cultural and natural heritage' of other Parties to the Convention, and to help other Parties in the identification and protection of their properties.

As the Project is unlikely to directly or indirectly have a significant impact on the Outstanding Universal Values of the GBRWHA, it is consistent with Australia's obligations under the World Heritage Convention.

10.4 Significant Impact Assessment

The likelihood that the Project will have significant residual impact on the GBRWHA was assessed using the MNES significant impact criteria (DoE 2013) in Table 26.

Table 26: Significant impact criteria and assessment for the GBRWHA within the Study Area.

Significant Residual Impact Criteria	Assessment	Significant Residual Impact Likelihood
An action is likely to have a significant impact on the World Heritage property if there is a real chance or possibility that it will cause:		
One or more of the World Heritage values to be lost	The potential impacts are insufficient to cause permanent, irreversible loss of GBRWHA values. The proposed works are likely to increase the area of seagrass, and decrease the loss of mangroves: a positive impact to the World Heritage values.	Not likely
One or more of the World Heritage values to be degraded or damaged	The potential impacts are insufficient to cause significant change to water quality or marine habitat that may degrade or damage GBRWHA values.	Not likely
One or more of the World Heritage values to be notably altered, modified, obscured or diminished	The potential impacts are insufficient to cause significant change to water quality or marine habitat that may notably alter, modify, obscure or diminish GBRWHA values. The proposed works are likely to increase the area of seagrass, and decrease the loss of mangroves: a positive impact to the World Heritage values.	Not likely

The Project is not likely to have a significant impact to the GBRWHA values as the Project and associated facilitated impacts are unlikely to lose, degrade or notably alter:

- values associated with the geology or landscape of the GBRWHA (i.e. natural water quality and coastal landforms).
- biological and ecological values (e.g. plant or animal populations, diversity or composition of plant and animal communities), with the exception the proposed works may result in an increase in the area of seagrass, and a decrease in mangrove loss, both positive impacts on the biological and ecological values of the area.
- wilderness, natural beauty or rare or unique environmental values (e.g. structures or changes that impact on the natural aesthetics of the GBRWHA, i.e. coral habitats).

11.0 Assessment of Potential Significant Impacts to Great Barrier Reef National Heritage Place

11.1 Impact Assessment

The potential impacts from the Project on the values of the GBRNHP are considered the same as those for the GBRWHA.

11.2 Significant Impact Assessment

The likelihood that the Project will have a significant residual impact on the GBRNHP was assessed using the MNES significant impact criteria (DoE 2013) in Table 27.

Table 27: Significant impact criteria and assessment for the GBRNHP within the Study Area

Significant Residual Impact Criteria	Assessment	Significant Residual Impact Likelihood
An action is likely to have a significant impact on the National Heritage values of a National Heritage place if there is a real chance or possibility that it will cause:		
One or more of the National Heritage values to be lost	The potential impacts are insufficient to cause permanent, irreversible loss of GBRNHP values.	Not likely
One or more of the National Heritage values to be degraded or damaged	The potential impacts are insufficient to degrade or damage GBRNHP values associated with the: • geological landscape. • biological and ecological values, or • wilderness, natural beauty or rare or unique environmental values. The proposed works are likely to increase the area of seagrass, and decrease the loss of mangroves: a positive impact to the National Heritage values. Places of heritage values are suitably distanced from the Project that potential impacts are negligible.	Not likely
One or more of the National Heritage values to be notably altered, modified, obscured or diminished	The potential impacts will not cause a notable impact to the biological and ecological values of the GBRNHP or notably alter or diminish GBRNHP values associated with the wilderness, natural beauty or rare or unique environmental values.	Not likely

The Project is not likely to have a significant residual impact to the GBRNHP as a result of the Project. Therefore, the Project and associated facilitated impacts are unlikely to lose, degrade or notably alter the National Heritage values within the GBRNHP, so that they can be protected, conserved and presented to all generations.

12.0 Monitoring and Offset Measures

12.1 Water Quality Monitoring

Turbidity will be measured during the proposed works, where it exceeds a threshold based on back ground values, works will cease, recommencing when the cause of the exceedance has been identified and rectified.

12.2 Localised High-Resolution Surveys

Every 6 months, or post significant storm events, for ten years from the commencement of construction a localised high- resolution survey will be conducted during spring low tide of Dungeness beach, the adjacent spit and the western mangrove island (SARA Decision Notice 2025).

12.3 Hydrographic Surveys

Within one month of completion of the works in the dredge area and surrounds, a hydrographic survey will be completed (SARA Decision Notice 2025).

Within the third, sixth and tenth year following commencement of construction, a hydrographic survey will be undertaken, as prepared by a suitably qualified person, of the Enterprise Channel and the adjacent Main Hinchinbrook Channel as defined by the Coastal Monitoring Dungeness Boating Safety Project plan, dated 01/04/2025 (SARA Decision Notice 2025).

A suitably qualified person will analyse and summarise the surveys, and review morphological changes and maintenance dredging requirements (SARA Decision Notice 2025).

12.4 Marine Plant Communities

The marine plant monitoring program will comprise as a minimum a survey following completion of works, a survey after 18 months to determine whether supplementary planting is required, and annual surveys for 5 years.

12.4.1 Monitoring of Temporarily Disturbed Mangroves

Permanent photographic reference sites will be established to cover the entire area of temporary disturbance (approximately 0.016 ha) and marked with GPS co-ordinates. In each survey the area will be photographed from these points, and the following recorded in the disturbed mangrove area:

- the overall condition of the sediment and suitability of the area for mangrove
- colonisation, including areas of deposition and erosion
- the average number of propagules and seedlings
- the location of any bare patches, or areas of concern to mangrove colonisation, and
- any issues that may prevent mangrove colonisation or be detrimental to their growth

In addition, the following will be recorded in ten appropriately sized quadrats (e.g. 8 m^2) in the disturbed area:

- number of seeds of each mangrove species
- number of seedlings of each mangrove species
- average height of seedlings (by species)

- average number of leaves (be species)
- crab abundance, and
- any issues that may prevent mangrove colonisation or be detrimental to their growth

Any issues that are identified in the monitoring that are preventing the recolonisation of mangroves or detrimentally impacting their growth will be addressed by ongoing management to ensure these areas recolonise, and that the mangroves grow.

12.4.2 Monitoring of Seagrass Adjacent to the Proposed Works

The distribution of seagrass meadows in the vicinity of the proposed works is naturally variable, and consequently it will be difficult to determine what, if any changes are due to the proposed works

Further, the seagrass species are small, and the seagrass meadows are in relatively turbid water. As a consequence, monitoring by remote imagery is constrained. If monitoring of the adjacent seagrass beds is required, we recommend annual spatial monitoring of the likely presence and distribution of seagrass, particularly of seagrass in intertidal and shallow subtidal areas, using a combination of high-resolution aerial plane, satellite or drone imagery

13.0 Conclusions and Recommendations

Risks to MNES are low and, and are unlikely to be significant in the medium to long term where they are managed and mitigated via an appropriately designed and effectively implemented construction management plan including:

- dredging and beach replenishment management plan, including a water quality monitoring program
- marine plant monitoring plan
- acid sulphate soil management plan, and a
- marine fauna management plan.

14.0 References

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Appendix A Time Series Plots of Changes to Bed Level

Dungeness EPBC Referral

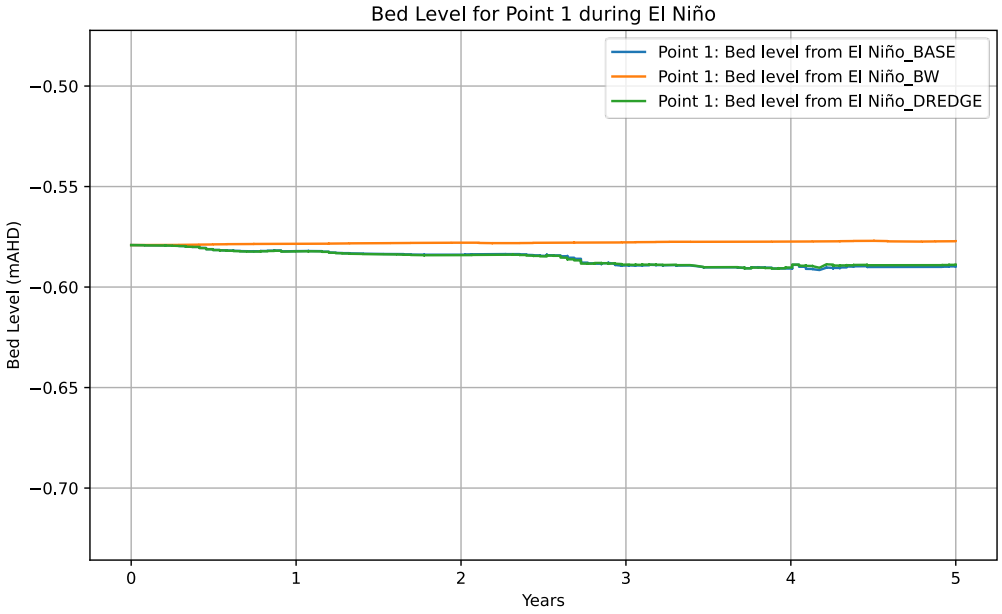
Dredge Channel and Coastal Infrastructure

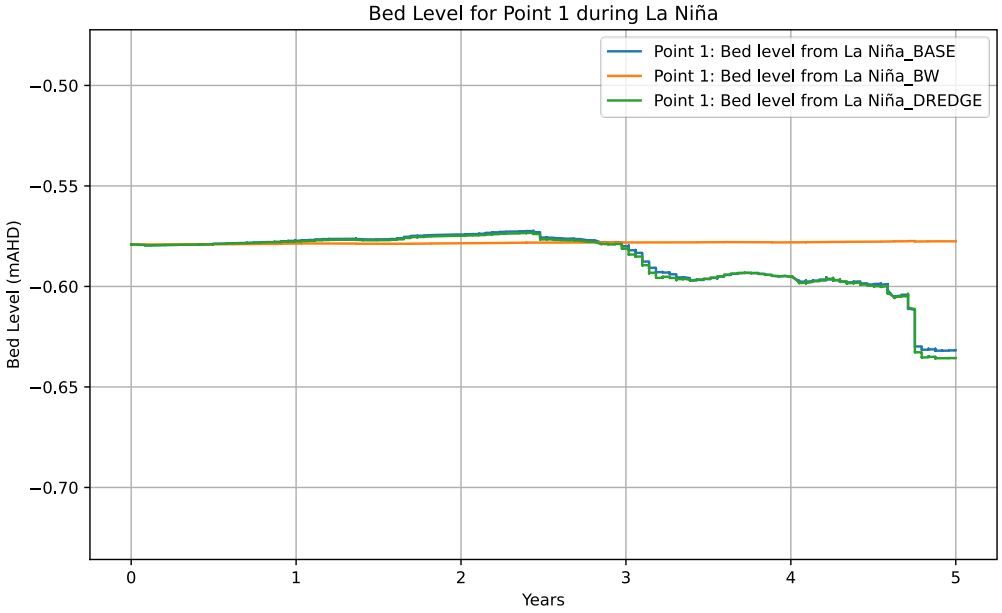
Hinchinbrook Shire Council

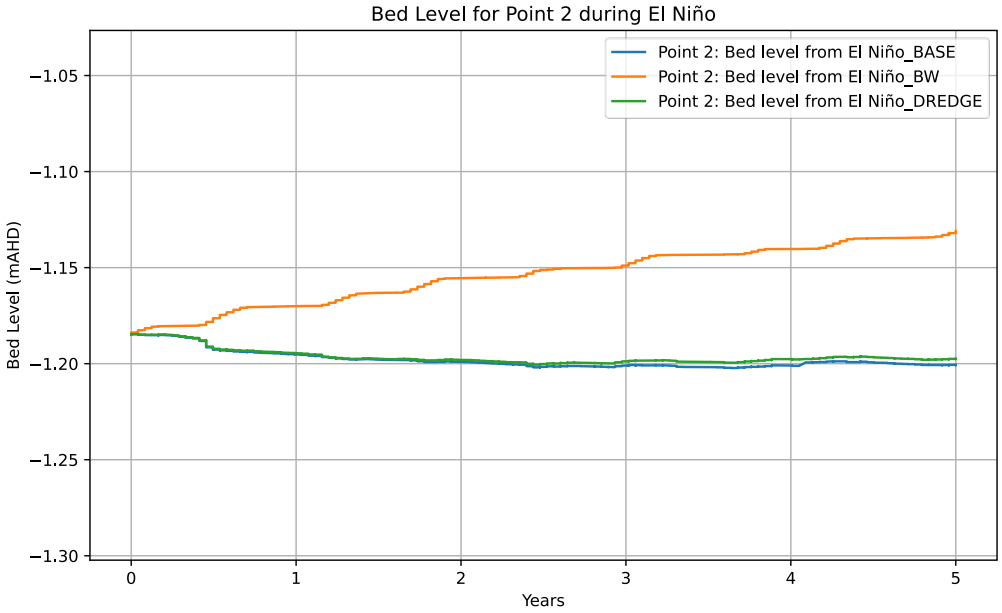
SLR Project No.: 635.000235

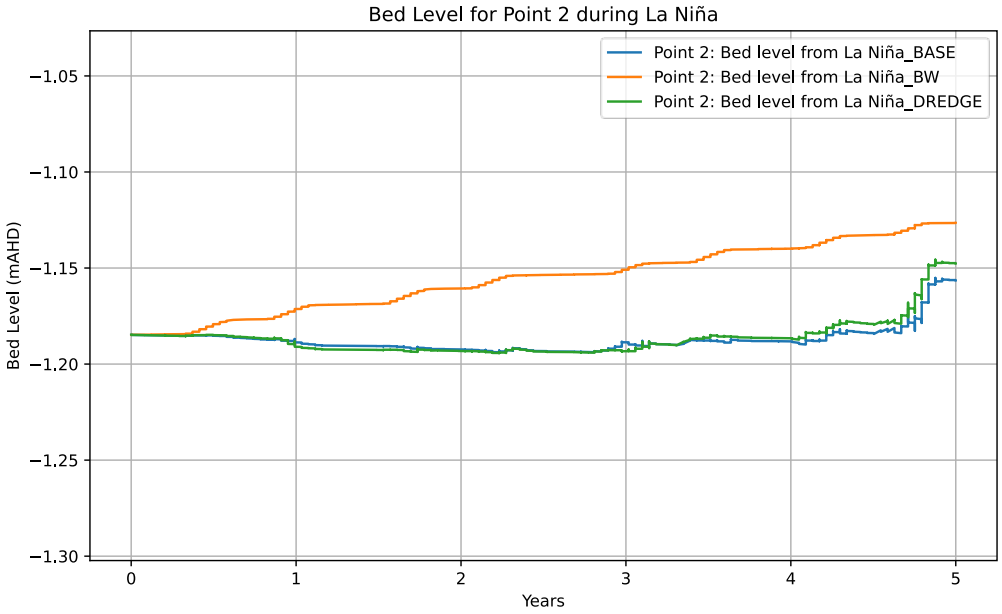
1 April 2026

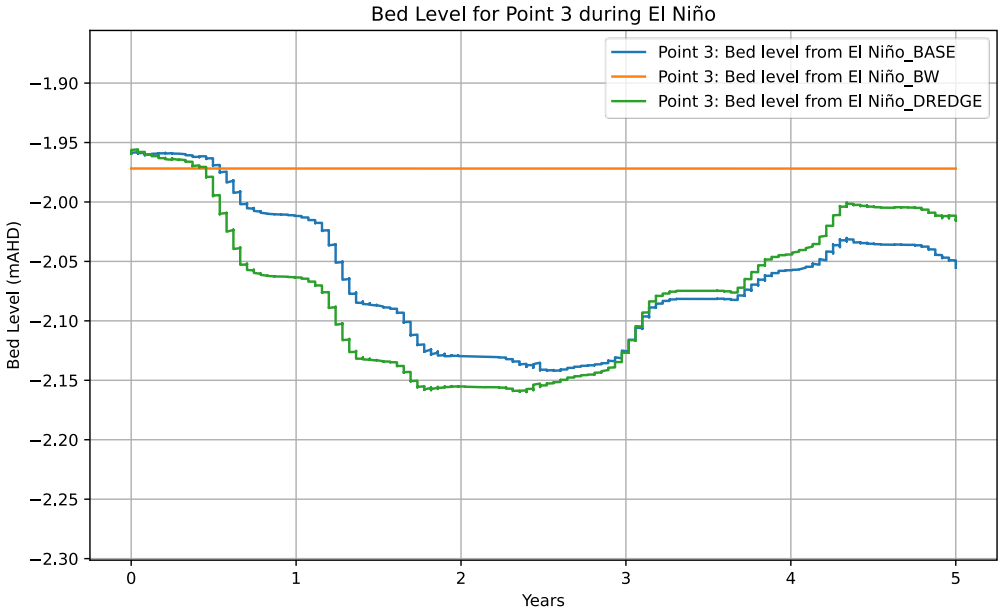
Appendix A Time Series Plots of Sediment Bed Level

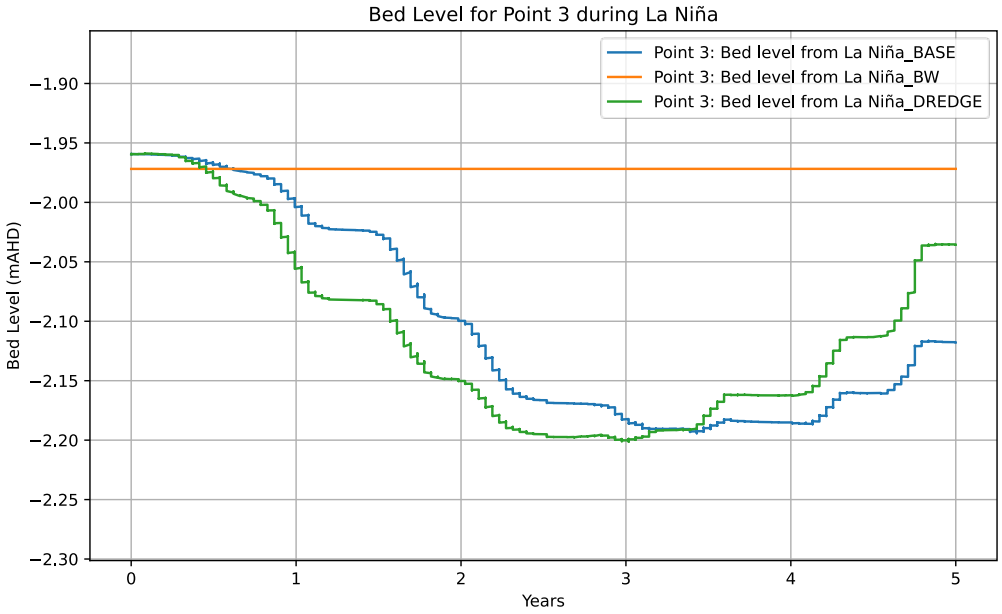





Bed Level for Point 2 during El Niño
Point 2: Bed level from El Niño_BASE
Point 2: Bed level from El Niño_BW
Point 2: Bed level from El Niño_DREDGE
Bed Level (mAHD)
−1.05
−1.10
−1.15
−1.20
−1.25
−1.30
0
1
2
3
4
5
Years


Bed Level for Point 2 during La Niña
Point 2: Bed level from La Niña_BASE
Point 2: Bed level from La Niña_BW
Point 2: Bed level from La Niña_DREDGE
Bed Level (mAHD)
−1.05
−1.10
−1.15
−1.20
−1.25
−1.30
0
1
2
3
4
5
Years


