5.4. FORESHORE MANAGEMENT PLANS

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RECOMMENDATION

That Council endorses the Foreshore Management Plans for Wonga Beach, Newell Beach, Cooya Beach, 4 Mile Beach and Oak Beach.

EXECUTIVE SUMMARY

The Foreshore Management Plans identify management objectives and actions to undertake to reduce the impacts of coastal hazards in the coastal zone.

BACKGROUND

In 2019, Douglas Shire Council developed the Resilient Coast Strategic Plan 2019-2029 (Strategy) and committed to undertake actions to reduce the impacts of coastal hazards, such as erosion and coastal flooding, and activities in the coastal zone. A priority outcome of the Strategy is to undertake dune protection, maintenance and monitoring. To help achieve this five (5) Foreshore Management Plans (The Plans) have been developed for Wonga Beach, Newell Beach, Cooya Beach, 4 Mile Beach and Oak Beach. The Plans have been workshopped with Councillors resulting in amendments to the management and maintenance of significant sites along the Four Mile Beach foreshore area.

COMMENT

The Plans allow Council to meet actions in the Resilient Coast Strategic Plan 2019-2029 to proactively manage the impacts of coastal hazards now and into the future. The Plans will guide Council in the protection, maintenance and management of the coastline and foreshore, while maintaining the natural character of the area and respecting ecological, cultural and social values of these coastal areas.
In 2020, Council endorsed an interim Wonga Beach Foreshore Management Plan to help with the management of vehicles on beaches and Council controlled land. The interim management plan was approved with a commitment to develop a more detailed and robust plan in 2021. The newly developed Foreshore Management Plans meet this commitment.

Key highlights of the Plans include the identification of:

- The environmental values including flora composition, conservation significance and disturbances and potential impacts to the fauna and flora;
- The amenity and livability of the foreshore areas, including key foreshore values of residents and visitors;
- Recreational uses and infrastructure requirements;
- Prioritised management actions to address threats and challenges to the foreshore area, including vehicular use on beaches;
- Special interest areas and their maintenance standard e.g. The foreshore area between Helmet and Cowrie Street to be maintained to a high standard; and

- Opportunities for Coastal Hazard Apaptation Strategy implementation and associated funding opportunities.

PROPOSAL

That Council adopts the five (5) Foreshore Management Plans.

FINANCIAL/RESOURCE IMPLICATIONS

The development of other Foreshore Management Plans as per Council's Resilient Coast Strategic Plan 2019-2029, will be prepared in subsequent financial years. Any management actions identified in the Foreshore Management Plans will be resourced appropriately within the relevant Operational Plan.

RISK MANAGEMENT IMPLICATIONS

Improving the management of Council's reserves can reduce public liability risk and improve public safety.

SUSTAINABILITY IMPLICATIONS

Economic: Implementing the management actions in the Foreshore Management Plans will contribute to reducing potential economic costs to the Shire by avoiding reactive maintenance and asset protection in the foreshore zone.

Environmental: The adoption of the Foreshore Management Plans will enable Council to proactively manage the vulnerable areas of the foreshore zone, including littoral rainforest, along with other coastal vegetation, that provide essential ecosystem services of coastal protection.

Social: The Foreshore Management Plans will foster a shared understanding of the social and cultural values and uses of the foreshore zone. The Plans support Council's commitment to displaying strong environmental leadership to the Douglas Community, while enhancing the quality of life and livability of our beautiful Shire.

CORPORATE/OPERATIONAL PLAN, POLICY REFERENCE

This report has been prepared in accordance with the following:

Corporate Plan 2019-2024 Initiatives:

Theme 1 - Celebrating Our Communities

Douglas Shire Council embraces the diversity of our communities and values the contribution that all people make to the Shire. We recognise that it is a core strength of the region. We acknowledge our past so that it may guide us in the future. We recognise the wrongs done to our Indigenous community and we actively seek to reconcile so that we may all benefit from and enjoy our Shire. We acknowledge early European settlers who forged an agricultural base for our economy and we welcome all new arrivals as part of our broader community.

Goal 2 - *We will deliver programs and services that protect and enhance the liveability of our beautiful Shire.*

Theme 3 - Leading Environmental Stewardship

Our visitors and residents deeply value the unparalleled environment in which we live. We recognise our responsibility in protecting and preserving our natural world for generations to come. We understand the strong link between the environment and the economy: they are interdependent. Douglas Shire will be at the forefront of environmental protection by developing strategies, setting policies, and working with all stakeholders to become the envy of and to inspire locations across Australia and the World.

Goal 1 - *We will protect our sensitive environment and plan for the impact of climate change.*

Goal 4 - *We will partner with the community to educate and monitor.*

Goal 5 - *We will recognise the contribution that Traditional Owners make to the protection of the environment.*

Theme 4 - Inclusive Engagement, Planning and Partnerships

In delivering for our communities, economy and environment, Douglas Shire will ensure open and transparent engagement and communication. We will develop robust strategic plans and we will partner with our community and key stakeholders.

Goal 1 - *We will implement transparent decision making through inclusive community engagement and communication.*

Theme 5 - Robust Governance and Efficient Service Delivery

Strong governance and financial management are the foundations of the way in which Council will conduct its business and implement the initiatives of the Corporate Plan.

Goal 4 - *We will work with our communities to ensure they are informed, empowered and supported so that they are resilient to the impacts of disaster events. Through our leadership and capabilities, we will plan, prepare, respond and recover from events so as to minimise the impact on people, property, the environment, and our economic stability.*

Operational Plan 2021-2022 Actions:

3.1.1 - Finalise and adopt Foreshore Management Plans for five key beach areas. Undertake revegetation and access formalisation in identified areas.

COUNCIL'S ROLE

Council can play a number of different roles in certain circumstances, and it is important to be clear about which role is appropriate for a specific purpose or circumstance. The implementation of actions will be a collective effort and Council's involvement will vary from information only through to full responsibility for delivery.

The following areas outline where Council has a clear responsibility to act:

Custodian	Council owns and manages infrastructure, facilities, reserves, resources and natural areas. In fulfilling its role as custodian, Council will be mindful of the community, the economy, the environment, and good governance.

CONSULTATION

Internal: Cross departmental consultation and Council Workshops in August 2021, November 2021 and April 2022.

External: Key stakeholders were contacted to provide feedback and input into the Plans. This included: Environmental Groups, Queensland Government, Jabalbina Yalanji Aboriginal Corporation, Dawul Wuru Aboriginal Corporation, and the Douglas Local Marine Advisory Committee.

COMMUNITY ENGAGEMENT

Council officers and the consultants undertook extensive community engagement during the development of the Foreshore Management Plans. The engagement process included the following actions:

- Online survey to all residents of the Shire between 31 March – 23 April 2021;
- The Plans were released for public comment on Council's website 28 May 2021;
- Public comment period closed 25 June 2021;
- Five face-to-face community engagement sessions at each of the beaches during the public comment period;
- Fact sheets were handed out during the face-to-face engagement sessions;
- Written submissions were being accepted by the public from 31 March 2021 to 25 June 2021;
- Various media releases posted on the Council Website throughout the development process.

ATTACHMENTS

1. Foreshore Management Plan - Wonga Beach Final [**5.4.1** - 91 pages]
2. Foreshore Management Plan - Newell Beach Final [**5.4.2** - 81 pages]
3. Foreshore Management Plan - Cooya Beach Final [**5.4.3** - 80 pages]
4. Foreshore Management Plan - Four Mile Final [**5.4.4** - 84 pages]
5. Foreshore Management Plan - Oak Beach Final [**5.4.5** - 80 pages]

Wonga Beach

FORESHORE MANAGEMENT PLAN

July 2021

DOUGLAS SHIRE COUNCIL

The Eastern Kuku Yalanji and Yirrganydji Peoples are the Traditional Custodians and Owners of the land and sea country that encompass the Douglas Shire region.

Douglas Shire Council acknowledges the 'Bama', the traditional rainforest Aboriginal coastal people of our region who hold the unique position of being the First Peoples of this country. We recognise and respect Bama cultural heritage, values, beliefs and continuing relationships and responsibility to their land and sea country. We honour and respect your Elders past, present and future.

We commit to maintaining and strengthening our partnerships and respectful relationships with Bama in the spirit of reconciliation so that together we can increase the opportunities for successful and positive outcomes to the advantage of everyone in our communities.

Council respectfully acknowledges other Aboriginal and Torres Strait Islander people who call our region 'home'.

This report has been prepared by Alluvium Consulting Australia Pty Ltd and Wild Environmental for Douglas Shire Council under the contract titled 'WO5429 Foreshore Management Plan'.

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Cover image:	Wonga Beach foreshore.

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1 Introduction

The coastline is an important place for many Australians, providing significant social and cultural value. This is especially so for many residents of the Douglas Shire who have identified these unique coastal landscapes and natural ecosystems among some of the most important factors attracting people to this coastline (DSC 2019a). The Douglas Shire coastline also has high tourism value, attracting many visitors to the area.

The Eastern Kuku-Yalanji and Yirriganydji Peoples are the Traditional Custodians of the Land and Sea Country within the Douglas Shire. They have lived in and cared for this region for thousands of years, represented in important cultural sites throughout the Shire, and the memories and experiences of its people; past, present and future.

Douglas Shire Council (DSC) has an extensive 111 km long coastline that extends from Degarra in the north to south of Wangetti. The Shire is well known for its diverse coastline and its proximity to the Great Barrier Reef. Much of the Shire is within the Wet Tropics World Heritage Area and its dynamic coast consists of a variety of sandy beaches, rocky headlands and coastal rainforests.