Bed Level for Point 3 during El Niño
Point 3: Bed level from El Niño_BASE
Point 3: Bed level from El Niño_BW
Point 3: Bed level from El Niño_DREDGE
Bed Level (mAHD)
−1.90
−1.95
−2.00
−2.05
−2.10
−2.15
−2.20
−2.25
−2.30
0
1
2
3
4
5
Years


Bed Level for Point 3 during La Niña
Point 3: Bed level from La Niña_BASE
Point 3: Bed level from La Niña_BW
Point 3: Bed level from La Niña_DREDGE
Bed Level (mAHD)
−1.90
−1.95
−2.00
−2.05
−2.10
−2.15
−2.20
−2.25
−2.30
0
1
2
3
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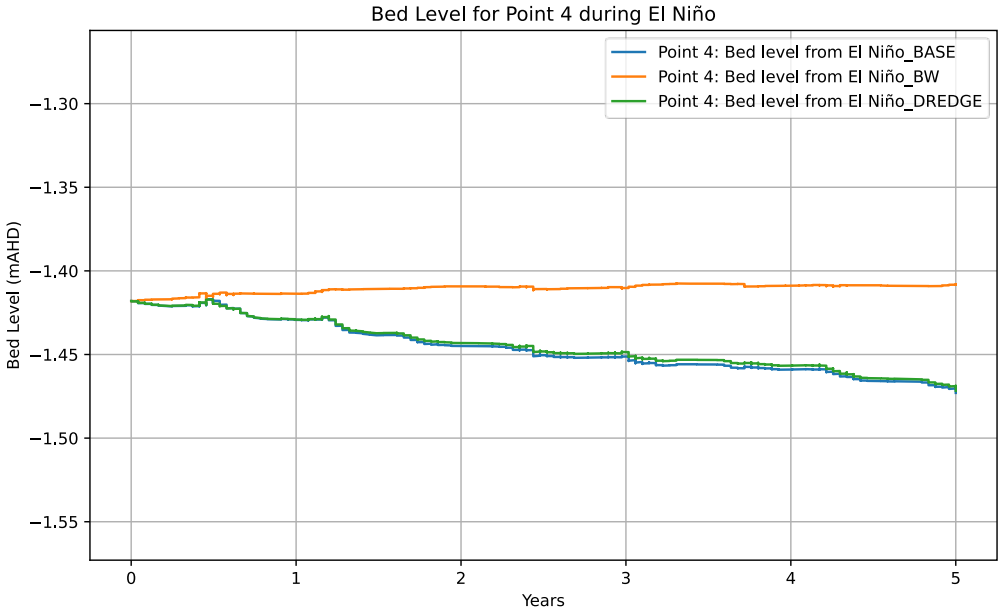
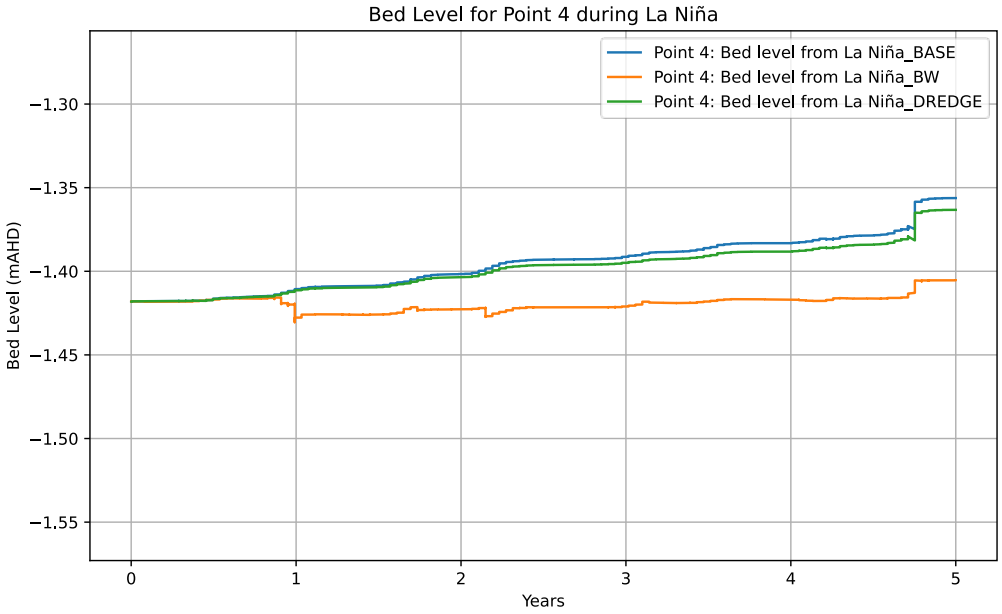
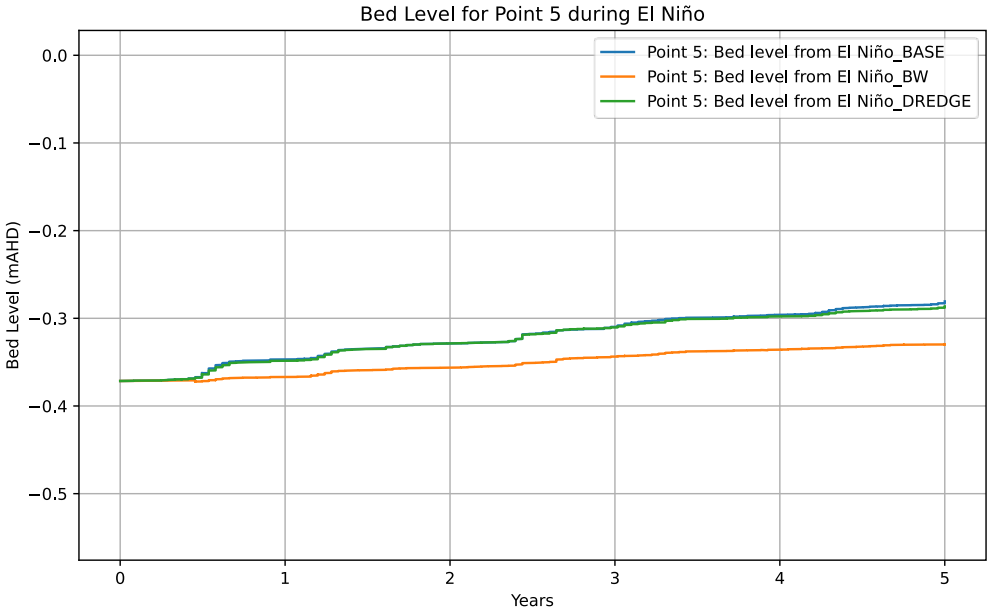
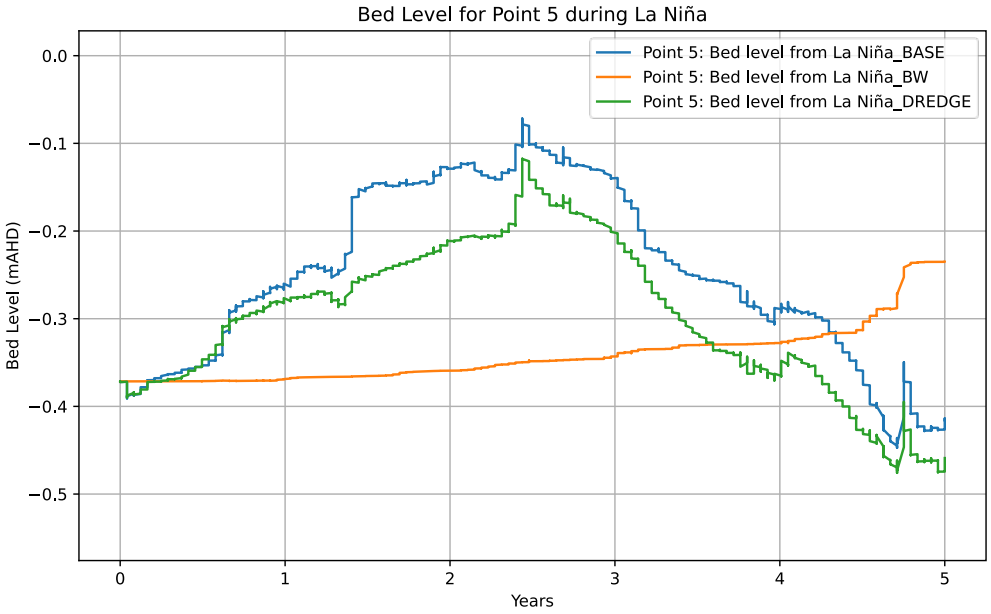
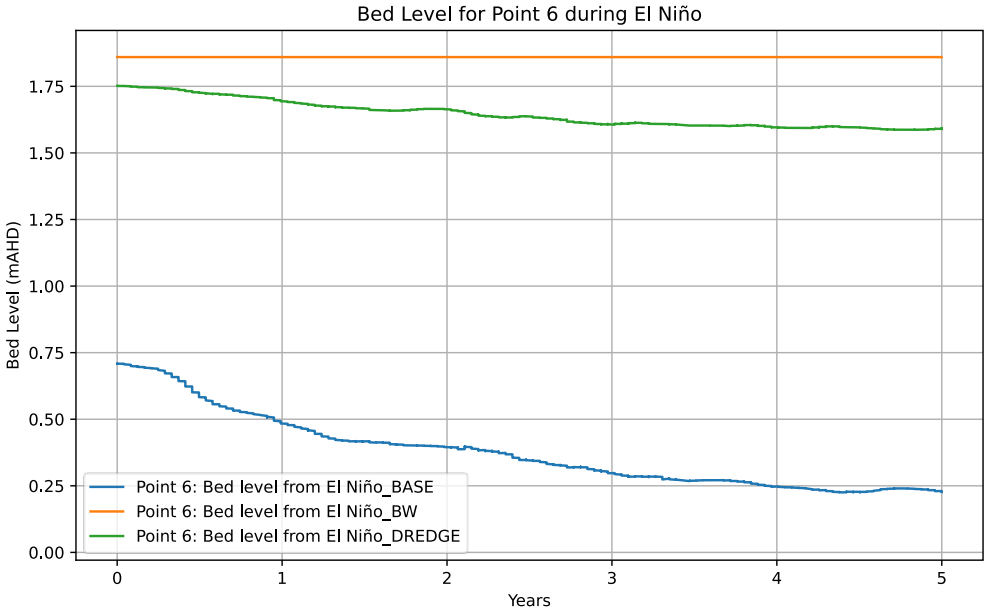
Years

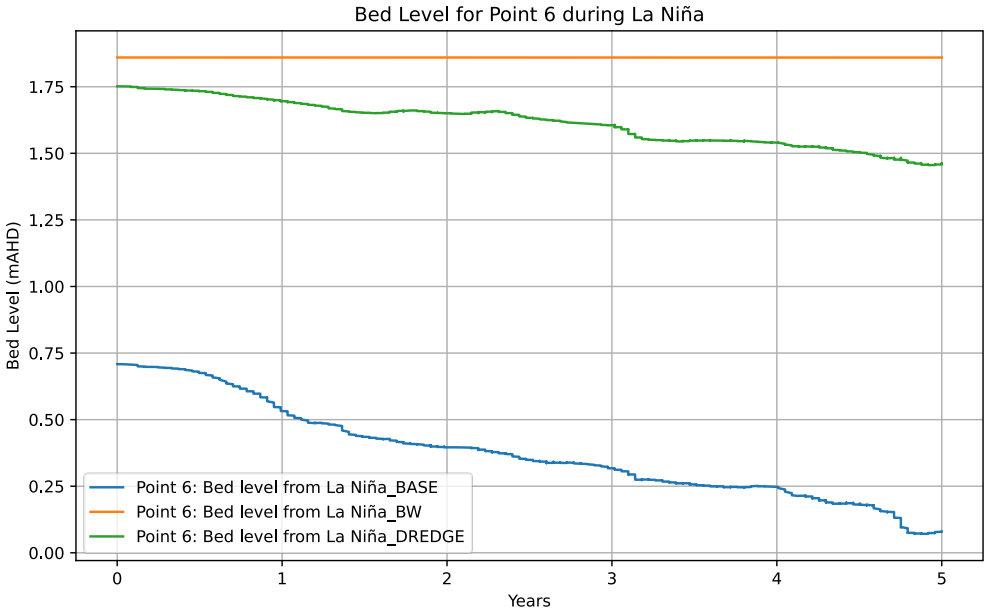

Bed Level for Point 4 during El Niño
Point 4: Bed level from El Niño_BASE
Point 4: Bed level from El Niño_BW
Point 4: Bed level from El Niño_DREDGE
Bed Level (mAHD)
−1.30
−1.35
−1.40
−1.45
−1.50
−1.55
0
1
2
3
4
5
Years

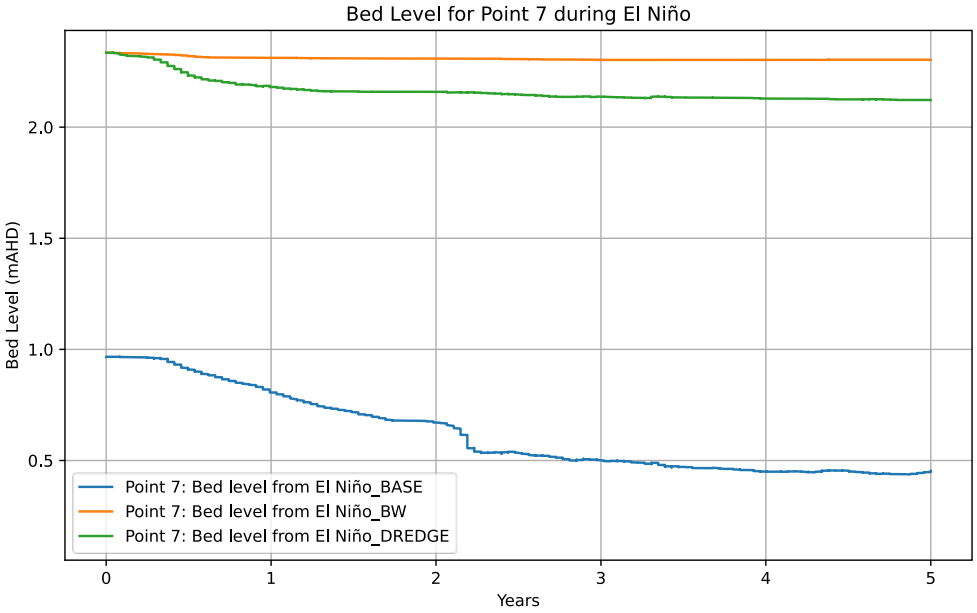

Bed Level for Point 4 during La Niña
Point 4: Bed level from La Niña_BASE
Point 4: Bed level from La Niña_BW
Point 4: Bed level from La Niña_DREDGE
Bed Level (mAHD)
−1.30
−1.35
−1.40
−1.45
−1.50
−1.55
0
1
2
3
4
5
Years

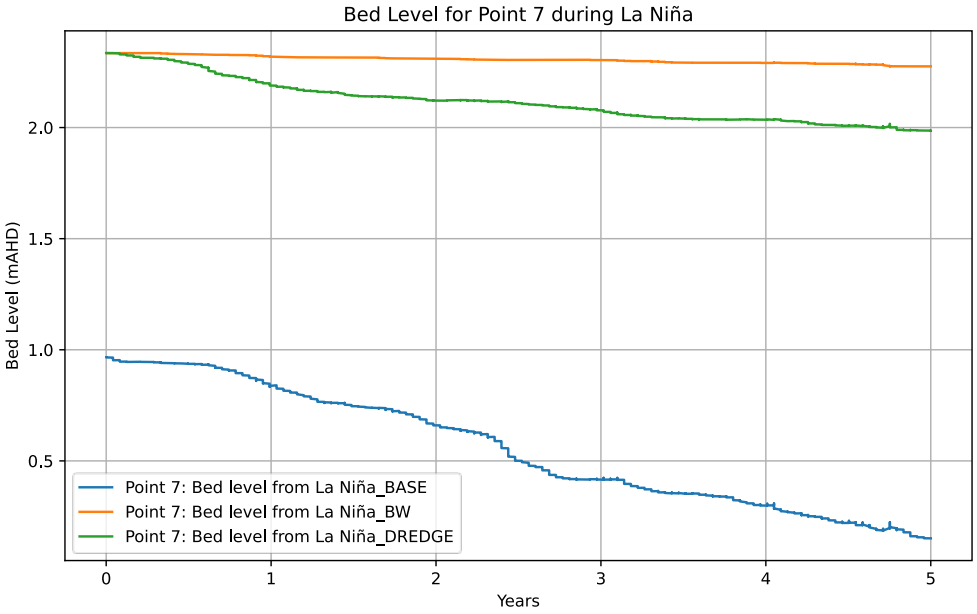

Bed Level for Point 5 during El Niño
Point 5: Bed level from El Niño_BASE
Point 5: Bed level from El Niño_BW
Point 5: Bed level from El Niño_DREDGE
Bed Level (mAHD)
0.0
−0.1
−0.2
−0.3
−0.4
−0.5
0
1
2
3
4
5
Years

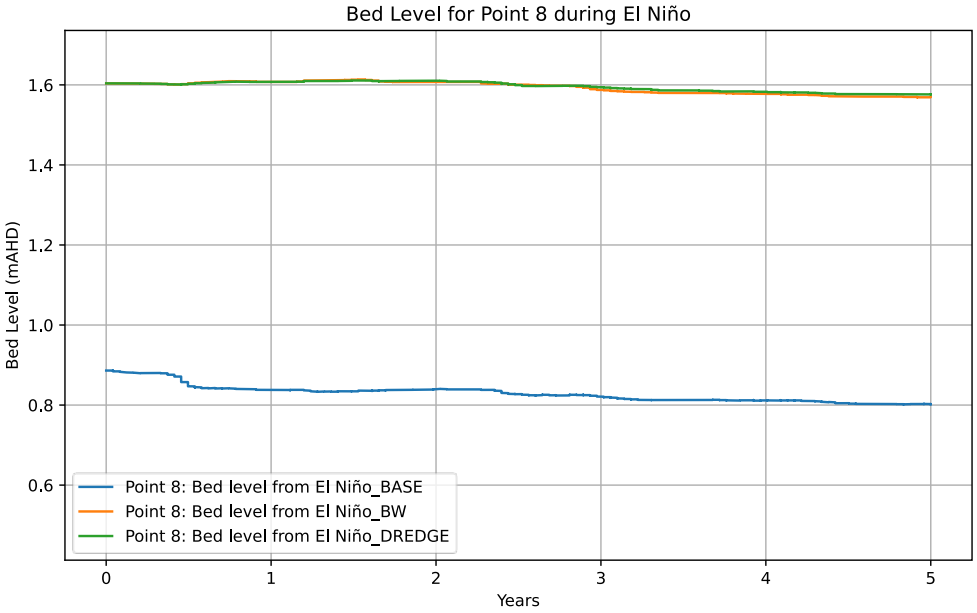

Bed Level for Point 5 during La Niña
Point 5: Bed level from La Niña_BASE
Point 5: Bed level from La Niña_BW
Point 5: Bed level from La Niña_DREDGE
Bed Level (mAHD)
0.0
−0.1
−0.2
−0.3
−0.4
−0.5
0
1
2
3
4
5
Years