The region's beaches and foreshore areas are important both to people and to the ecosystems around them. Coastal landscapes provide essential habitat for life on the foreshore and provide visual and recreational amenity to the people. Healthy coastal ecosystems are necessary to promote the resilience of plant and animal communities to coastal hazard impacts. Denser vegetation types are also effective in reducing the destructive forces of a storm tide for communities and infrastructure landward of the foreshore.

However, these ecosystems are experiencing ongoing disturbance as a result of erosion, vehicle and pedestrian access, weeds and pest species, illegal dumping, and runoff from stormwater and agricultural land. These factors threatening dune stability and reducing the erosion buffer often result in vegetation loss, impacts to native fauna species, and changes in ecosystem structure.

To help manage and protect these important coastal zones, DSC has developed five Foreshore Management Plans (FMPs) for the Wonga, Newell, Cooya, Four Mile and Oak Beaches.

1.1 Purpose

In 2019, DSC developed the Resilient Coast Strategic Plan 2019-2029 (referred to henceforth as the Strategy) and has committed to undertake actions to reduce the impacts of coastal hazards, such as erosion and coastal flooding, and activities in the coastal zone. A priority outcome of the Strategy is to undertake dune protection, maintenance and monitoring. This encompasses the foreshore area and is the focus of the FMP.

The FMPs will help to guide Council in the protection, maintenance and management of the coastline and foreshore, while maintaining the natural character of the area and respecting ecological, cultural and social values of these coastal reserves. Funding has been secured through the Queensland Government Reef Assist Program which will be used to support some of the implementation of the management actions outlined in the FMP.

The plans will:

- Ensure there is a **shared understanding** of the social, cultural, environmental and economic values and uses of the foreshore zone
- Identify options for the **proactive management** of vulnerable areas of the foreshore zone over the next 5 years
- Help **improve and maintain** the vegetation cover and condition in the foreshore zone.

The Interim Wonga Beach Foreshore Management Plan was developed in 2020 primarily to manage the use of all-terrain vehicles (ATVs) on the beach for recreational purposes (DSC 2020). The Interim FMP set out the approval process for ATV use on the beach and actions for dune protection and maintenance. It is intended that

the Wonga Beach FMP will incorporate the actions set out in the Interim FMP to maintain the values of the community.

1.2 Foreshore Management Plan area

Wonga Beach is a coastal community located on a broad sandy embayment that extends along the coastline south of the Daintree River for approximately 10 km and represents almost 10 % of the Shire's coastal length (Figure 1) (DSC 2019b, DSC 2020). The sandy embayment that forms Wonga Beach is part of a beach ridge system.

Wonga Beach is one of the main coastal settlements in the Douglas Shire. There are more than 500 residential dwellings and a number of tourist facilities, including Pinnacle Village Holiday Park. The settlement is located at the southern end of the sandy embayment. The most recent census data from 2016 indicates there were 975 residents at Wonga Beach (ABS 2017), most of whom reside there permanently. However, it is likely that Wonga Beach has seen some population growth in the following years.

Figure 1. *Wonga Beach foreshore management area.*

1.3 Implementation

This FMP has been developed following a series of site inspections, including vegetation mapping, species identification and coastal morphology assessments, as well as public engagement with residents and ratepayers from Wonga Beach and the greater Douglas Shire. The site inspections, survey results and public engagement sessions have informed the management actions and planning decisions for the Wonga Beach foreshore area. The management actions have been tailored to incorporate what the community values about their foreshore and how the foreshore is used.

The Wonga FMP outlines actions for dune protection, including weed species for removal, native vegetation species for revegetation, and pedestrian and vehicle access management. It also provides a schedule for implementation to allow Council to prioritise actions for the area. This FMP remains non-statutory but once approved by Council provides an informed and proactive guide for the future management of Wonga Beach over a five-year timeframe.

2 Study area and planning context

Wonga Beach is a coastal community located on a sandy beach between Rocky Point and the Daintree River. It is bordered by the Great Barrier Reef Marine Park to the east and the Wet Tropics World Heritage Area to the west. As a result, there are a variety of land zoning uses and ecological communities at Wonga Beach. The following section outlines the DSC land zoning and vegetation and faunal communities identified in the literature review and supported by the findings of the site visits and surveys.

2.1 Legislative, policy and strategy setting

Coastal management is guided by Commonwealth, State and local legislation. The legislation results in a complex structure of rights and responsibilities. Key legislation, plans, policies and strategies relevant to foreshore management are summarised in Table 1.

Table 1. Summary of the legislation, policy, plans and strategies relevant to foreshore management

Legislation	Relevance

Biosecurity Act 2014	• This Act provides a comprehensive biosecurity framework to manage the impacts of animal and plant diseases and pests.
	• The purpose of this Act is to:
	  ○ Provide a framework for an effective biosecurity system for Queensland.
	  ○ Ensure the safety and quality of animal feed, fertilisers and other agricultural inputs.
	  ○ Help align responses to biosecurity risks in the State with national and international obligations and requirements.
	• The purpose of the Act is also to manage risks associated with emerging, endemic and exotic pests and diseases.