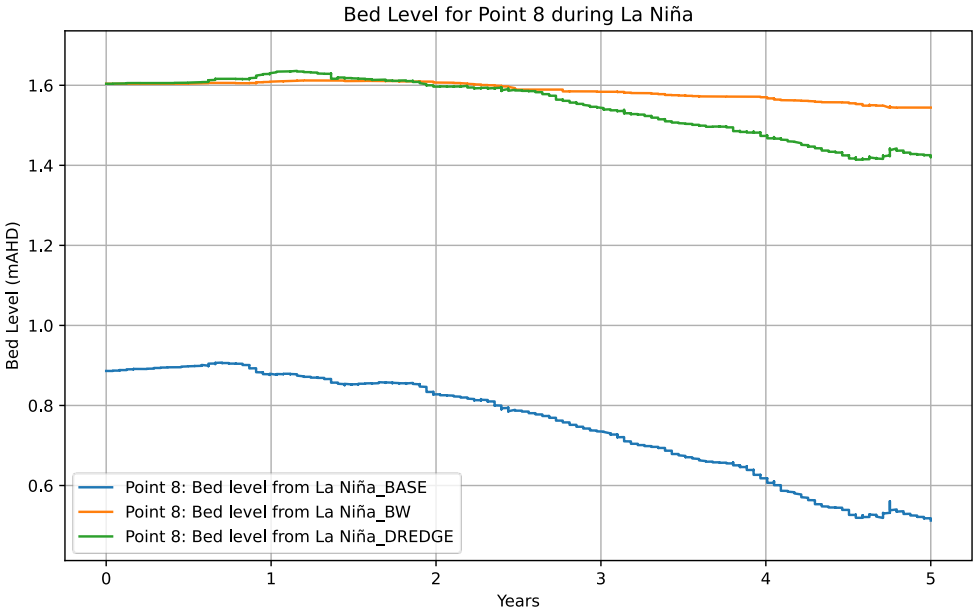

Bed Level for Point 6 during El Niño
Bed Level (mAHD)
1.75
1.50
1.25
1.00
0.75
0.50
0.25
0.00
0
1
2
3
4
5
Years
Point 6: Bed level from El Niño_BASE
Point 6: Bed level from El Niño_BW
Point 6: Bed level from El Niño_DREDGE

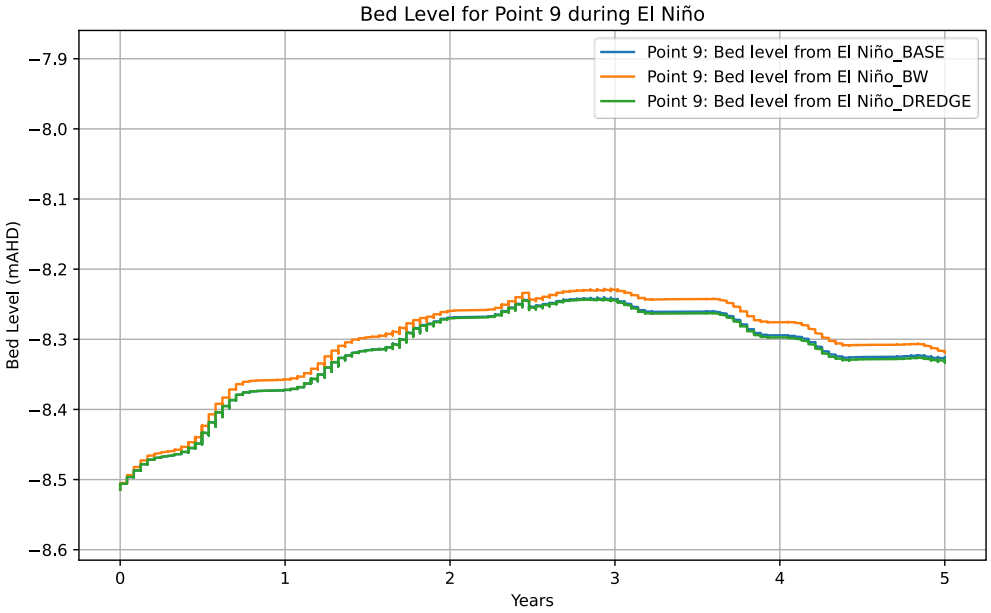

Bed Level for Point 6 during La Niña
Bed Level (mAHD)
1.75
1.50
1.25
1.00
0.75
0.50
0.25
0.00
0
1
2
3
4
5
Years
Point 6: Bed level from La Niña_BASE
Point 6: Bed level from La Niña_BW
Point 6: Bed level from La Niña_DREDGE

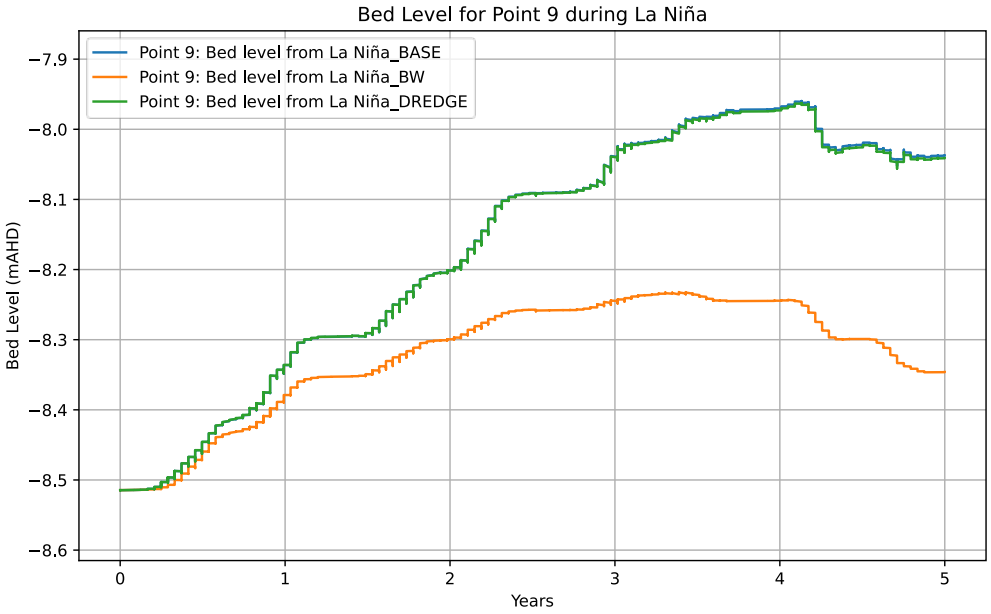

Bed Level for Point 7 during El Niño
Bed Level (mAHD)
2.0
1.5
1.0
0.5
0
1
2
3
4
5
Years
Point 7: Bed level from El Niño_BASE
Point 7: Bed level from El Niño_BW
Point 7: Bed level from El Niño_DREDGE


Bed Level for Point 7 during La Niña
Bed Level (mAHD)
2.0
1.5
1.0
0.5
0
1
2
3
4
5
Years
Point 7: Bed level from La Niña_BASE
Point 7: Bed level from La Niña_BW
Point 7: Bed level from La Niña_DREDGE


Bed Level for Point 8 during El Niño
Bed Level (mAHD)
1.6
1.4
1.2
1.0
0.8
0.6
0
1
2
3
4
5
Years
Point 8: Bed level from El Niño_BASE
Point 8: Bed level from El Niño_BW
Point 8: Bed level from El Niño_DREDGE


Bed Level for Point 8 during La Niña
Bed Level (mAHD)
1.6
1.4
1.2
1.0
0.8
0.6
0
1
2
3
4
5
Years
Point 8: Bed level from La Niña_BASE
Point 8: Bed level from La Niña_BW
Point 8: Bed level from La Niña_DREDGE


Bed Level for Point 9 during El Niño
Point 9: Bed level from El Niño_BASE
Point 9: Bed level from El Niño_BW
Point 9: Bed level from El Niño_DREDGE
Bed Level (mAHD)
−7.9
−8.0
−8.1
−8.2
−8.3
−8.4
−8.5
−8.6
0
1
2
3
4
5
Years


Bed Level for Point 9 during La Niña
Point 9: Bed level from La Niña_BASE
Point 9: Bed level from La Niña_BW
Point 9: Bed level from La Niña_DREDGE
Bed Level (mAHD)
−7.9
−8.0
−8.1
−8.2
−8.3
−8.4
−8.5
−8.6
0
1
2
3
4
5
Years

Appendix B Marine Plant, Deposition and Erosion Maps

Dungeness EPBC Referral

Dredge Channel and Coastal Infrastructure

Hinchinbrook Shire Council

SLR Project No.: 635.000235

1 April 2026

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PO Box 2363
Wellington Point
Q 4160 Australia

P 07 3286 3850
E info@frcenv.com.au
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Dungeness Enterprise Proposed Dredge and Rock Wall

Map 1:
Zone Classification for Morphology Results Analysis

SOURCES

Hinchinbrook Shire Council proposed works

Document Path: C:\Users\andrew.bentley\OneDrive - SLR Consulting\Documents - FRC Utility\Mapping\Projects\202402403.08_WT_Dungeness\Workspaces\210202_Zones_24-05-07_AB.mxd

LEGEND

Zone Classification
- Zone 01
- Zone 02
- Zone 03
- Zone 04
- Zone 05
- Zone 06
- Zone 07
- Zone 08
- Zone 09
- Zone 10
- Zone 11
- Zone 12

- Coastal Structure
- Dredge Channel
- Beach Nourishment Area

N

SCALE

0 0.5 1
Kilometres

Scale: 1:25,000 @ A3

PROJECTION
Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

DATE
2021-04-19

DRAWN BY
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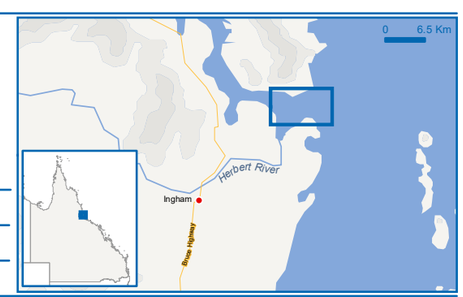
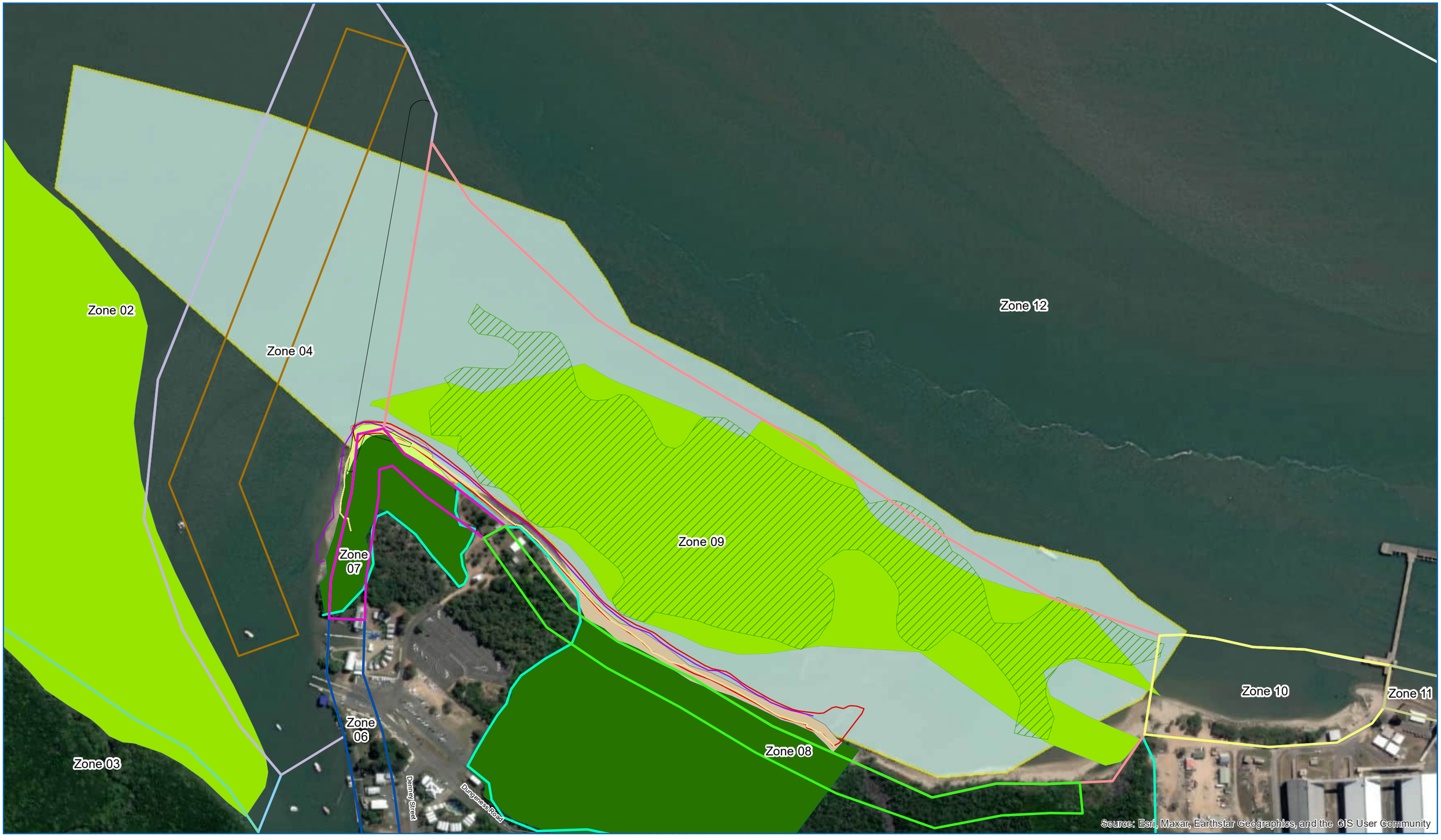
VERSION
1





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Wellington Point
Q 4160 Australia

P 07 3286 3850
E info@frcenv.com.au
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Dungeness Enterprise Proposed Dredge and Rock Wall Works

Map 2: Marine Plants

SOURCES

frc environmental marine plant surveys 2019 and 2021
Hinchinbrook Shire Council propose works

Document Path: C:\Users\andrewbentley\OneDrive - SLR Consulting\Documents - FRC Utility\Mapping\Projects\202424030B_WT_Dungeness\Workspaces\210202_Marine_plants_24-04-29_AB.mxd

LEGEND

Zone Classification
- Zone 02
- Zone 03
- Zone 04
- Zone 06
- Zone 07
- Zone 08
- Zone 09
- Zone 10
- Zone 11
- Zone 12

- HAT
- MHWS
- MSL
- Coastal Structure
- Dredge Channel
- Beach Nourishment Area
- Investigation area 2021

- Bare sand with mangrove debris
- Sparse mangroves
- Dense mangroves
- All seagrass 2019
- All seagrass 2021

N

SCALE

0 0.125 0.25
Kilometres

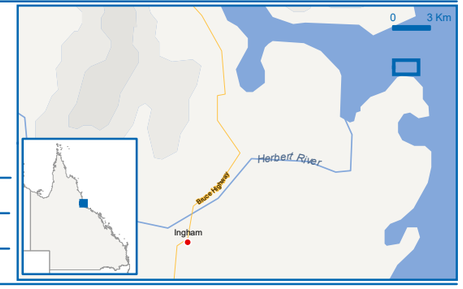
Scale: 1:5,000 @ A3

PROJECTION
Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

DATE
2024-05-07

DRAWN BY
AB

VERSION
ii



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Dungeness Enterprise Proposed Dredge and Rock Wall

Map 3: 2021 Seagrass species

SOURCES

frc environmental marine plant survey 2021
Hinchinbrook Shire Council proposed works

Document Path: C:\Users\andrew.bentley\OneDrive - SLR Consulting\Documents - FRC Utility\Mapping\Projects\202402403\08_WT_Dungeness\Workspaces\210202_Seagrass_species_24-04-29_AB.mxd

LEGEND

Zone Classification
- Zone 02
- Zone 03
- Zone 04
- Zone 06
- Zone 07
- Zone 08
- Zone 09
- Zone 10
- Zone 11
- Zone 12

- HAT
- Coastal Structure
- Dredge Channel
- Beach Nourishment Area

- Moderate *Halodule uninervis* and *Sparse Halophila decipiens*
- Moderate *Zostera muelleri*
- Sparse *Zostera muelleri*
- Sparse *Halodule uninervis* and *Halophila decipiens*
- Moderate *Halodule uninervis*
- Sparse *Halodule uninervis*

N

SCALE

0 0.125 0.25
Kilometres

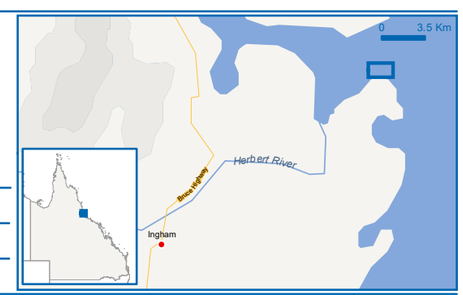
Scale: 1:5,000 @ A3

PROJECTION
Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

DATE
2021-04-19

DRAWN BY
AB

VERSION
ii



Dungeness Enterprise Proposed Dredge and Coastal Structure Works

Map 4: Proposed Direct Impacts

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SOURCES

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LEGEND

- Modelling zones

Proposed works

- Channel
- Placement of dredge spoil
- Coastal structure
- Indicative access track
- Indicative dredge pipeline

Distribution of marine plants (frc environmental 2018, 2021 & 2024)

- Mangrove 2018 & 2021
- Seagrass 2018 & 2021
- Mangroves 2024
- Limit of seagrass mapping

N

SCALE

0 40 80 160 240 320 400
Meters

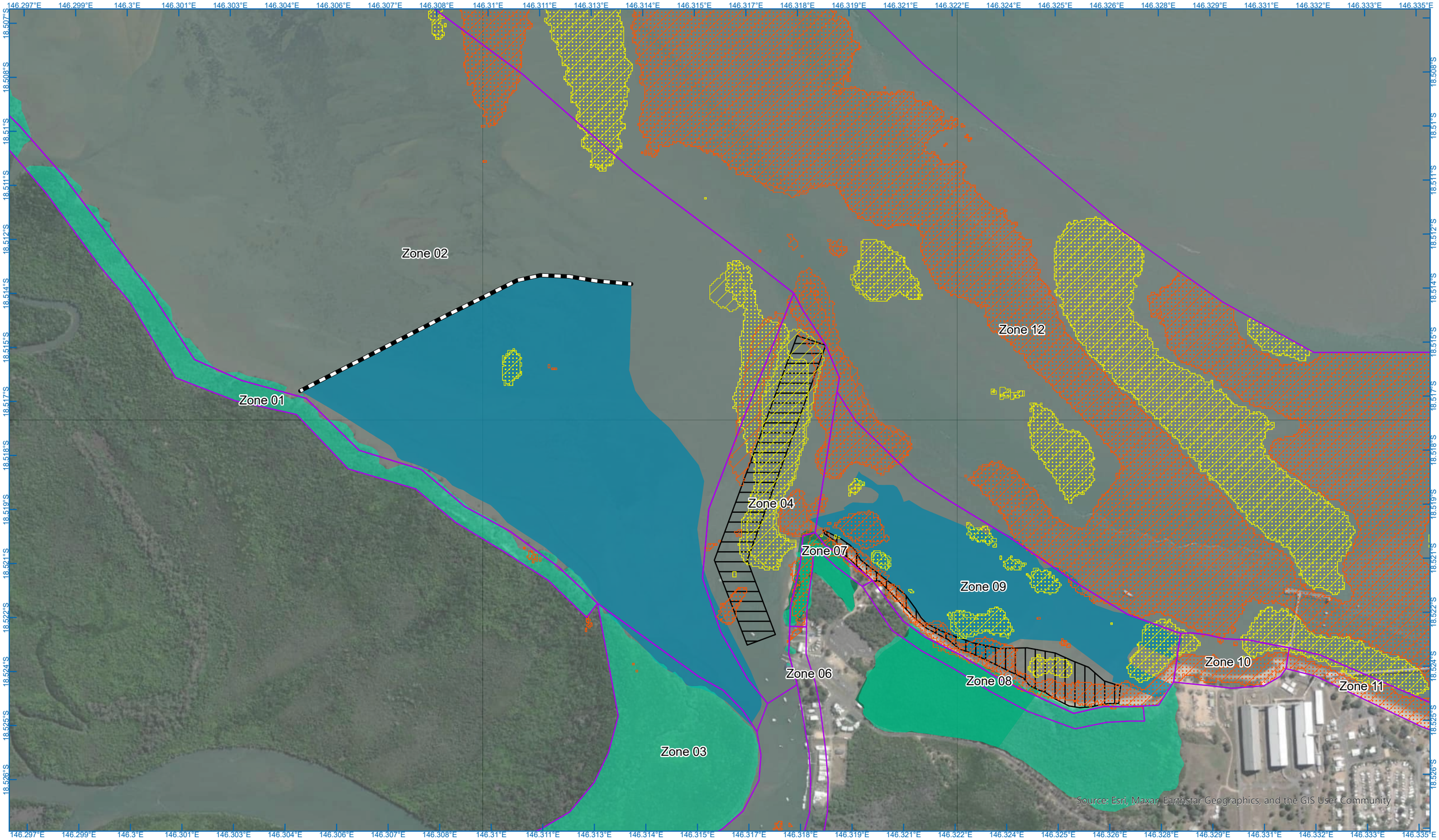
Scale: 1:10,000 @ A3

PROJECTION
Coordinate System: GDA2020 MGA Zone 55
Projection: Transverse Mercator
Datum: GDA2020