Coastal Protection and Management Act 1995	• This Act aims to provide for the protection, conservation, rehabilitation and management of the coastal zone, including its resources and biological diversity. • This Act considers the goal, core objectives and guiding principles of the National Strategy for Ecologically Sustainable Development in the use of the coastal zone. • This Act ensures that decisions about land use and development safeguard life and property from the threat of coastal hazards. • This Act encourages the enhancement of knowledge of coastal resources and the effect of human activities on the coastal zone.

Planning Act 2016	• This Act provides for an efficient, effective, transparent, integrated, coordinated and accountable systems of land use planning and development assessment to facilitate the achievement of ecological sustainability by:
	  ○ Coordinating and integrating planning at the local (i.e., planning schemes), regional and State scales
	  ○ Managing the process and effects of development on the environment (including managing the use of premises).

Native Title Act 1993	• The purpose of this Act is for the recognition and protection of native title.
	• It covers:
	  ○ Acts affecting native title.
	  ○ Determining whether native title exists and compensation for acts affecting native title.

Legislation	Relevance
Aboriginal Cultural Heritage Act 2003	• The main purpose of this Act is to provide effective recognition, protection and conservation of Aboriginal cultural heritage.
Vegetation Management Act 1999	• This Act aims to regulate the clearing of vegetation by: o Managing the environmental effects of clearing. o Regulating clearing in a way that conserves remnant vegetation that is an endangered regional ecosystem, an of concern ecosystem, or a least concern regional ecosystem. o Ensuring clearing does not cause land degradation and allows for sustainable land use. o Preventing the loss of biodiversity, maintain ecological processes, and reduce greenhouse gas emissions.
Environmental Protection Act 1994	• This Act aims to protect Queensland's environment while allowing for development that improves the total quality of life, both now and in the future, and that maintains the ecological processes on which life depends. • The Act defines environmental value, environmental harm and best practice environmental management.
Nature Conservation Act 1992	• This Act aims to conserve nature while allowing for the involvement of indigenous people in the management of protected areas. • This is to be achieved by a conservation strategy for Queensland that declares and manages protected areas, protects native wildlife and habitats, ensures use of protected wildlife and areas to be ecologically sustainable, and allows cooperative involvement of Aboriginal and Torres Strait Islander people.
Environment Protection and Biodiversity Conservation Act 1999	• This Act aims to provide protection of the environment, promote ecologically sustainable development and the conservation of biodiversity. • The Act aims to promote the use of indigenous knowledge of biodiversity through a cooperative approach to the protection and management of environments.
Queensland Local Government Act 2009	• This Act provides a system of local government in Queensland, including: o The way in which a local government is constituted and the nature and extent of its responsibilities and powers. • A system of local government in Queensland that is accountable, effective, efficient and sustainable.
Marine Parks Act 2004	• The main purpose of this Act is to provide for conservation of the marine environment. • This purpose as it relates to this plan can be achieved through: o Cooperative involvement of public authorities and other interested groups and persons, including members of Aboriginal and Torres Strait Islander communities. o Recognition of the cultural, economic, environmental and social relationships between marine parks and other areas, whether of water or land.

Legislation	Relevance
Local Laws	• Local laws sit within the *Local Government Act 2009* and under the Act a local government may make and enforce any local law that is necessary or convenient for the good rule and local government of its local government area. • This legislation sets out the laws for the Douglas Shire Council area, including animal management, community and environmental management, local government areas, and facilities.

2.2 Zoning

Land use

The DSC Planning Scheme (2018) has been used to understand the boundaries between different land uses (Figure 2) (DSC 2018a). At Wonga Beach, the primary land uses within or immediately adjacent to the foreshore area are conservation, recreation and open space, and residential, including low density and rural. These land uses have implications for the management of the foreshore area. Changes within these zones can have flow-on impacts to the foreshore area, including:

- habitat fragmentation (loss of habitat into smaller, isolated areas)
- runoff
- illegal clearing and planting, including weed dispersal and growth
- impacts on fauna (light and noise pollution, road/beach kills).

Conservation zone

The conservation zone provides for the protection, restoration and management of areas identified to support significant biological diversity and ecological integrity (DSC 2018a). Relevant outcomes identified in the Douglas Planning Scheme for the conservation zone include (DSC 2018a):

- Protection of biological diversity, ecological integrity and scenic amenity.
- Recreational or other uses of areas are consistent with the management plans of the controlling authority so that conservation and scenic values of these areas are not adversely affected.
- Any use of land in private ownership does not affect the environmental, habitat, conservation or scenic values of that land or surrounding area.
- Any low intensity facilities based on the appreciation of the natural environment or nature based recreation only establish where there is a demonstrated need and provided they have a minimal impact on the environmental and scenic amenity values of the site or surrounding area.
- The provisions of the Return to Country Local Plan facilitate economic and social opportunities on traditional Indigenous lands.
- Further lot reconfigurations other than amalgamations, boundary realignments to resolve encroachments, or for the practical needs of essential community infrastructure, or to facilitate Return to Country outcomes do not occur.