DATE
2024-10-02

DRAWN BY
JA

VERSION
I



Dungeness Enterprise Proposed Dredge and Coastal Structure Works

Map 5: Modelled Deposition and Erosion for Dredge Scenario During El Niño

SOURCES
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LEGEND

- Modelling zones

Modelling results (WaterTech 2024)

Dredge scenario
- Deposition area
- Erosion area

Base scenario
- Deposition area
- Erosion area

Proposed works
- Channel
- Placement of dredge spoil

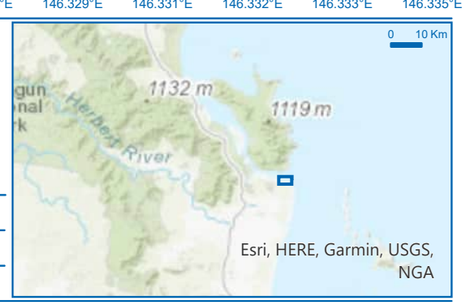
Distribution of marine plants (frc environmental 2018, 2021 & 2024)
- Mangrove 2018 & 2021
- Seagrass 2018 & 2021
- Mangroves 2024
- Limit of seagrass mapping

N

SCALE
0 40 80 160 240 320 400
Meters
Scale: 1:10,000 @ A3

PROJECTION
Coordinate System: GDA2020 MGA Zone 55
Projection: Transverse Mercator
Datum: GDA2020

DATE 2024-10-02
DRAWN BY JA
VERSION i



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Q 4160 Australia

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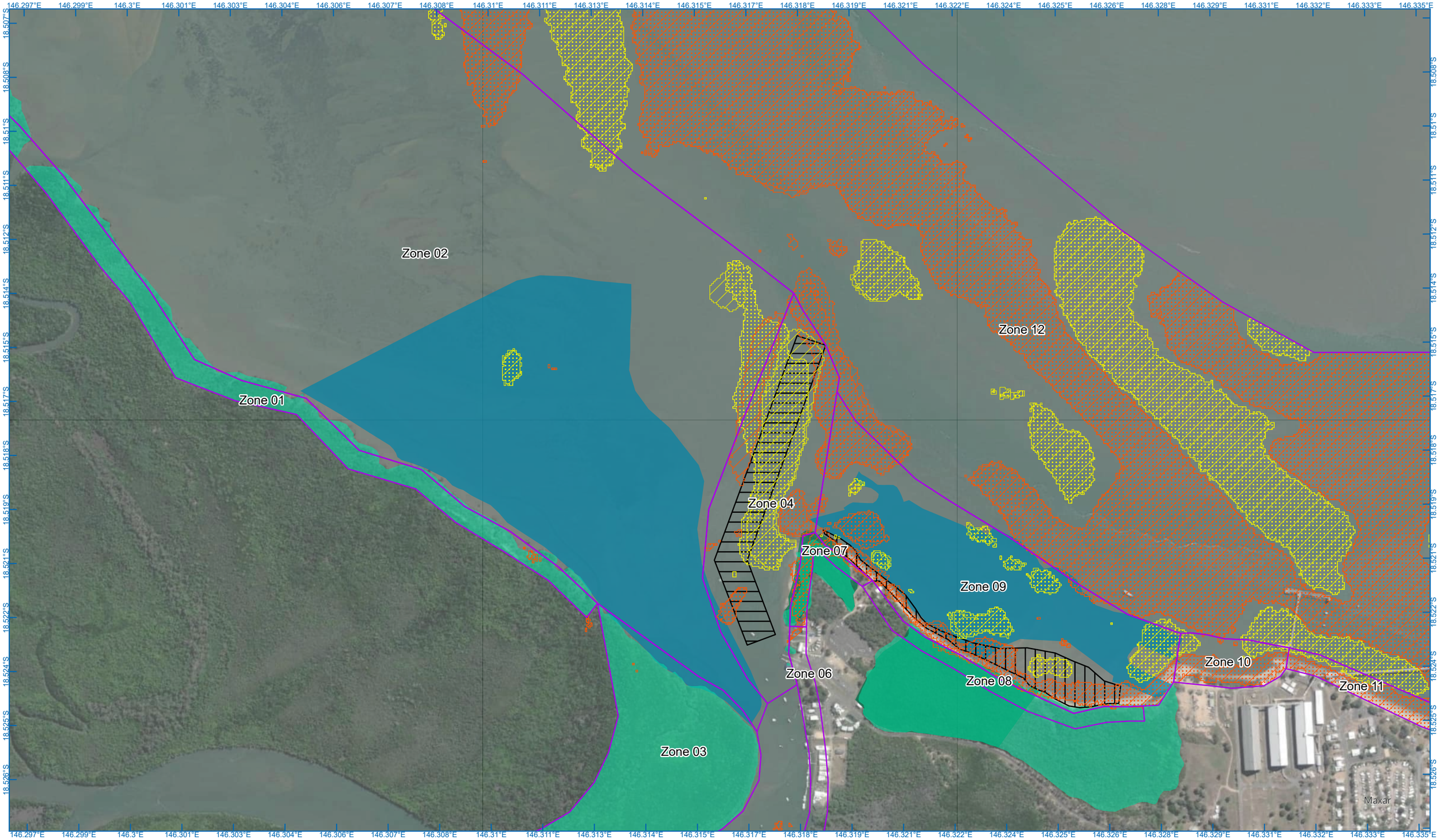

Dungeness Enterprise Proposed Dredge and Coastal Structure Works

Map 5: Modelled Deposition and Erosion for Dredge Scenario During El Niño

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LEGEND

- Modelling zones

Modelling results (WaterTech 2024)

Dredge scenario
- Deposition area
- Erosion area

Base scenario
- Deposition area
- Erosion area

Proposed works
- Channel
- Dredge placement

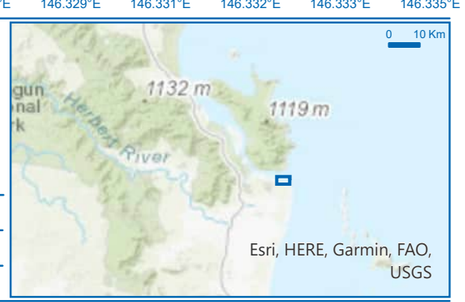
Marine plant mapping (frc environmental 2018 & 2021)
- Mangrove
- Seagrass
- Indicative mangroves 2024

N

SCALE
0 40 80 160 240 320 400
Meters
Scale: 1:10,000 @ A3

PROJECTION
Coordinate System: GDA2020 MGA Zone 55
Projection: Transverse Mercator
Datum: GDA2020

DATE 2024-09-26
DRAWN BY JA
VERSION i



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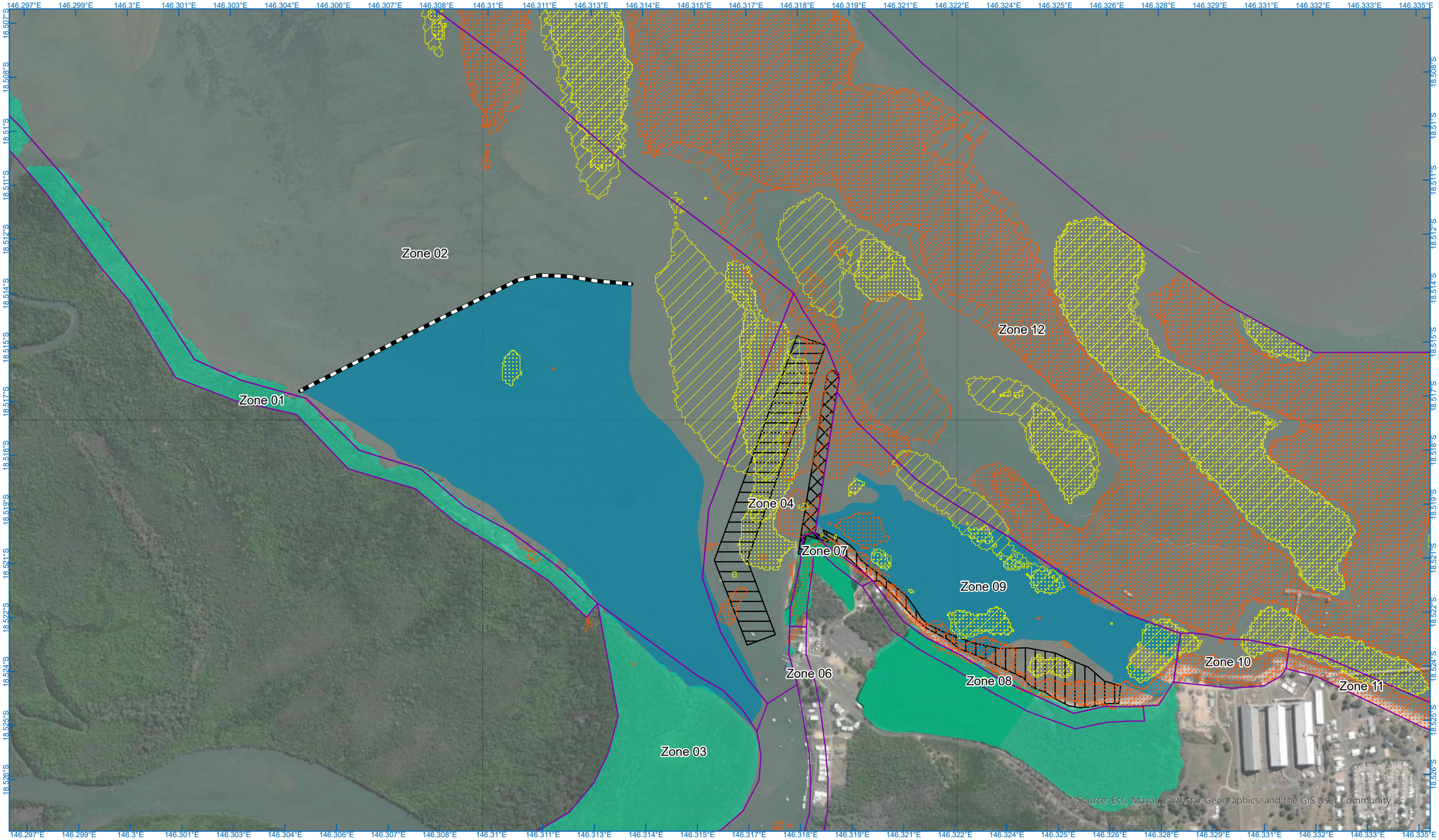

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Dungeness Enterprise Proposed Dredge and Coastal Structure Works

Map 6: Modelled Deposition and Erosion for Coastal Structure Scenario During El Niño

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LEGEND

- Modelling zones

Modelling results (WaterTech 2024)

Coastal structure scenario
- Deposition area
- Erosion area

Base scenario
- Deposition area
- Erosion area

Proposed works
- Channel
- Placement of dredge spoil
- Coastal structure

Distribution of marine plants (frc environmental 2018, 2021 & 2024)
- Mangrove 2018 & 2021
- Seagrass 2018 & 2021
- Mangroves 2024
- Limit of seagrass mapping

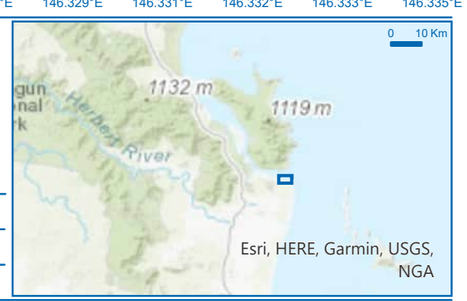
N

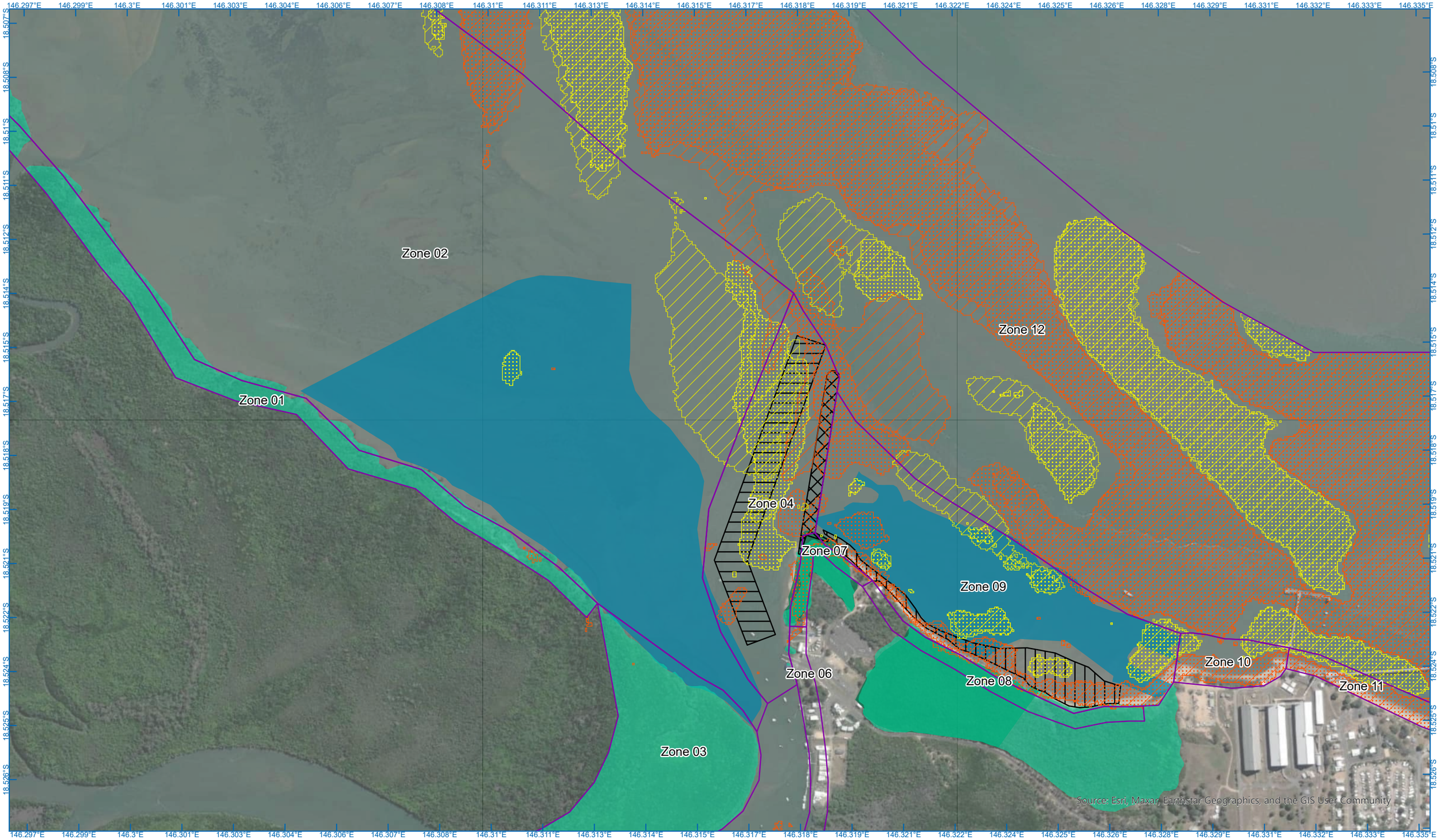
SCALE
0 40 80 160 240 320 400
Meters

Scale: 1:10,000 @ A3

PROJECTION
Coordinate System: GDA2020 MGA Zone 55
Projection: Transverse Mercator
Datum: GDA2020

DATE 2024-10-02
DRAWN BY JA
VERSION i





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Q 4160 Australia

P 07 3286 3850
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Dungeness Enterprise Proposed Dredge and Coastal Structure Works

Map 6: Modelled Deposition and Erosion for Coastal Structure Scenario During El Niño

SOURCES

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LEGEND

- Modelling zones

Modelling results (WaterTech 2024)

Coastal structure scenario
- Deposition area
- Erosion area

Base scenario
- Deposition area
- Erosion area

Proposed works
- Channel
- Dredge placement
- Coastal structure

Marine plant mapping (frc environmental 2018 & 2021)
- Mangrove
- Seagrass
- Indicative mangroves 2024