Recreation and open space

The purpose of the recreation and open space zone is to provide for informal recreation where the built form is not essential to the enjoyment of the space, parks that serve the recreational needs of residents and visitors, and a range of organised activities that require a level of built infrastructure (DSC 2018a). Relevant outcomes to the recreation and open space zone include (DSC 2018a):

- Areas are provided for active sport and recreation to meet community needs.
- Open space is accessible to the general public for a range of outdoor sport and recreation activities.
- A range of functional and accessible open spaces, including local and regional parks and linkages, are available for the use and enjoyment of residents and visitors.

- Ancillary structures and buildings such as shelters, amenity facilities, picnic tables and playgrounds are provided where necessary.
- Sport and recreation areas are planned and designed to enhance community liveability, scenic amenity and provide a retreat from developed areas.
- The use of sport and recreation areas does not unduly affect the amenity of adjacent areas particularly residential areas.

Residential

Within Wonga Beach, there are low density and rural residential areas adjacent to the foreshore area. Low density residential areas provide for predominantly dwelling houses supported by community uses and small-scale services and facilities that cater for local residents (DSC 2018a). The purpose of the low density residential zone will be achieved through the following relevant outcomes (DSC 2018a):

- Development maintains a high level of residential amenity having regard to traffic, noise, dust, odour, lighting and other locally specific impacts.
- Development reflects and enhances the existing low density scale and character of the area.
- Development is reflective and responsive to the environmental constraints of the land.
- Development is supported by necessary community facilities, open space and recreational areas and appropriate infrastructure to support the needs of the local community.

Rural residential areas provide for rural residential development on large lots (DSC 2018a). Relevant outcomes to the rural residential land zone include (DSC 2018a):

- Development preserves the environmental, scenic amenity and topographical features of the land by integrating an appropriate scale of residential activities among these features.
- Development provides a high level of residential amenity.
- Development provides for the safe use of on-site wastewater treatment systems for effluent disposal with systems designed for varied soil type, slopes and prolonged periods of wet weather.

Native Title

Native Title determination recognises the holders to exercise their rights to traditional law and customs. A section of Wonga Beach is held under Native Title by the Eastern Kuku Yalanji People (see Figure 2) (NNTT 2020).

Great Barrier Reef Coast Marine Park Zoning

The Great Barrier Reef (GBR) Coast Marine Park Zoning classifies the land and waters below the high tide mark within the Wonga Beach FMP area as Habitat Protection Zone (Figure 2). This zoning protects and manages sensitive habitats and ensures that they are generally free from damaging activities (GBRMPA 2021).

Wet Tropics World Heritage Area

A small section at the northern end of the Wonga Beach foreshore precinct falls under the Wet Tropics World Heritage Area (Figure 2) (WTMA n.d.). The goal of this status is to conserve, protect, rehabilitate, present and transmit to future generations. Activities undertaken along the Wonga Beach foreshore may have an impact on the Wet Tropics area and needs to be considered accordingly.