N

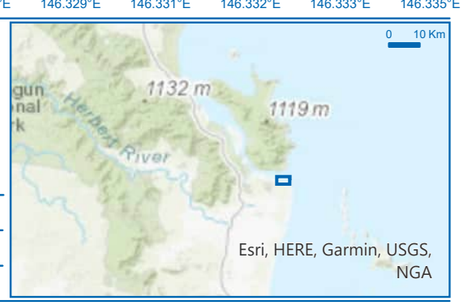
SCALE

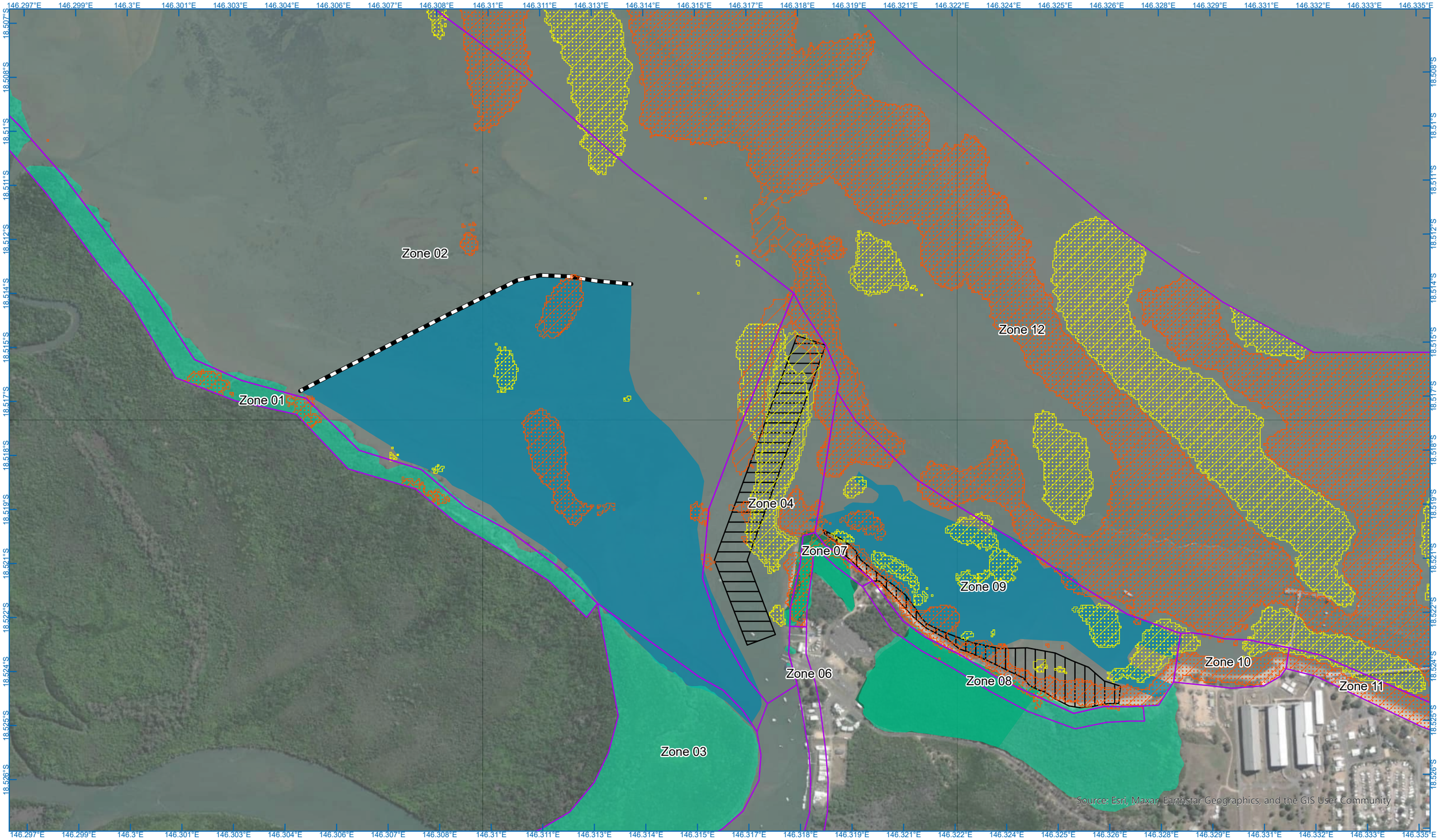
0 40 80 160 240 320 400
Meters

Scale: 1:10,000 @ A3

PROJECTION
Coordinate System: GDA2020 MGA Zone 55
Projection: Transverse Mercator
Datum: GDA2020

DATE 2024-09-26
DRAWN BY JA
VERSION i





Dungeness Enterprise Proposed Dredge and Coastal Structure Works

Map 7: Modelled Deposition and Erosion for Dredge Scenario During La Niña

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LEGEND

- Modelling zones

Modelling results (WaterTech 2024)

Dredge scenario
- Deposition area
- Erosion area

Base scenario
- Deposition area
- Erosion area

Proposed works
- Channel
- Placement of dredge spoil

Distribution of marine plants (frc environmental 2018, 2021 & 2024)
- Mangrove 2018 & 2021
- Seagrass 2018 & 2021
- Mangroves 2024
- Limit of seagrass mapping

N

SCALE
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Projection: Transverse Mercator
Datum: GDA2020

DATE 2024-10-02
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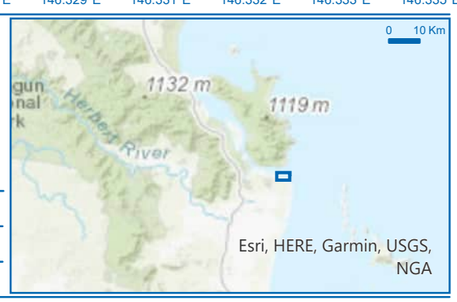
VERSION I



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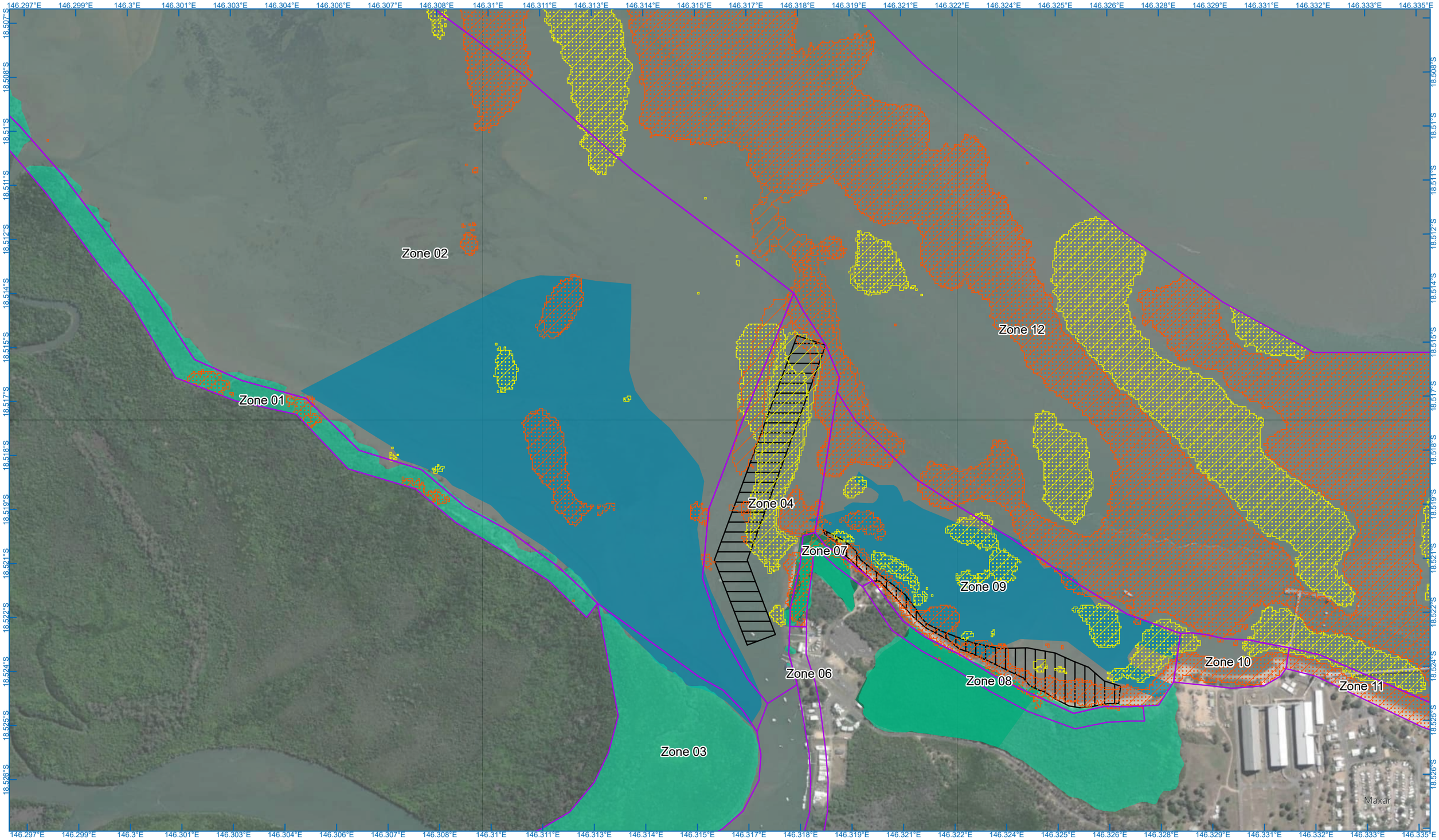
PO Box 2363
Wellington Point
Q 4160 Australia

P 07 3286 3850
E info@frcenv.com.au
www.frcenv.com.au



Dungeness Enterprise Proposed Dredge and Coastal Structure Works

Map 7: Modelled Deposition and Erosion for Dredge Scenario During La Niña

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Wellington Point
Q 4160 Australia

P 07 3286 3850
E info@frcenv.com.au
www.frcenv.com.au

SOURCES

Document Path: C:\Users\josh.arthy\OneDrive - SLR Consulting\Documents - FRC Utility\Mapping\Projects\2024\240308_WT_Dungeness\240308_WT_Dungeness\240308_WT_Dungeness.aprx

LEGEND

- Modelling zones

Modelling results (WaterTech 2024)

Dredge scenario
- Deposition area
- Erosion area

Base scenario
- Deposition area
- Erosion area

Proposed works
- Channel
- Dredge placement

Marine plant mapping (frc environmental 2018 & 2021)
- Mangrove
- Seagrass
- Indicative mangroves 2024

N

SCALE

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Kilometres

Scale: 1:10,000 @ A3

PROJECTION
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DATE
2024-09-26

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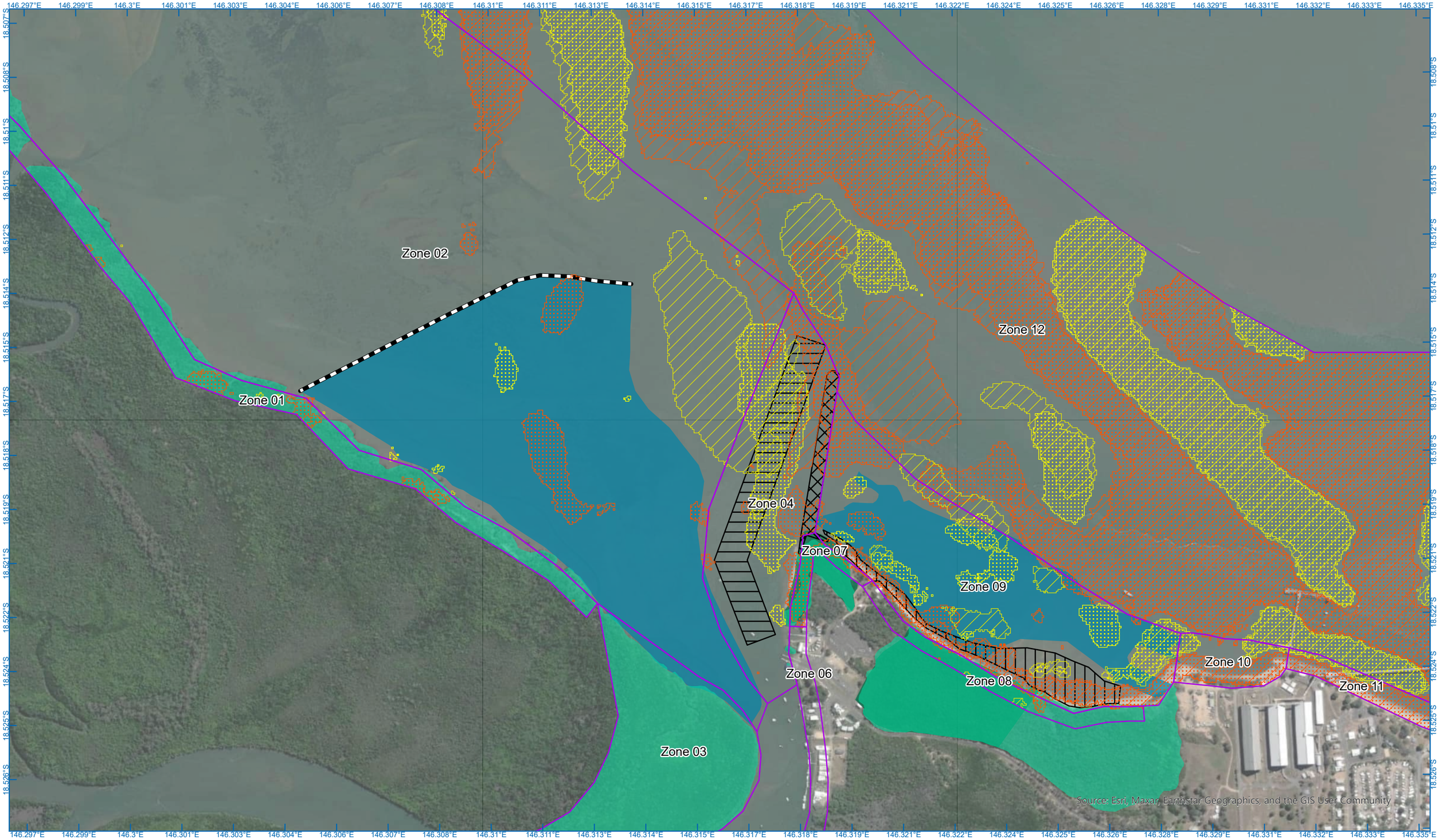

Dungeness Enterprise Proposed Dredge and Coastal Structure Works

Map 8: Modelled Deposition and Erosion for Coastal Structure Scenario During La Niña

SOURCES
© WaterTech 2024
© frc environmental 2018 & 2021
© Nearmap 2024

LEGEND
- Modelling zones
- Modelling results (WaterTech 2024)
- Coastal structure scenario
  - Deposition area
  - Erosion area
- Base scenario
  - Deposition area
  - Erosion area
- Proposed works
  - Channel
  - Placement of dredge spoil
  - Coastal structure
- Distribution of marine plants (frc environmental 2018, 2021 & 2024)
  - Mangrove 2018 & 2021
  - Seagrass 2018 & 2021
  - Indicative mangroves 2024
  - Limit of seagrass mapping

N

SCALE
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Meters
Scale: 1:10,000 @ A3

PROJECTION
Coordinate System: GDA2020 MGA Zone 55
Projection: Transverse Mercator
Datum: GDA2020

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Q 4160 Australia

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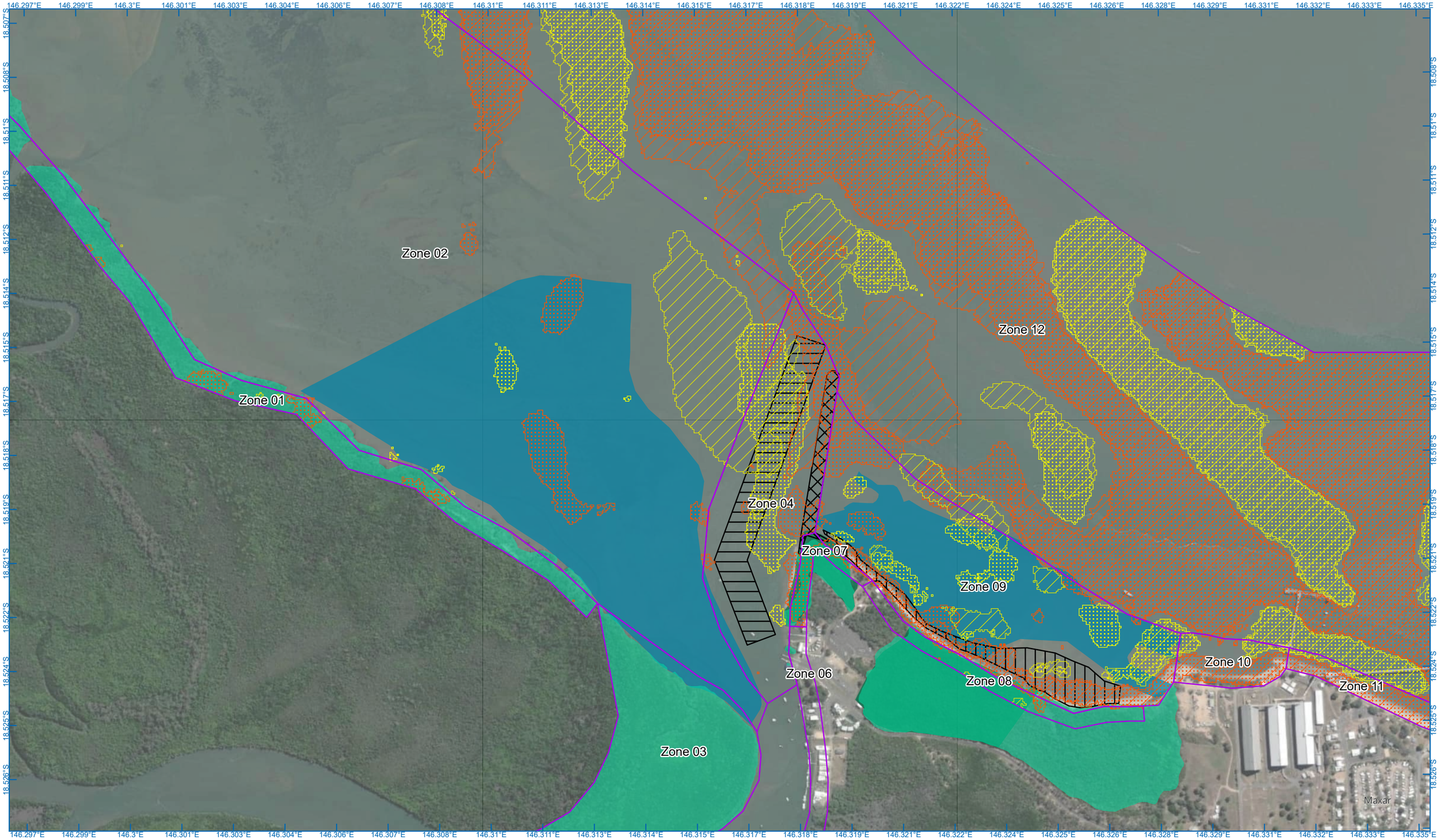

Dungeness Enterprise Proposed Dredge and Coastal Structure Works

Map 8: Modelled Deposition and Erosion for Coastal Structure Scenario During La Niña

SOURCES
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LEGEND

Modelling zones

Modelling results (WaterTech 2024)

Coastal structure scenario
- Deposition area
- Erosion area

Base scenario
- Deposition area
- Erosion area

Proposed works
- Channel
- Dredge placement
- Coastal structure

Marine plant mapping (frc environmental 2018 & 2021)
- Mangrove
- Seagrass
- Indicative mangroves 2024

N

SCALE
0 40 80 160 240 320 400
Meters

Scale: 1:10,000 @ A3

PROJECTION
Coordinate System: GDA2020 MGA Zone 55
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PO Box 2363
Wellington Point
Q 4160 Australia

P 07 3286 3850
E info@frcenv.com.au
www.frcenv.com.au

Appendix C PMST Search Results

Dungeness EPBC Referral

Dredge Channel and Coastal Infrastructure

Hinchinbrook Shire Council

SLR Project No.: 635.000235

1 April 2026

Australian Government

Department of Climate Change, Energy, the Environment and Water

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 06-Feb-2026

Summary

Details

- Matters of NES
- Other Matters Protected by the EPBC Act
- Extra Information

Caveat

Acknowledgements

Summary

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	2
National Heritage Places:	3
Wetlands of International Importance (Ramsar	None
Great Barrier Reef Marine Park:	3
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	3
Listed Threatened Species:	58
Listed Migratory Species:	60

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at https://www.dcceew.gov.au/parks-heritage/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Lands:	1
Commonwealth Heritage Places:	None
Listed Marine Species:	114
Whales and Other Cetaceans:	13
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have

State and Territory Reserves:	5
Regional Forest Agreements:	None
Nationally Important Wetlands:	None
EPBC Act Referrals:	2
Key Ecological Features (Marine):	None
Biologically Important Areas:	5
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

World Heritage Properties [Resource Information]

Name	State	Legal Status	Buffer Status
Great Barrier Reef	QLD	Declared property	In feature area
Wet Tropics of Queensland	QLD	Declared property	In feature area

National Heritage Places [Resource Information]

Name	State	Legal Status	Buffer Status
Indigenous			
Wet Tropics World Heritage Area (Indigenous Values)	QLD	Within listed place	In feature area
Natural			
Great Barrier Reef	QLD	Listed place	In feature area
Wet Tropics of Queensland	QLD	Listed place	In feature area

Great Barrier Reef Marine Park [Resource Information]

Zone Type	Zone ID	IUCN	Buffer Status
Conservation Park	CP-18-4051	IV	In buffer area only
General Use	GU-16-6004	VI	In buffer area only
Habitat Protection	HP-18-5378	VI	In feature area

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Status of Vulnerable, Disallowed and Ineligible are not MNES under the EPBC Act.

Community Name	Threatened Category	Presence Text	Buffer Status
Broad leaf tea-tree (Melaleuca viridiflora) woodlands in high rainfall coastal north Queensland	Endangered	Community likely to occur within area	In buffer area only
Littoral Rainforest and Coastal Vine Thickets of Eastern Australia	Critically Endangered	Community likely to occur within area	In feature area
Lowland tropical rainforest of the Wet Tropics	Endangered	Community likely to occur within area	In feature area

Listed Threatened Species [Resource Information]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.
Number is the current name ID.

Scientific Name	Threatened Category	Presence Text	Buffer Status
BIRD			
Arenaria interpres Ruddy Turnstone [872]	Vulnerable	Roosting known to occur within area	In buffer area only
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat may occur within area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Roosting known to occur within area	In feature area
Calidris canutus Red Knot, Knot [855]	Vulnerable	Species or species habitat known to occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Calidris tenuirostris Great Knot [862]	Vulnerable	Roosting known to occur within area	In feature area
Casuarius casuarius listed as Casuarius casuarius johnsonii Southern Cassowary [1096]	Endangered	Species or species habitat known to occur within area	In buffer area only
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area	In feature area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area	In buffer area only
Erythrotriorchis radiatus Red Goshawk [942]	Endangered	Species or species habitat likely to occur within area	In feature area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Fregetta grallaria grallaria White-bellied Storm-Petrel (Tasman Sea), White-bellied Storm-Petrel (Australasian) [64438]	Vulnerable	Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Limosa lapponica baueri Nunivak Bar-tailed Godwit, Western Alaskan Bar-tailed Godwit [86380]	Endangered	Species or species habitat known to occur within area	In feature area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Pluvialis squatarola Grey Plover [865]	Vulnerable	Roosting known to occur within area	In feature area
Poephila cincta cincta Southern Black-throated Finch [64447]	Endangered	Species or species habitat likely to occur within area	In feature area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area	In feature area
Sternula albifrons Little Tern [82849]	Vulnerable	Breeding likely to occur within area	In feature area
Tringa nebularia Common Greenshank, Greenshank [832]	Endangered	Species or species habitat known to occur within area	In feature area
Tyto novaehollandiae kimberli Masked Owl (northern) [26048]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Xenus cinereus Terek Sandpiper [59300]	Vulnerable	Roosting known to occur within area	In feature area
FISH			
Stiphodon semoni Opal Cling Goby [83909]	Critically Endangered	Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
FROG			
Litoria dayi			
Australian Lace-lid, Lace-eyed Tree Frog, Day's Big-eyed Treefrog [86707]	Vulnerable	Species or species habitat likely to occur within area	In feature area
MAMMAL			
Balaenoptera musculus			
Blue Whale [36]	Endangered	Species or species habitat may occur within area	In feature area
Dasyurus hallucatus			
Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331]	Endangered	Species or species habitat likely to occur within area	In feature area
Hipposideros semoni			
Semon's Leaf-nosed Bat, Greater Wart-nosed Horseshoe-bat [180]	Vulnerable	Species or species habitat may occur within area	In feature area
Macroderma gigas			
Ghost Bat [174]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Mesembriomys gouldii rattoides			
Black-footed Tree-rat (north Queensland), Shaggy Rabbit-rat [87620]	Vulnerable	Species or species habitat may occur within area	In feature area
Orcaella heinsohni			
Australian Snubfin Dolphin [81322]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Petauroides minor			
Greater Glider (northern), Greater Glider (north-eastern Queensland) [92008]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Petaurus gracilis			
Mahogany Glider [26775]	Endangered	Species or species habitat likely to occur within area	In feature area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)			
Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Endangered	Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Pteropus conspicillatus Spectacled Flying-fox [185]	Endangered	Species or species habitat likely to occur within area	In feature area
Pteropus poliocephalus Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Rhinolophus robertsi Large-eared Horseshoe Bat, Greater Large-eared Horseshoe Bat [87639]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Saccolaimus saccolaimus nudicluniatus Bare-rumped Sheath-tailed Bat, Bare-rumped Sheathtail Bat [66889]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Sousa sahulensis Australian Humpback Dolphin [87942]	Vulnerable	Breeding known to occur within area	In feature area
Xeromys myoides Water Mouse, False Water Rat, Yirrkoo [66]	Vulnerable	Species or species habitat likely to occur within area	In feature area
PLANT			
Leichhardtia araujacea [91900]	Critically Endangered	Species or species habitat may occur within area	In feature area
Lindsaea pulchella var. blanda [20842]	Vulnerable	Species or species habitat may occur within area	In feature area
Myrmecodia beccarii Ant Plant [11852]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Phaius pictus [22564]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Phalaenopsis rosenstromii listed as Phalaenopsis amabilis subsp. rosenstromii Native Moth Orchid [15984]	Endangered	Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Phlegmariurus tetrastichoides Square Tassel Fern [86555]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Tephrosia leveillei [16946]	Vulnerable	Species or species habitat may occur within area	In buffer area only
REPTILE			
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area	In feature area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area	In feature area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area	In feature area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area	In feature area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Breeding likely to occur within area	In feature area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area	In feature area
SHARK			
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area	In feature area
Pristis pristis Largetooth Sawfish, Freshwater Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Endangered	Species or species habitat may occur within area	In feature area
Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Breeding likely to occur within area	In feature area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Sphyrna lewini](#) Scalloped Hammerhead [85267]	Conservation Dependent	Species or species habitat likely to occur within area	In feature area

Listed Migratory Species [Resource Information]

Scientific Name	Threatened Category	Presence Text	Buffer Status
null			
[Balaenoptera omurai](#) Omura's Whale [87136]		Species or species habitat likely to occur within area	In feature area
Migratory Marine Birds			
[Anous stolidus](#) Common Noddy [825]		Species or species habitat likely to occur within area	In feature area
[Apus pacificus](#) Fork-tailed Swift [678]		Species or species habitat likely to occur within area	In feature area
[Fregata ariel](#) Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat known to occur within area	In feature area
[Fregata minor](#) Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat known to occur within area	In feature area
[Phaethon lepturus](#) White-tailed Tropicbird [1014]		Species or species habitat may occur within area	In feature area
[Phaethon rubricauda](#) Red-tailed Tropicbird [994]		Species or species habitat likely to occur within area	In feature area
[Sternula albifrons](#) Little Tern [82849]	Vulnerable	Breeding likely to occur within area	In feature area
Migratory Marine Species			
[Anoxypristis cuspidata](#) Narrow Sawfish, Knifetooth Sawfish [68448]		Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area	In feature area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area	In feature area
Carcharhinus longimanus Oceanic Whitetip Shark [84108]		Species or species habitat may occur within area	In feature area
Carcharias taurus Grey Nurse Shark [64469]		Species or species habitat may occur within area	In feature area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area	In feature area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area	In feature area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area	In feature area
Crocodylus porosus Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area	In feature area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area	In feature area
Dugong dugon Dugong [28]		Species or species habitat known to occur within area	In feature area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area	In feature area
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Breeding likely to occur within area	In feature area
Megaptera novaeangliae Humpback Whale [38]		Species or species habitat known to occur within area	In feature area
Mobula alfredi as Manta alfredi Reef Manta Ray, Coastal Manta Ray [90033]		Species or species habitat may occur within area	In feature area
Mobula birostris as Manta birostris Giant Manta Ray [90034]		Species or species habitat may occur within area	In feature area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area	In feature area
Orcaella heinsohni Australian Snubfin Dolphin [81322]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area	In feature area
Pristis pristis Largetooth Sawfish, Freshwater Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Endangered	Species or species habitat may occur within area	In feature area
Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Breeding likely to occur within area	In feature area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area	In feature area
Sousa sahulensis as Sousa chinensis Australian Humpback Dolphin [87942]	Vulnerable	Breeding known to occur within area	In feature area
Migratory Terrestrial Species			
Cuculus optatus Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Hirundo rustica Barn Swallow [662]		Species or species habitat likely to occur within area	In feature area
Motacilla flava Yellow Wagtail [644]		Species or species habitat likely to occur within area	In feature area
Migratory Wetlands Species			
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area	In feature area
Arenaria interpres Ruddy Turnstone [872]	Vulnerable	Roosting known to occur within area	In buffer area only
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Roosting known to occur within area	In feature area
Calidris canutus Red Knot, Knot [855]	Vulnerable	Species or species habitat known to occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area	In feature area
Calidris ruficollis Red-necked Stint [860]		Roosting known to occur within area	In feature area
Calidris tenuirostris Great Knot [862]	Vulnerable	Roosting known to occur within area	In feature area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area	In buffer area only
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Gallinago megala Swinhoe's Snipe [864]		Roosting likely to occur within area	In feature area
Gallinago stenura Pin-tailed Snipe [841]		Roosting likely to occur within area	In feature area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area	In feature area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Numenius minutus Little Curlew, Little Whimbrel [848]		Roosting likely to occur within area	In feature area
Numenius phaeopus Whimbrel [849]		Roosting known to occur within area	In feature area
Pandion haliaetus Osprey [952]		Breeding known to occur within area	In feature area
Pluvialis fulva Pacific Golden Plover [25545]		Roosting known to occur within area	In feature area
Pluvialis squatarola Grey Plover [865]	Vulnerable	Roosting known to occur within area	In feature area
Tringa brevipes Grey-tailed Tattler [851]		Roosting known to occur within area	In feature area
Tringa nebularia Common Greenshank, Greenshank [832]	Endangered	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Roosting known to occur within area	In buffer area only
Xenus cinereus Terek Sandpiper [59300]	Vulnerable	Roosting known to occur within area	In feature area

Other Matters Protected by the EPBC Act

Commonwealth Lands [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Commonwealth Land Name	State	Buffer Status
Australian Maritime Safety Authority		
Lot 1 on RP 710944 [AGPR233]	QLD	In buffer area only

Listed Marine Species [Resource Information]

Scientific Name	Threatened Category	Presence Text	Buffer Status
Bird			
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area	In feature area
Anous stolidus Common Noddy [825]		Species or species habitat likely to occur within area	In feature area
Anseranas semipalmata Magpie Goose [978]		Species or species habitat may occur within area overfly marine area	In feature area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area	In feature area
Arenaria interpres Ruddy Turnstone [872]	Vulnerable	Roosting known to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Bubulcus ibis as Ardea ibis Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Roosting known to occur within area	In feature area
Calidris canutus Red Knot, Knot [855]	Vulnerable	Species or species habitat known to occur within area overfly marine area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area overfly marine area	In feature area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area	In feature area
Calidris ruficollis Red-necked Stint [860]		Roosting known to occur within area overfly marine area	In feature area
Calidris tenuirostris Great Knot [862]	Vulnerable	Roosting known to occur within area overfly marine area	In feature area
Chalcites osculans as Chrysococcyx osculans Black-eared Cuckoo [83425]		Species or species habitat likely to occur within area overfly marine area	In feature area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area	In feature area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area	In buffer area only
Charadrius ruficapillus Red-capped Plover [881]		Roosting known to occur within area overfly marine area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Fregata ariel](#) Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat known to occur within area	In feature area
[Fregata minor](#) Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat known to occur within area	In feature area
[Gallinago hardwickii](#) Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat likely to occur within area overfly marine area	In feature area
[Gallinago megala](#) Swinhoe's Snipe [864]		Roosting likely to occur within area overfly marine area	In feature area
[Gallinago stenura](#) Pin-tailed Snipe [841]		Roosting likely to occur within area overfly marine area	In feature area
[Haliaeetus leucogaster](#) White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area	In feature area
[Hirundapus caudacutus](#) White-throated Needletail [682]	Vulnerable	Species or species habitat likely to occur within area overfly marine area	In feature area
[Hirundo rustica](#) Barn Swallow [662]		Species or species habitat likely to occur within area overfly marine area	In feature area
[Limosa lapponica](#) Bar-tailed Godwit [844]		Species or species habitat known to occur within area	In feature area
[Merops ornatus](#) Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat likely to occur within area overfly marine area	In feature area
Motacilla flava Yellow Wagtail [644]		Species or species habitat likely to occur within area overfly marine area	In feature area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat likely to occur within area overfly marine area	In feature area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Numenius minutus Little Curlew, Little Whimbrel [848]		Roosting likely to occur within area overfly marine area	In feature area
Numenius phaeopus Whimbrel [849]		Roosting known to occur within area	In feature area
Pandion haliaetus Osprey [952]		Breeding known to occur within area	In feature area
Phaethon lepturus White-tailed Tropicbird [1014]		Species or species habitat may occur within area	In feature area
Phaethon rubricauda Red-tailed Tropicbird [994]		Species or species habitat likely to occur within area	In feature area
Pluvialis fulva Pacific Golden Plover [25545]		Roosting known to occur within area	In feature area
Pluvialis squatarola Grey Plover [865]	Vulnerable	Roosting known to occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Rhipidura rufifrons](#) Rufous Fantail [592]		Species or species habitat likely to occur within area overfly marine area	In feature area
[Rostratula australis as Rostratula benghalensis (sensu lato)](#) Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area overfly marine area	In feature area
[Sternula albifrons as Sterna albifrons](#) Little Tern [82849]	Vulnerable	Breeding likely to occur within area	In feature area
[Symposiachrus trivirgatus as Monarcha trivirgatus](#) Spectacled Monarch [83946]		Species or species habitat known to occur within area overfly marine area	In feature area
[Tringa brevipes as Heteroscelus brevipes](#) Grey-tailed Tattler [851]		Roosting known to occur within area	In feature area
[Tringa nebularia](#) Common Greenshank, Greenshank [832]	Endangered	Species or species habitat known to occur within area overfly marine area	In feature area
[Tringa stagnatilis](#) Marsh Sandpiper, Little Greenshank [833]		Roosting known to occur within area overfly marine area	In buffer area only
[Xenus cinereus](#) Terek Sandpiper [59300]	Vulnerable	Roosting known to occur within area overfly marine area	In feature area
Fish			
[Acentronura tentaculata](#) Shortpouch Pygmy Pipehorse [66187]		Species or species habitat may occur within area	In feature area
[Bulbonaricus davaoensis](#) Davao Pughead Pipefish [66190]		Species or species habitat may occur within area	In feature area
[Campichthys tryoni](#) Tryon's Pipefish [66193]		Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Choeroichthys brachysoma Pacific Short-bodied Pipefish, Short-bodied Pipefish [66194]		Species or species habitat may occur within area	In feature area
Choeroichthys sculptus Sculptured Pipefish [66197]		Species or species habitat may occur within area	In feature area
Choeroichthys suillus Pig-snouted Pipefish [66198]		Species or species habitat may occur within area	In feature area
Corythoichthys amplexus Fijian Banded Pipefish, Brown-banded Pipefish [66199]		Species or species habitat may occur within area	In feature area
Corythoichthys flavofasciatus Reticulate Pipefish, Yellow-banded Pipefish, Network Pipefish [66200]		Species or species habitat may occur within area	In feature area
Corythoichthys intestinalis Australian Messmate Pipefish, Banded Pipefish [66202]		Species or species habitat may occur within area	In feature area
Corythoichthys ocellatus Orange-spotted Pipefish, Ocellated Pipefish [66203]		Species or species habitat may occur within area	In feature area
Corythoichthys paxtoni Paxton's Pipefish [66204]		Species or species habitat may occur within area	In feature area
Corythoichthys schultzi Schultz's Pipefish [66205]		Species or species habitat may occur within area	In feature area
Cosmocampus darrosanus D'Arros Pipefish [66207]		Species or species habitat may occur within area	In buffer area only
Cosmocampus maxweberi Maxweber's Pipefish [66209]		Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Doryrhamphus dactyliophorus Banded Pipefish, Ringed Pipefish [66210]		Species or species habitat may occur within area	In feature area
Doryrhamphus excisus Bluestripe Pipefish, Indian Blue-stripe Pipefish, Pacific Blue-stripe Pipefish [66211]		Species or species habitat may occur within area	In feature area
Doryrhamphus janssi Cleaner Pipefish, Janss' Pipefish [66212]		Species or species habitat may occur within area	In feature area
Festucalex cinctus Girdled Pipefish [66214]		Species or species habitat may occur within area	In feature area
Festucalex gibbsi Gibbs' Pipefish [66215]		Species or species habitat may occur within area	In feature area
Halicampus dunckeri Red-hair Pipefish, Duncker's Pipefish [66220]		Species or species habitat may occur within area	In feature area
Halicampus grayi Mud Pipefish, Gray's Pipefish [66221]		Species or species habitat may occur within area	In feature area
Halicampus macrorhynchus Whiskered Pipefish, Ornate Pipefish [66222]		Species or species habitat may occur within area	In feature area
Halicampus mataafae Samoan Pipefish [66223]		Species or species habitat may occur within area	In feature area
Halicampus nitidus Glittering Pipefish [66224]		Species or species habitat may occur within area	In feature area
Halicampus spinirostris Spiny-snout Pipefish [66225]		Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Hippichthys cyanospilos Blue-speckled Pipefish, Blue-spotted Pipefish [66228]		Species or species habitat may occur within area	In feature area
Hippichthys heptagonus Madura Pipefish, Reticulated Freshwater Pipefish [66229]		Species or species habitat may occur within area	In feature area
Hippichthys penicillus Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species habitat may occur within area	In feature area
Hippichthys spicifer Belly-barred Pipefish, Banded Freshwater Pipefish [66232]		Species or species habitat may occur within area	In feature area
Hippocampus bargibanti Pygmy Seahorse [66721]		Species or species habitat may occur within area	In feature area
Hippocampus histrix Spiny Seahorse, Thorny Seahorse [66236]		Species or species habitat may occur within area	In feature area
Hippocampus kuda Spotted Seahorse, Yellow Seahorse [66237]		Species or species habitat may occur within area	In feature area
Hippocampus planifrons Flat-face Seahorse [66238]		Species or species habitat may occur within area	In feature area
Hippocampus zebra Zebra Seahorse [66241]		Species or species habitat may occur within area	In feature area
Micrognathus andersonii Anderson's Pipefish, Shortnose Pipefish [66253]		Species or species habitat may occur within area	In feature area
Micrognathus brevirostris thorntail Pipefish, Thorn-tailed Pipefish [66254]		Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Microphis brachyurus](#) Short-tail Pipefish, Short-tailed River Pipefish [66257]		Species or species habitat may occur within area	In feature area
[Nannocampus pictus](#) Painted Pipefish, Reef Pipefish [66263]		Species or species habitat may occur within area	In feature area
[Phoxocampus diacanthus](#) Pale-blotched Pipefish, Spined Pipefish [66266]		Species or species habitat may occur within area	In feature area
[Siokunichthys breviceps](#) Softcoral Pipefish, Soft-coral Pipefish [66270]		Species or species habitat may occur within area	In feature area
[Solegnathus hardwickii](#) Pallid Pipehorse, Hardwick's Pipehorse [66272]		Species or species habitat may occur within area	In feature area
[Solenostomus cyanopterus](#) Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area	In feature area
[Solenostomus paradoxus](#) Ornate Ghostpipefish, Harlequin Ghost Pipefish, Ornate Ghost Pipefish [66184]		Species or species habitat may occur within area	In feature area
[Syngnathoides biaculeatus](#) Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area	In feature area
[Trachyrhamphus bicoarctatus](#) Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area	In feature area
[Trachyrhamphus longirostris](#) Straightstick Pipefish, Long-nosed Pipefish, Straight Stick Pipefish [66281]		Species or species habitat may occur within area	In feature area
Mammal			
[Dugong dugon](#) Dugong [28]		Species or species habitat known to occur within area	In feature area
Reptile			