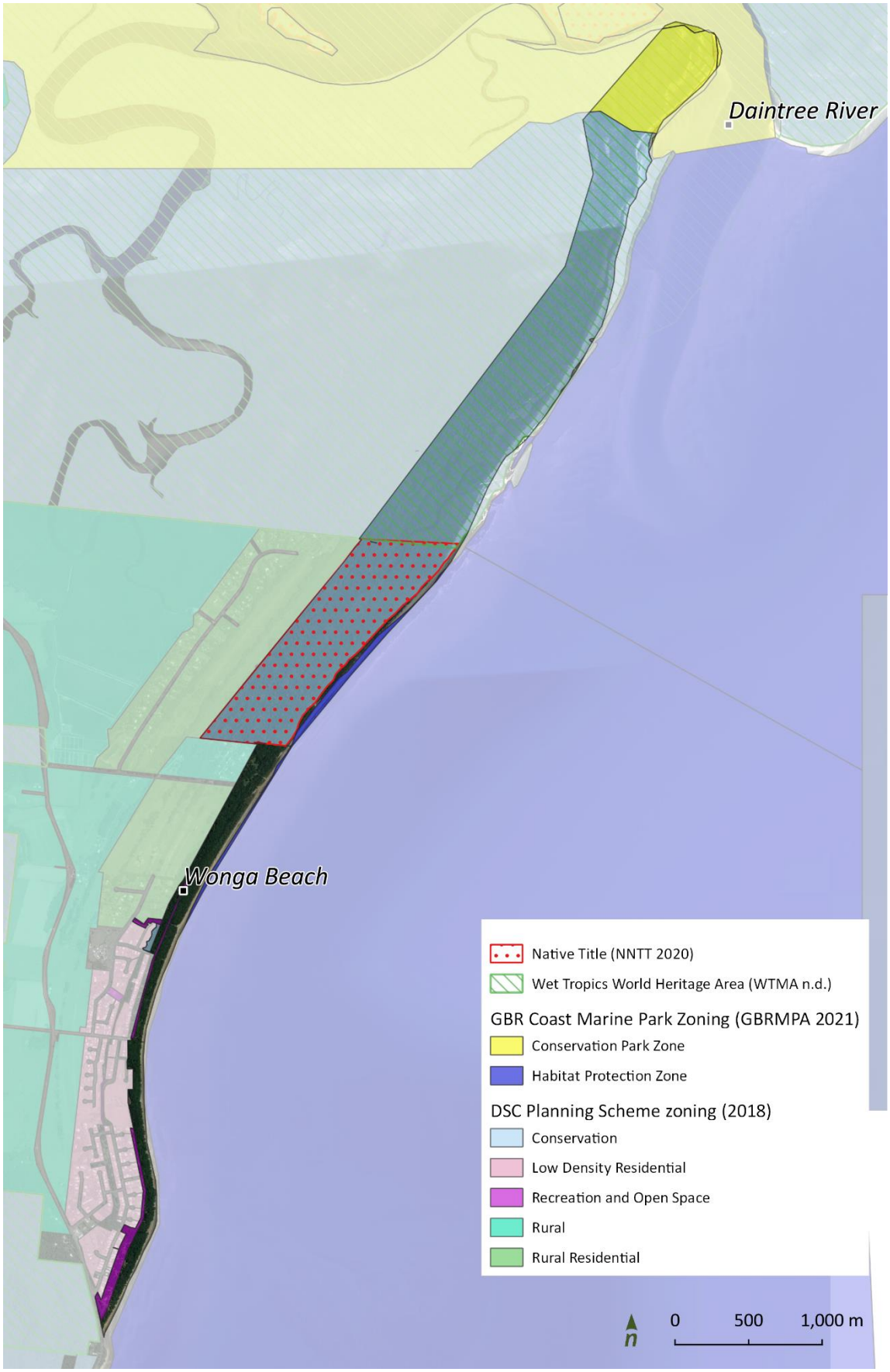

Figure 2. *Wonga Beach foreshore area land use zoning (DSC 2018, NNTT 2020, GBRMPA 2021, WTMA n.d.).*

2.3 Coastal hazards

The upper section of Wonga Beach is vulnerable to coastal erosion (DSC 2019b). This erosion may be temporary or permanent. Temporary erosion is generally caused by storms, winds or waves, and the beach rebuilds during calmer periods. Permanent erosion is more likely to occur over the longer-term due to rising sea levels or significant changes to sediment transport dynamics where sand becomes lost to the coastal system. Erosion may impact the foreshore area, including the vegetation, wildlife habitats, infrastructure, recreational uses or values.

2.4 Foreshore management precinct

The foreshore precinct at Wonga Beach, which is the focus of this FMP, has been designated as the zone between the low tide mark, landward to the edge of the low density residential zone. The area between the low tide mark and highest astronomical tide (HAT) line has been included in the foreshore area in order to accommodate for the use of ATVs along the beach in this intertidal zone.

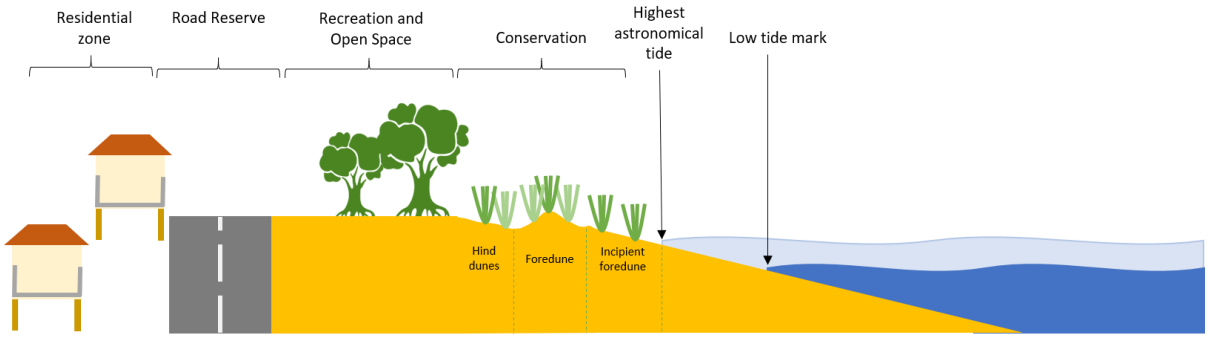

Figure 3. *Graphic representation of the Wonga Beach foreshore management precinct.*

The foreshore area includes the dune system behind the beach, immediately landward of the HAT mark and is made up of the following three key sections (Figure 3):

- **Incipient foredune:** a windblown platform that forms in front of the foredune, however is not present on all beaches. This is where vegetation such as grasses and creepers first establish and provides a protective buffer to erosion, and storm effects, including winds and waves.
- **Foredune:** the main sandy formation and is of greater height than the incipient dune. Larger vegetation species establish here, including shrubs, which provide greater wind protection.
- **Hind dune:** a smaller dune system behind the foredune. These systems tend to be well established, including larger vegetation species such as trees.