Scientific Name	Threatened Category	Presence Text	Buffer Status
Aipysurus duboisii Dubois' Sea Snake, Dubois' Seasnake, Reef Shallows Sea Snake [1116]		Species or species habitat may occur within area	In feature area
Aipysurus laevis Olive Sea Snake, Olive-brown Sea Snake [1120]		Species or species habitat may occur within area	In feature area
Aipysurus mosaicus as Aipysurus eydouxii Mosaic Sea Snake [87261]		Species or species habitat may occur within area	In feature area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area	In feature area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area	In feature area
Crocodylus porosus Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area	In feature area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area	In feature area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area	In feature area
Hydrophis elegans Elegant Sea Snake, Bar-bellied Sea Snake [1104]		Species or species habitat may occur within area	In feature area
Hydrophis hardwickii as Lapemis hardwickii Spine-bellied Sea Snake [93516]		Species or species habitat may occur within area	In feature area
Hydrophis kingii as Disteira kingii Spectacled Sea Snake [93511]		Species or species habitat may occur within area	In feature area
Hydrophis macdowelli as Hydrophis mcdowelli MacDowell's Sea Snake, Small-headed Sea Snake, [75601]		Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Hydrophis major as Disteira major Olive-headed Sea Snake [93512]		Species or species habitat may occur within area	In feature area
Hydrophis ornatus Spotted Sea Snake, Ornate Reef Sea Snake [1111]		Species or species habitat may occur within area	In feature area
Hydrophis peronii as Acalyptophis peronii Horned Sea Snake [93509]		Species or species habitat may occur within area	In feature area
Hydrophis platura as Pelamis platurus Yellow-bellied Sea Snake [93746]		Species or species habitat may occur within area	In feature area
Hydrophis stokesii as Astrotia stokesii Stokes' Sea Snake [93510]		Species or species habitat may occur within area	In feature area
Hydrophis zweifeli as Enhydrina schistosa Australian Beaked Sea Snake [93514]		Species or species habitat may occur within area	In feature area
Laticauda colubrina Yellow-lipped Sea Krait [1092]		Species or species habitat may occur within area	In feature area
Laticauda laticaudata a sea krait [1093]		Species or species habitat may occur within area	In feature area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Breeding likely to occur within area	In feature area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area	In feature area

Whales and Other Cetaceans			[Resource Information]
Current Scientific Name	Status	Type of Presence	Buffer Status
Mammal			
Balaenoptera acutorostrata Minke Whale [33]		Species or species habitat may occur within area	In feature area

Current Scientific Name	Status	Type of Presence	Buffer Status
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area	In feature area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area	In feature area
Balaenoptera omurai Omura's Whale [87136]		Species or species habitat likely to occur within area	In feature area
Delphinus delphis Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area	In feature area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area	In feature area
Megaptera novaeangliae Humpback Whale [38]		Species or species habitat known to occur within area	In feature area
Orcaella heinsohni Australian Snubfin Dolphin [81322]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area	In feature area
Sousa sahulensis Australian Humpback Dolphin [87942]	Vulnerable	Breeding known to occur within area	In feature area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area	In feature area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area	In feature area

Current Scientific Name	Status	Type of Presence	Buffer Status
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area	In feature area

Extra Information

State and Territory Reserves			[Resource Information]
Protected Area Name	Reserve Type	State	Buffer Status
Girringun	National Park	QLD	In buffer area only
Great Barrier Reef Coast	Marine Park	QLD	In feature area
Halifax	Fish Habitat Area (B)	QLD	In feature area
Hinchinbrook	Fish Habitat Area (A)	QLD	In feature area
Hinchinbrook Island	National Park	QLD	In buffer area only

EPBC Act Referrals				[Resource Information]
Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Controlled action				
Sand Bag Groyne construction	2000/113	Controlled Action	Completed	In feature area
Not controlled action				
Barramundi grow out facility	2006/2710	Not Controlled Action	Completed	In feature area

Biologically Important Areas			[Resource Information]
Scientific Name	Behaviour	Presence	Buffer Status
Dolphins			
Sousa chinensis Indo-Pacific Humpback Dolphin [50]	Breeding	Known to occur	In feature area
Tursiops aduncus Indo-Pacific/Spotted Bottlenose Dolphin [68418]	Breeding	Likely to occur	In buffer area only
Tursiops aduncus Indo-Pacific/Spotted Bottlenose Dolphin [68418]	Breeding	Known to occur	In feature area
Seabirds			

Scientific Name	Behaviour	Presence	Buffer Status
Sterna sumatrana Black-naped Tern [800]	Breeding	Known to occur	In feature area
Whales			
Megaptera novaeangliae Humpback Whale [38]	Breeding and calving	Known to occur	In feature area

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data is available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance on the contents of this report.

3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species

Threatened, migratory and marine species distributions have been discerned through a variety of methods. Where distributions are well known and if time permits, distributions are inferred from either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) together with point locations and described habitat; or modelled (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions when time permits.

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded breeding sites; and
- seals which have only been mapped for breeding sites near the Australian continent

The breeding sites may be important for the protection of the Commonwealth Marine environment.

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact us page.

Department of Climate Change, Energy, the Environment and Water
GPO Box 3090
Canberra ACT 2601 Australia
+61 2 6274 1111

Appendix D Wildnet Search Results

Dungeness EPBC Referral

Dredge Channel and Coastal Infrastructure

Hinchinbrook Shire Council

SLR Project No.: 635.000235

1 April 2026

WN Taxon ID	Kingdom	Class	Family	Scientific name	Common name	NCA status	EPBC status	Superseded	Conservation significant	Establishment	Sensitive species	Area survey lists	Sighting records	Specimen records	Sighting summary
716	Animalia	Amphibia	Bufonidae	Rhinella marina	cane toad			No	No	II	No		1	1	1
611	Animalia	Amphibia	Hylidae	Litoria gracilenta	graceful treefrog	C		No	No	QA	No		1	1	1
42565	Animalia	Amphibia	Hylidae	Litoria pyrina				No	No		No		1	1	1
677	Animalia	Amphibia	Limnodynastidae	Limnodynastes convexiusculus	marbled frog	C		No	No	QAI	No		1	1	1
680	Animalia	Amphibia	Limnodynastidae	Platyplectrum ornatum	ornate burrowing frog	C		No	No	QA	No		1	1	1
1742	Animalia	Aves	Accipitridae	Accipiter cirrocephalus	collared sparrowhawk	C		No	No	QAI	No		1	0	1
1725	Animalia	Aves	Accipitridae	Elanus axillaris	black-shouldered kite	C		No	No	QAI	No		1	0	1
1718	Animalia	Aves	Accipitridae	Haliaeetus leucogaster	white-bellied sea-eagle	C		No	No	QAI	No		8	0	8
1720	Animalia	Aves	Accipitridae	Haliastur indus	brahminy kite	C		No	No	QAI	No		15	0	15
1707	Animalia	Aves	Accipitridae	Haliastur sphenurus	whistling kite	C		No	No	QAI	No		4	0	4
1714	Animalia	Aves	Accipitridae	Milvus migrans	black kite	C		No	No	QAI	No		10	0	10
1777	Animalia	Aves	Alcedinidae	Ceyx pusillus	little kingfisher	C		No	No	QAI	No		2	0	2
1766	Animalia	Aves	Alcedinidae	Dacelo leachii	blue-winged kookaburra	C		No	No	QAI	No		4	0	4
1760	Animalia	Aves	Alcedinidae	Todiramphus macleayii	forest kingfisher	C		No	No	QAI	No		1	0	1
1762	Animalia	Aves	Alcedinidae	Todiramphus sanctus	sacred kingfisher	C		No	No	QAI	No		10	0	10
1759	Animalia	Aves	Alcedinidae	Todiramphus sordidus	Torresian kingfisher	C		No	No	QAI	No		2	0	2
1829	Animalia	Aves	Ardeidae	Ardea alba modesta	eastern great egret	C		No	No	QAI	No		7	0	7
1831	Animalia	Aves	Ardeidae	Ardea intermedia	intermediate egret	C		No	No	QAI	No		5	0	5
1839	Animalia	Aves	Ardeidae	Butorides striata	striated heron	C		No	No	QAI	No		4	0	4

1840	Animalia	Aves	Ardeidae	Egretta garzetta	little egret	C		No	No	QAI	No		9	0	9
1826	Animalia	Aves	Ardeidae	Egretta novaehollandiae	white-faced heron	C		No	No	QAI	No		4	0	4
1813	Animalia	Aves	Ardeidae	Egretta sacra	eastern reef egret	C		No	No	QAI	No		3	0	3
1660	Animalia	Aves	Artamidae	Artamus leucorynchus	white-breasted woodswallow	C		No	No	QA	No		13	0	13
1956	Animalia	Aves	Burhinidae	Burhinus grallarius	bush stone-curlew	C		No	No	QAI	No		7	0	7
1958	Animalia	Aves	Burhinidae	Esacus magnirostris	beach stone-curlew	V		No	Yes	QAI	No		17	0	17
1196	Animalia	Aves	Cacatuidae	Calyptorhynchus banksii	red-tailed black-cockatoo	C		No	No	QA	No		4	0	4
1636	Animalia	Aves	Campephagidae	Coracina novaehollandiae	black-faced cuckoo-shrike	C		No	No	QAI	No		1	0	1
1637	Animalia	Aves	Campephagidae	Coracina papuensis	white-bellied cuckoo-shrike	C		No	No	QAI	No		7	0	7
1640	Animalia	Aves	Campephagidae	Lalage leucomela	varied triller	C		No	No	QAI	No		2	0	2
1872	Animalia	Aves	Scolopacidae	Arenaria interpres	ruddy turnstone	V	V	No	Yes	QAI	No		6	0	6
1874	Animalia	Aves	Scolopacidae	Calidris acuminata	sharp-tailed sandpiper	V	V	No	Yes	QAI	No		6	0	6
1937	Animalia	Aves	Charadriidae	Charadrius ruficapillus	red-capped plover	C		No	No	QAI	No		28	0	28
1942	Animalia	Aves	Charadriidae	Erythrogonys cinctus	red-kneed dotterel	C		No	No	QA	No		1	0	1
1944	Animalia	Aves	Charadriidae	Pluvialis fulva	Pacific golden plover	SL		No	Yes	QAI	No		8	0	8
1877	Animalia	Aves	Scolopacidae	Calidris canutus	red knot	V	V	No	Yes	QAI	No		4	0	4
27774	Animalia	Aves	Charadriidae	Vanellus miles	masked lapwing	C		No	No	QAI	No		14	0	14
1932	Animalia	Aves	Charadriidae	Vanellus miles miles	masked lapwing (northern subspecies)	C		No	No	QAI	No		5	0	5
1820	Animalia	Aves	Ciconiidae	Ephippiorhynchus asiaticus	black-necked stork	C		No	No	QAI	No		3	1	3
1806	Animalia	Aves	Columbidae	Ducula bicolor	pied imperial-pigeon	C		No	No	QAI	No		3	0	3
1810	Animalia	Aves	Columbidae	Geopelia humeralis	bar-shouldered dove	C		No	No	QAI	No		9	0	9
18323	Animalia	Aves	Columbidae	Geopelia placida	peaceful dove	C		No	No	QAI	No		20	0	20
1774	Animalia	Aves	Columbidae	Spilopelia chinensis	spotted dove			No	No	II	No		4	0	4
1608	Animalia	Aves	Corvidae	Corvus coronoides	Australian raven	C		No	No	QA	No		1	0	1
1609	Animalia	Aves	Corvidae	Corvus orru	Torresian crow	C		No	No	QAI	No		1	0	1
1744	Animalia	Aves	Cuculidae	Chalcites basalis	Horsfield's bronze-cuckoo	C		No	No	QAI	No		1	0	1
1738	Animalia	Aves	Cuculidae	Eudynamys orientalis	eastern koel	C		No	No	QAI	No		1	0	1

1611	Animalia	Aves	Dicaeidae	Dicaeum hirundinaceum	mistletoebird	C		No	No	QAI	No		7	0	7
1601	Animalia	Aves	Dicruridae	Dicrurus bracteatus	spangled drongo	C		No	No	QAI	No		7	0	7
1366	Animalia	Aves	Estrildidae	Lonchura castaneothorax	chestnut-breasted mannikin	C		No	No	QAI	No		3	0	3
1367	Animalia	Aves	Estrildidae	Lonchura punctulata	nutmeg mannikin			No	No	II	No		7	0	7
1342	Animalia	Aves	Estrildidae	Taeniopygia bichenovii	double-barred finch	C		No	No	QA	No		2	0	2
1343	Animalia	Aves	Estrildidae	Taeniopygia guttata	zebra finch	C		No	No	QA	No		2	0	2
1704	Animalia	Aves	Falconidae	Falco cenchroides	nankeen kestrel	C		No	No	QAI	No		2	0	2
1692	Animalia	Aves	Falconidae	Falco peregrinus macropus	Australian peregrine falcon	C		No	No	QA	No		1	0	1
1281	Animalia	Aves	Fregatidae	Fregata ariel	lesser frigatebird	SL		No	Yes	QAI	No		1	0	1
1282	Animalia	Aves	Fregatidae	Fregata minor	great frigatebird	SL		No	Yes	QAI	No		1	0	1
1923	Animalia	Aves	Glareolidae	Stiltia isabella	Australian pratincole	C		No	No	QA	No		1	0	1
1677	Animalia	Aves	Gruidae	Antigone antigone	sarus crane	C		No	No	QAI	No		1	0	1
1926	Animalia	Aves	Haematopodidae	Haematopus longirostris	Australian pied oystercatcher	C		No	No	QAI	No		38	0	38
1572	Animalia	Aves	Hirundinidae	Hirundo neoxena	welcome swallow	C		No	No	QAI	No		12	0	12
1585	Animalia	Aves	Hirundinidae	Petrochelidon ariel	fairy martin	C		No	No	QA	No		2	0	2
1573	Animalia	Aves	Hirundinidae	Petrochelidon nigricans	tree martin	C		No	No	QAI	No		1	0	1
1916	Animalia	Aves	Laridae	Anous stolidus	brown noddy	SL		No	Yes	QA	No		1	0	1
1912	Animalia	Aves	Laridae	Chroicocephalus novaehollandiae	silver gull	C		No	No	QAI	No		28	0	28
1886	Animalia	Aves	Laridae	Gelochelidon macrotarsa	Australian tern	C		No	No	QAI	No		15	0	15
1896	Animalia	Aves	Laridae	Hydroprogne caspia	Caspian tern	SL		No	Yes	QAI	No		25	0	25
1906	Animalia	Aves	Laridae	Onychoprion anaethetus	bridled tern	SL		No	Yes	QAI	No		2	0	2
1899	Animalia	Aves	Laridae	Sterna hirundo	common tern	SL		No	Yes	QAI	No		10	0	10
1890	Animalia	Aves	Laridae	Sterna sumatrana	black-naped tern	SL		No	Yes	QAI	No		2	0	2
1878	Animalia	Aves	Scolopacidae	Calidris ferruginea	curlew sandpiper	CR	CE	No	Yes	QAI	No		2	0	2
1907	Animalia	Aves	Laridae	Thalasseus bengalensis	lesser crested tern	C		No	No	QAI	No		28	0	28
1895	Animalia	Aves	Laridae	Thalasseus bergii	crested tern	SL		No	Yes	QAI	No		39	0	39
1539	Animalia	Aves	Meliphagidae	Entomyzon cyanotis	blue-faced honeyeater	C		No	No	QAI	No		7	0	7
1524	Animalia	Aves	Meliphagidae	Gavicalis fasciogularis	mangrove honeyeater	C		No	No	QA	No		2	0	2

1510	Animalia	Aves	Meliphagidae	Gavicalis versicolor	varied honeyeater	C		No	No	QAI	No		9	0	9
1497	Animalia	Aves	Meliphagidae	Lichmera indistincta	brown honeyeater	C		No	No	QA	No		12	0	12
1507	Animalia	Aves	Meliphagidae	Melithreptus albogularis	white-throated honeyeater	C		No	No	QAI	No		3	0	3
1488	Animalia	Aves	Meliphagidae	Myzomela obscura	dusky honeyeater	C		No	No	QAI	No		2	0	2
1492	Animalia	Aves	Meliphagidae	Philemon buceroides	helmeted friarbird	C		No	No	QAI	No		11	0	11
1494	Animalia	Aves	Meliphagidae	Philemon corniculatus	noisy friarbird	C		No	No	QAI	No		2	0	2
1474	Animalia	Aves	Meliphagidae	Ramsayornis modestus	brown-backed honeyeater	C		No	No	QAI	No		1	0	1
1511	Animalia	Aves	Meliphagidae	Stomiopera flava	yellow honeyeater	C		No	No	Q	No		1	0	1
1466	Animalia	Aves	Meliphagidae	Xanthotis macleayanus	Macleay's honeyeater	C		No	No	Q	No		2	0	2
1764	Animalia	Aves	Meropidae	Merops ornatus	rainbow bee-eater	C		No	No	QAI	No		7	0	7
1589	Animalia	Aves	Monarchidae	Grallina cyanoleuca	magpie-lark	C		No	No	QAI	No		8	0	8
1598	Animalia	Aves	Monarchidae	Myiagra alecto	shining flycatcher	C		No	No	QAI	No		1	0	1
1586	Animalia	Aves	Monarchidae	Myiagra rubecula	leaden flycatcher	C		No	No	QAI	No		4	0	4
1587	Animalia	Aves	Monarchidae	Myiagra ruficollis	broad-billed flycatcher	C		No	No	QAI	No		1	0	1
1455	Animalia	Aves	Motacillidae	Anthus novaeseelandiae	Australasian pipit	C		No	No	QAI	No		1	0	1
1451	Animalia	Aves	Nectariniidae	Cinnyris jugularis	olive-backed sunbird	C		No	No	QAI	No		3	0	3
1441	Animalia	Aves	Oriolidae	Oriolus flavocinctus	green oriole	C		No	No	QAI	No		8	0	8
1442	Animalia	Aves	Oriolidae	Oriolus sagittatus	olive-backed oriole	C		No	No	QAI	No		2	0	2
1444	Animalia	Aves	Oriolidae	Sphecotheres vieilloti	Australasian figbird	C		No	No	QAI	No		9	0	9
1450	Animalia	Aves	Pachycephalidae	Colluricincla megarhyncha	little shrike-thrush	C		No	No	QAI	No		1	0	1
1702	Animalia	Aves	Pandionidae	Pandion haliaetus cristatus	eastern osprey	SL		No	Yes	QAI	No		23	0	23
1392	Animalia	Aves	Pardalotidae	Pardalotus striatus	striated pardalote	C		No	No	QA	No		1	0	1
1360	Animalia	Aves	Passeridae	Passer domesticus	house sparrow			No	No	II	No		10	0	10
1284	Animalia	Aves	Pelecanidae	Pelecanus conspicillatus	Australian pelican	C		No	No	QAI	No		21	0	21
1348	Animalia	Aves	Petroicidae	Peneoenanthe pulverulenta	mangrove robin	C		No	No	QA	No		1	0	1
1261	Animalia	Aves	Phalacrocoracidae	Microcarbo melanoleucos	little pied cormorant	C		No	No	QAI	No		1	0	1
1124	Animalia	Aves	Psittaculidae	Trichoglossus chlorolepidotus	scaly-breasted lorikeet	C		No	No	QA	No		1	0	1
1125	Animalia	Aves	Psittaculidae	Trichoglossus moluccanus	rainbow lorikeet	C		No	No	QA	No		6	0	6