3 Foreshore values

The Wonga Beach foreshore is valued for a number of reasons. The long length of Wonga Beach and the near-pristine condition of the northern end of the beach support a number of habitats for vulnerable marine species. The foreshore and beach areas are also enjoyed for their recreational value. These values support the management of the foreshore area. The following section outlines the social, cultural and environmental values that have been identified for the Wonga Beach foreshore area, as well as describing any threats or challenges to these values.

3.1 Knowledge sharing and community engagement

The Wonga Beach community has previously been engaged through the Strategy and as part of the development of the Interim Wonga Beach Foreshore Management Plan. The findings from the survey as part of the Strategy found anecdotal reports of sand loss from the northern end of Wonga Beach (DSC 2018b).

An additional community survey was undertaken as part of a Draft Vehicles on Beaches General Policy. A draft policy was distributed to households for comment, publicised on Council's website, advertised in the local paper and physical copies were made available at Wonga Beach Servo (DSC 2019c). Council received 85 submissions, representing 187 residents. Over two-thirds (69 %) of the respondents were supportive of the use of ATVs/quad bikes along the beach, while the remainder of respondents were neutral (3 %) or against (28 %) their use. There was the belief amongst some residents that the conditions set out in the interim plan were too limiting.

For the current FMP, a survey was distributed to the Wonga Beach community and wider Douglas Shire residents and ratepayers to understand how they use and what they value about the foreshore zone, and how they would like to see it managed. The survey was advertised through the Council Foreshore Management Plans page, Facebook, community noticeboards, emails to residents and community groups, and physical copies were made available at Council offices. The survey ran from 31st March to 23rd April 2021 and received a total of 317 responses from residents and community groups throughout the Douglas Shire. The largest response was received from residents and ratepayers at Wonga Beach, with 86 responses received, most being permanent residents (homeowners).

In addition to the survey, there was also a period of public consultation following the release of the draft FMP for Wonga Beach. A four-week public comment period provided residents and ratepayers with an opportunity to submit feedback on the draft FMP. A number of drop-in sessions were also held at numerous locations throughout the Shire, including at Wonga Beach State School, to allow people to discuss the FMP in greater detail. Feedback from the public consultation has been used to further understand the values and shape the management actions for the final FMP.

Social values

The majority of survey respondents at Wonga Beach live adjacent to or within 1 km of the foreshore area. Most of the respondents also visit the foreshore at least once a week. This information indicates the foreshore area is significant to residents and ratepayers at Wonga Beach.

Residents predominantly use the Wonga Beach foreshore for exercise and relaxation (Figure 4). The next most common uses for the foreshore area are meeting family and friends, fishing and walking the dog. Wonga Beach residents use ATVs along the beach for recreation and to access fishing spots on the Daintree River. The foreshore is used less often for BBQs, recreation and using the playground. In some cases, the residents are using the foreshore area as an extension of their yard.

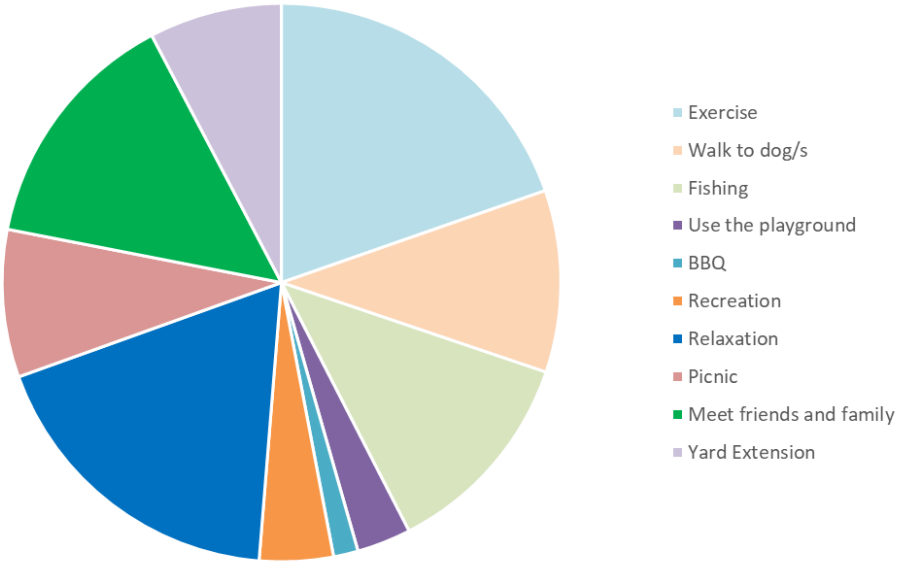

Figure 4. *The most common uses of the foreshore area at Wonga Beach.*

Sense of place

Wonga Beach residents most value the unspoilt natural beauty, peace and serenity of the foreshore, including ocean views and proximity to the Daintree River. They also value the abundance of wildlife, including shorebirds, turtles and other marine animals. The vegetation and space that the beach provides for recreation and as a meeting place is also highly valued.