1161	Animalia	Aves	Ptilonorhynchidae	Chlamydera nuchalis	great bowerbird	C		No	No	QA	No		1	0	1
1893	Animalia	Aves	Recurvirostridae	Himantopus leucocephalus	pied stilt	C		No	No	QAI	No		1	0	1
1576	Animalia	Aves	Rhipiduridae	Rhipidura leucophrys	willie wagtail	C		No	No	QAI	No		7	0	7
1885	Animalia	Aves	Scolopacidae	Actitis hypoleucos	common sandpiper	SL		No	Yes	QAI	No		6	0	6
1856	Animalia	Aves	Scolopacidae	Calidris tenuirostris	great knot	V	V	No	Yes	QAI	No		25	0	25
1948	Animalia	Aves	Charadriidae	Charadrius leschenaultii	greater sand plover	V	V	No	Yes	QAI	No		33	0	33
1875	Animalia	Aves	Scolopacidae	Calidris alba	sanderling	SL		No	Yes	QAI	No		1	0	1
1936	Animalia	Aves	Charadriidae	Charadrius mongolus	lesser sand plover	E	E	No	Yes	QAI	No		28	0	28
1867	Animalia	Aves	Scolopacidae	Limosa lapponica baueri	Western Alaskan bar-tailed godwit	E	E	No	Yes	QAI	No		38	0	38
1880	Animalia	Aves	Scolopacidae	Calidris ruficollis	red-necked stint	SL		No	Yes	QAI	No		19	0	19
1855	Animalia	Aves	Scolopacidae	Limosa limosa	black-tailed godwit	E	E	No	Yes	QAI	No		1	0	1
1843	Animalia	Aves	Scolopacidae	Numenius madagascariensis	eastern curlew	CR	CE	No	Yes	QAI	No		45	0	45
860	Animalia	Mammalia	Phascolarctidae	Phascolarctos cinereus	koala	E	E	No	Yes	QA	No		1	0	1
1931	Animalia	Aves	Charadriidae	Pluvialis squatarola	grey plover	V	V	No	Yes	QAI	No		1	0	1
1844	Animalia	Aves	Scolopacidae	Numenius minutus	little curlew	SL		No	Yes	QAI	No		2	0	2
1845	Animalia	Aves	Scolopacidae	Numenius phaeopus	whimbrel	SL		No	Yes	QAI	No		40	0	40
1860	Animalia	Aves	Scolopacidae	Tringa brevipes	grey-tailed tattler	SL		No	Yes	QAI	No		21	0	21
1905	Animalia	Aves	Laridae	Sternula albifrons	little tern	SL	V	No	Yes	QAI	No		19	0	19
1841	Animalia	Aves	Scolopacidae	Tringa stagnatilis	marsh sandpiper	SL		No	Yes	QAI	No		5	0	5
1853	Animalia	Aves	Scolopacidae	Tringa nebularia	common greenshank	E	E	No	Yes	QAI	No		15	0	15
1314	Animalia	Aves	Sturnidae	Acridotheres tristis	common myna			No	No	II	No		19	0	19
1300	Animalia	Aves	Sturnidae	Aplonis metallica	metallic starling	C		No	No	QAI	No		2	0	2
1812	Animalia	Aves	Threskiornithidae	Threskiornis molucca	Australian white ibis	C		No	No	QAI	No		6	0	6
1800	Animalia	Aves	Threskiornithidae	Threskiornis spinicollis	straw-necked ibis	C		No	No	QAI	No		6	0	6
22645	Animalia	Chondrichthyes	Aetobatidae	Aetobatus ocellatus	whitespotted eagle ray			No	No	QAI	No		1	0	1

912	Animalia	Mammalia	Macropodidae	Notamacropus agilis	agile wallaby	C		No	No	QAI	No		1	0	1
996	Animalia	Mammalia	Molossidae	Chaerephon jobensis	northern freetail bat	C		No	No	QAI	No		2	2	2
998	Animalia	Mammalia	Molossidae	Mormopterus lumsdenae	northern free-tailed bat	C		No	No	QA	No		1	0	1
741	Animalia	Mammalia	Muridae	Rattus fuscipes	bush rat	C		No	No	QA	No		1	0	1
736	Animalia	Mammalia	Muridae	Uromys caudimaculatus	giant white-tailed rat	C		No	No	QAI	No		1	0	1
35851	Animalia	Mammalia	Peramelidae	Perameles pallescens	northern long-nosed bandicoot	C		No	No	Q	No		1	0	1
1827	Animalia	Aves	Scolopacidae	Xenus cinereus	terek sandpiper	V	V	No	Yes	QAI	No		13	0	13
512	Animalia	Reptilia	Colubridae	Dendrelaphis punctulatus	green tree snake	C		No	No	QAI	No		1	0	1
584	Animalia	Reptilia	Crocodylidae	Crocodylus porosus	estuarine crocodile	V		No	Yes	QAI	No		5	0	5
26888	Animalia	Incertae sedis	Indeterminate	Indeterminate	Unknown or Code Pending			No	No	U	No		1	0	1
23549	Fungi	Lecanoromycetes	Ramalinaceae	Ramalina exiguella		C		No	No	NTQ	No		1	1	1
18095	Plantae	Equisetopsida	Acanthaceae	Acanthus ilicifolius		C		No	No	NTQ	No		1	1	1
6799	Plantae	Equisetopsida	Acanthaceae	Avicennia marina subsp. eucalyptifolia		C		No	No	NTQ	No		1	1	1
17772	Plantae	Equisetopsida	Anacardiaceae	Buchanania arborescens		C		No	No	NTQ	No		1	1	1
15895	Plantae	Equisetopsida	Annonaceae	Xylopia maccreae		C		No	No	NTQ	No		1	1	1

41669	Plantae	Equisetopsida	Apocynaceae	Leichhardtia glandulifera		C		No	No	NTQ	No		1	1	1
35897	Plantae	Equisetopsida	Apocynaceae	Vincetoxicum carnosum		C		No	No	NTQ	No		2	2	2
12780	Plantae	Equisetopsida	Arecaceae	Livistona drudei	Halifax fan palm	E		No	Yes	NTQ	Yes		1	1	1
15884	Plantae	Equisetopsida	Arecaceae	Ptychosperma elegans	solitaire palm	C		No	No	NTQ	No		1	1	1
35900	Plantae	Equisetopsida	Asteraceae	Erigeron pusillus				No	No	NAQ	No		1	1	1
16982	Plantae	Equisetopsida	Boraginaceae	Heliotropium ovalifolium		C		No	No	NTQ	No		1	1	1
16274	Plantae	Equisetopsida	Celastraceae	Salacia chinensis		C		No	No	NTQ	No		1	1	1
16115	Plantae	Equisetopsida	Chenopodiaceae	Suaeda australis		C		No	No	NTQ	No		1	1	1
31677	Plantae	Equisetopsida	Chenopodiaceae	Tecticornia indica		C		No	No	NTQ	No		1	1	1
41554	Plantae	Equisetopsida	Cleomaceae	Arivela viscosa		C		No	No	NTQ	No		1	1	1
16025	Plantae	Equisetopsida	Combretaceae	Terminalia muelleri		C		No	No	NTQ	No		2	2	2

17780	Plantae	Equisetopsida	Cyperaceae	Bulbostylis barbata		C		No	No	NTQ	No		1	1	1
17513	Plantae	Equisetopsida	Cyperaceae	Cyperus conicus var. conicus		C		No	No	NTQ	No		1	1	1
17525	Plantae	Equisetopsida	Cyperaceae	Cyperus javanicus		C		No	No	NTQ	No		1	1	1
17529	Plantae	Equisetopsida	Cyperaceae	Cyperus pedunculatus		C		No	No	NTQ	No		1	1	1
14667	Plantae	Equisetopsida	Cyperaceae	Cyperus scariosus		C		No	No	NTQ	No		1	1	1
17440	Plantae	Equisetopsida	Ebenaceae	Diospyros compacta		C		No	No	NTQ	No		1	1	1
35534	Plantae	Equisetopsida	Ebenaceae	Diospyros laurina		C		No	No	NTQ	No		1	1	1
17331	Plantae	Equisetopsida	Elaeocarpaceae	Elaeocarpus grandis	blue quandong	C		No	No	NTQ	No		1	1	1
2255	Plantae	Equisetopsida	Euphorbiaceae	Claoxylon hillii		C		No	No	NTQ	No		1	1	1
34440	Plantae	Equisetopsida	Euphorbiaceae	Euphorbia pallens		C		No	No	NTQ	No		1	1	1
9244	Plantae	Equisetopsida	Euphorbiaceae	Euphorbia tannensis subsp. tannensis		C		No	No	NTQ	No		1	1	1

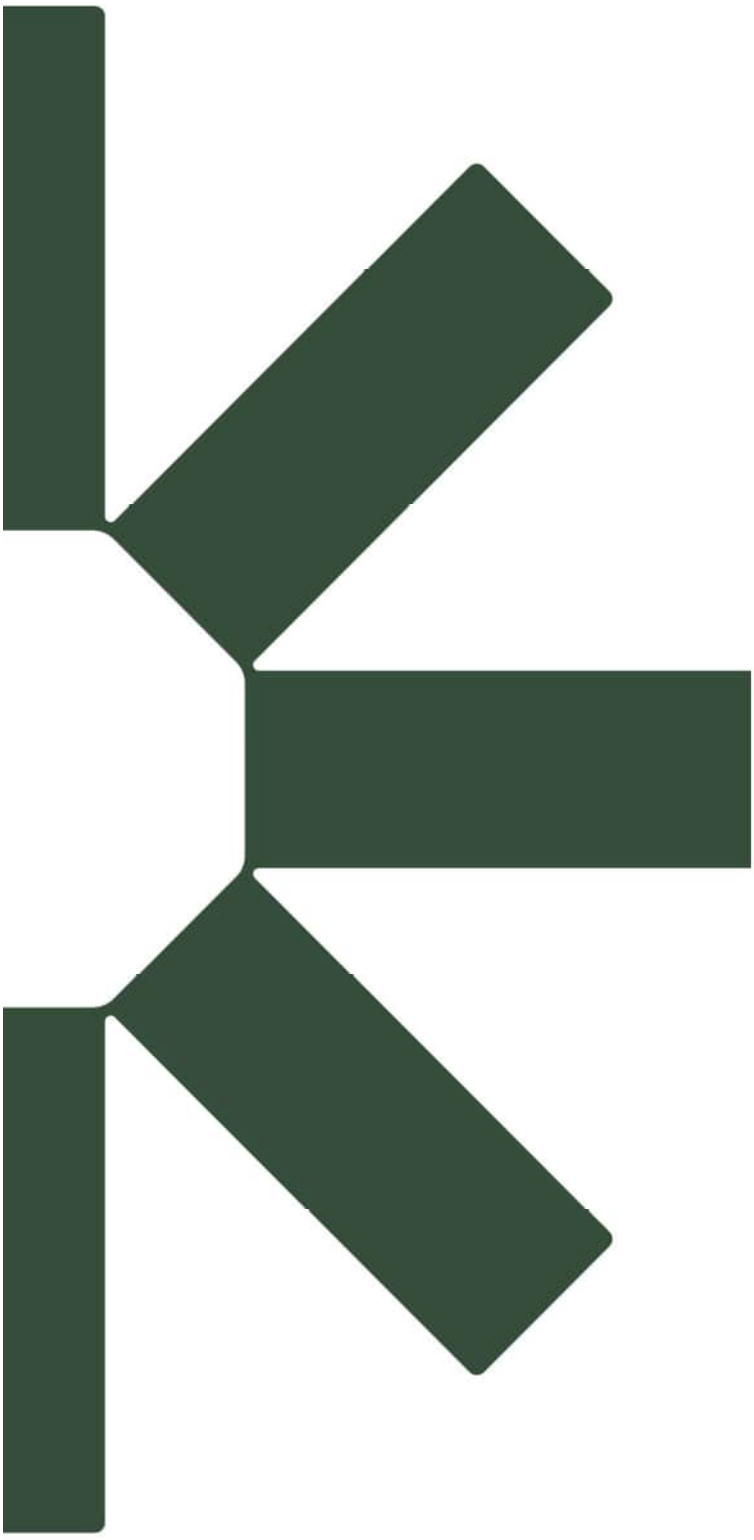
12495	Plantae	Equisetopsida	Lamiaceae	Clerodendrum longiflorum var. glabrum		C		No	No	NTQ	No		1	1	1
17542	Plantae	Equisetopsida	Lauraceae	Cryptocarya vulgaris		C		No	No	NTQ	No		2	2	2
16758	Plantae	Equisetopsida	Lauraceae	Litsea fawcettiana		C		No	No	NTQ	No		1	1	1
9088	Plantae	Equisetopsida	Lecythidaceae	Barringtonia acutangula subsp. acutangula		C		No	No	NTQ	No		1	1	1
15794	Plantae	Equisetopsida	Leguminosae	Acacia crassicarpa		C		No	No	NTQ	No		1	1	1
15470	Plantae	Equisetopsida	Leguminosae	Crotalaria mitchellii subsp. mitchellii		C		No	No	NTQ	No		1	1	1
15491	Plantae	Equisetopsida	Leguminosae	Dalbergia candenatensis		C		No	No	NTQ	No		1	1	1
15299	Plantae	Equisetopsida	Leguminosae	Indigofera tinctoria				No	No	NAQ	No		1	1	1
14445	Plantae	Equisetopsida	Leguminosae	Leucaena leucocephala				No	No	NAQ	No		6	0	6
6280	Plantae	Equisetopsida	Leguminosae	Leucaena leucocephala subsp. leucocephala				No	No	NAQ	No		1	1	1
14407	Plantae	Equisetopsida	Lindsaeaceae	Lindsaea media		C		No	No	NTQ	No		1	1	1

14516	Plantae	Equisetopsida	Loganiaceae	Geniostoma rupestre var. australianum		C		No	No	NTQ	No		1	1	1
14850	Plantae	Equisetopsida	Loranthaceae	Amyema conspicua subsp. conspicua		C		No	No	NTQ	No		1	1	1
17454	Plantae	Equisetopsida	Loranthaceae	Dendrophthoe vitellina	long-flowered mistletoe	C		No	No	NTQ	No		1	1	1
16741	Plantae	Equisetopsida	Lygodiaceae	Lygodium microphyllum	snake fern	C		No	No	NTQ	No		1	1	1
16742	Plantae	Equisetopsida	Lygodiaceae	Lygodium reticulatum		C		No	No	NTQ	No		1	1	1
18042	Plantae	Equisetopsida	Meliaceae	Aglaia elaeagnoidea		C		No	No	NTQ	No		1	1	1
13344	Plantae	Equisetopsida	Moraceae	Ficus benghalensis	banyan			No	No	NAQ	No		1	1	1
17186	Plantae	Equisetopsida	Moraceae	Ficus congesta var. congesta		C		No	No	NTQ	No		1	1	1
6556	Plantae	Equisetopsida	Myristicaceae	Myristica globosa subsp. muelleri	native nugmeg	C		No	No	NTQ	No		1	1	1
41727	Plantae	Equisetopsida	Ophioglossaceae	Ophioderma pendula		C		No	No	NTQ	No		1	1	1
15686	Plantae	Equisetopsida	Orchidaceae	Apostasia wallichii		SL		No	Yes	NTQ	Yes		1	1	1

7947	Plantae	Equisetopsida	Orchidaceae	Drymoanthus minutus		SL		No	Yes	NTQ	Yes		1	1	1
17094	Plantae	Equisetopsida	Phyllanthaceae	Glochidion harveyanum var. harveyanum		C		No	No	NTQ	No		1	1	1
16459	Plantae	Equisetopsida	Pittosporaceae	Pittosporum revolutum	yellow pittosporum	C		No	No	NTQ	No		1	1	1
36589	Plantae	Equisetopsida	Pittosporaceae	Pittosporum tinifolium		C		No	No	NTQ	No		1	1	1
15485	Plantae	Equisetopsida	Poaceae	Cymbopogon refractus	barbed-wire grass	C		No	No	NTQ	No		1	1	1
15489	Plantae	Equisetopsida	Poaceae	Dactyloctenium aegyptium	coast button grass			No	No	NAQ	No		1	1	1
11696	Plantae	Equisetopsida	Polypodiaceae	Platycerium bifurcatum		SL		No	Yes	NTQ	No		1	1	1
13095	Plantae	Equisetopsida	Portulacaceae	Portulaca bicolor		C		No	No	NTQ	No		1	1	1
16382	Plantae	Equisetopsida	Psilotaceae	Psilotum nudum	skeleton fork fern	SL		No	Yes	NTQ	No		1	1	1
17814	Plantae	Equisetopsida	Rhizophoraceae	Bruguiera exaristata		C		No	No	NTQ	No		2	2	2
17815	Plantae	Equisetopsida	Rhizophoraceae	Bruguiera gymnorhiza	large-fruited orange mangrove	C		No	No	NTQ	No		4	4	4

4134	Plantae	Equisetopsida	Rhizophoraceae	Ceriops australis		C		No	No	NTQ	No		1	1	1
33854	Plantae	Equisetopsida	Rhizophoraceae	Ceriops pseudodecandra		C		No	No	NTQ	No		2	2	2
13272	Plantae	Equisetopsida	Rhizophoraceae	Ceriops tagal	yellow mangrove	C		No	No	NTQ	No		3	3	3
16284	Plantae	Equisetopsida	Rhizophoraceae	Rhizophora stylosa	spotted mangrove	C		No	No	NTQ	No		1	1	1
8449	Plantae	Equisetopsida	Rubiaceae	Oldenlandia corymbosa var. corymbosa				No	No	NAQ	No		1	1	1
16384	Plantae	Equisetopsida	Rubiaceae	Psychotria dallachiana		C		No	No	NTQ	No		1	1	1
15868	Plantae	Equisetopsida	Rutaceae	Acronychia acronychioides		C		No	No	NTQ	No		1	1	1
18015	Plantae	Equisetopsida	Sapindaceae	Allophylus cobbe		C		No	No	NTQ	No		1	1	1
17080	Plantae	Equisetopsida	Sapindaceae	Ganophyllum falcatum		C		No	No	NTQ	No		1	1	1
6175	Plantae	Equisetopsida	Sapindaceae	Mischarytera lautereriana	corduroy tamarind	C		No	No	NTQ	No		1	1	1
16633	Plantae	Equisetopsida	Sapindaceae	Mischocarpus exangulatus		C		No	No	NTQ	No		1	1	1

16635	Plantae	Equisetopsida	Sapindaceae	Mischocarpus lachnocarpus		C		No	No	NTQ	No		1	1	1
16205	Plantae	Equisetopsida	Schizaeaceae	Schizaea bifida	forked comb fern	SL		No	Yes	NTQ	No		1	1	1
15982	Plantae	Equisetopsida	Sparrmanniaceae	Triumfetta repens		C		No	No	NTQ	No		1	1	1
15983	Plantae	Equisetopsida	Sparrmanniaceae	Triumfetta rhomboidea	chinese burr			No	No	NAQ	No		1	1	1
16988	Plantae	Equisetopsida	Sterculiaceae	Heritiera littoralis		C		No	No	NTQ	No		1	1	1



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