The northern end of Wonga Beach is referred to as the "North Wonga Beach Protection Reserve" and is recognised as Native Title land held by the Eastern Kuku Yalanji people (CRC 2012). Traditional uses for this land include camping and hunting (CRC 2012). Marine turtles are very important for the Eastern Kuku Yalanji people. Turtles connect the tribes at Wonga Beach and further afield. They are also an important traditional food source. There are also a number of culturally significant sites along the foreshore. These include graves near Lifu Close and at the southern end of Marlin Drive.

There are anecdotal reports of environmentally significant sites at Wonga Beach. These require further investigation and monitoring to understand the numbers and species that are present. However, they are likely to include bird nesting and feeding sites at the northern end of Wonga Beach, a variety of crab species and turtle nesting sites.

Concerns and threats

The survey raised some concerns, particularly around infrastructure and threats to the foreshore, including vegetation. It identified a lack of infrastructure to support residents, including walking paths, exercise equipment and places to socialise. The residents feel that more needs to be done to protect the vegetation along the foreshore in order to preserve the natural amenity of Wonga Beach and provide habitat for native animals.

Some residents also identified the use of vehicles, including four-wheel drives (4WD) and ATVs, on the beach as a concern and threat to the overall beach state. It is believed these vehicles have contributed to the destruction of vegetation and widening of access paths, loss of habitat for native animals and cause noise pollution. Illegal camping is also contributing to noise pollution and results in rubbish dumping. However, it can be noted that vegetation loss may also be caused by erosion during storms and through illegal clearing. Weeds along the foreshore also pose a threat to the native vegetation.

3.2 Environmental values

The vegetation cover varies along Wonga Beach. The most developed areas in the southern-most management precincts of Old Wonga, New Wonga and Giblin Street north to Pinnacle Village have only a narrow area of mapped remnant foreshore vegetation between 80 to 100 m wide. The vegetation in these areas is heavily impacted by illegal clearing to maintain views and access for ATVs and pedestrians. From Pinnacle Village north to the Daintree River there is more intact remnant vegetation with good connectivity to surrounding vegetation and few illegal access tracks.

Flora composition

Vegetation mapping of the northern section of Wonga Beach indicates that approximately 17 different Regional Ecosystems (RE) types are supported (DOR 2020). The three REs that dominate the foreshore vegetation community at Wonga Beach are 7.2.1c, 7.2.2g and 7.2.7a, as confirmed by ground-truthing of the vegetation mapping. The RE descriptions, Vegetation Management (VM) Class, Biodiversity (BD) Status and local representation are summarised in Table 2 and Figure 5. A full list of the REs at Wonga Beach is provided in Attachment A. The local representation of vegetation in the dune system at Wonga Beach is summarised in Table 3.

Table 2. Regional Ecosystems (RE) of Wonga Beach

RE	Mapped RE description	VM Class[1]	BD Status[2]	Local representation
7.2.1c	Closed forest with *Calophyllum inophyllum*, *Terminalia arenicola*, *Dillenia alata*, *Myristica insipida*, *Planchonella obovata*, *Millettia pinnata*, and *Hibiscus tiliaceus*. Beach ridge deposits adjacent to the foredune, in the very wet rainfall zone.	E	E	A closed to semi-closed woodland dominated by *Terminalia catappa*, *Calophyllum innophyllum* and *T. Arenicola.* Also present were *Ptychosperma elegans, Ficus microcarpa,* and *Entada rheedii.*
7.2.2g	Vine forest with *Hibiscus tiliaceus* and *Calophyllum australianum*. Intermittently inundated narrow dune swales	OC	E	*Hibiscus tiliaceus* and *Calophyllum inophyllum* is present through much of the assessed areas however impacts in the hind area are higher and the lower strata are frequently removed or the vegetation has been replaced with stands of coconut trees (*Cocos nucifera*).
7.2.7a	Complex of open shrubland to closed shrubland, grassland, low woodland and open forest. Includes pure stands of *Casuarina equisetifolia*, and *Acacia crassicarpa*, *Syzygium forte* subsp. *forte*, *Calophyllum inophyllum* and *Pandanus* spp. woodland to open forest. Beach strand and foredune.	OC	E	*Casuarina equesitifolia, Thespesia populnea* and *Terminalia* spp. form the dominant tree layer with occasional *Pandanus cookii.* The coastal facing edge is dominated by shrubs, *Scaevola taccada*, *Wollastonia uniflora* and *Vitex rotundafolia*, vines *Vigna marina* and *Ipomoea pes-caprae*, and grasses and sedges *Ischaemum muticum*, *Thuarea involuta* and *Cyperus pedunculatus.*

[1] VM Class: LC – Least Concern, OC – Of Concern, E – Endangered.
[2] BD Status: NC – No Concern, OC – Of Concern, E – Endangered.

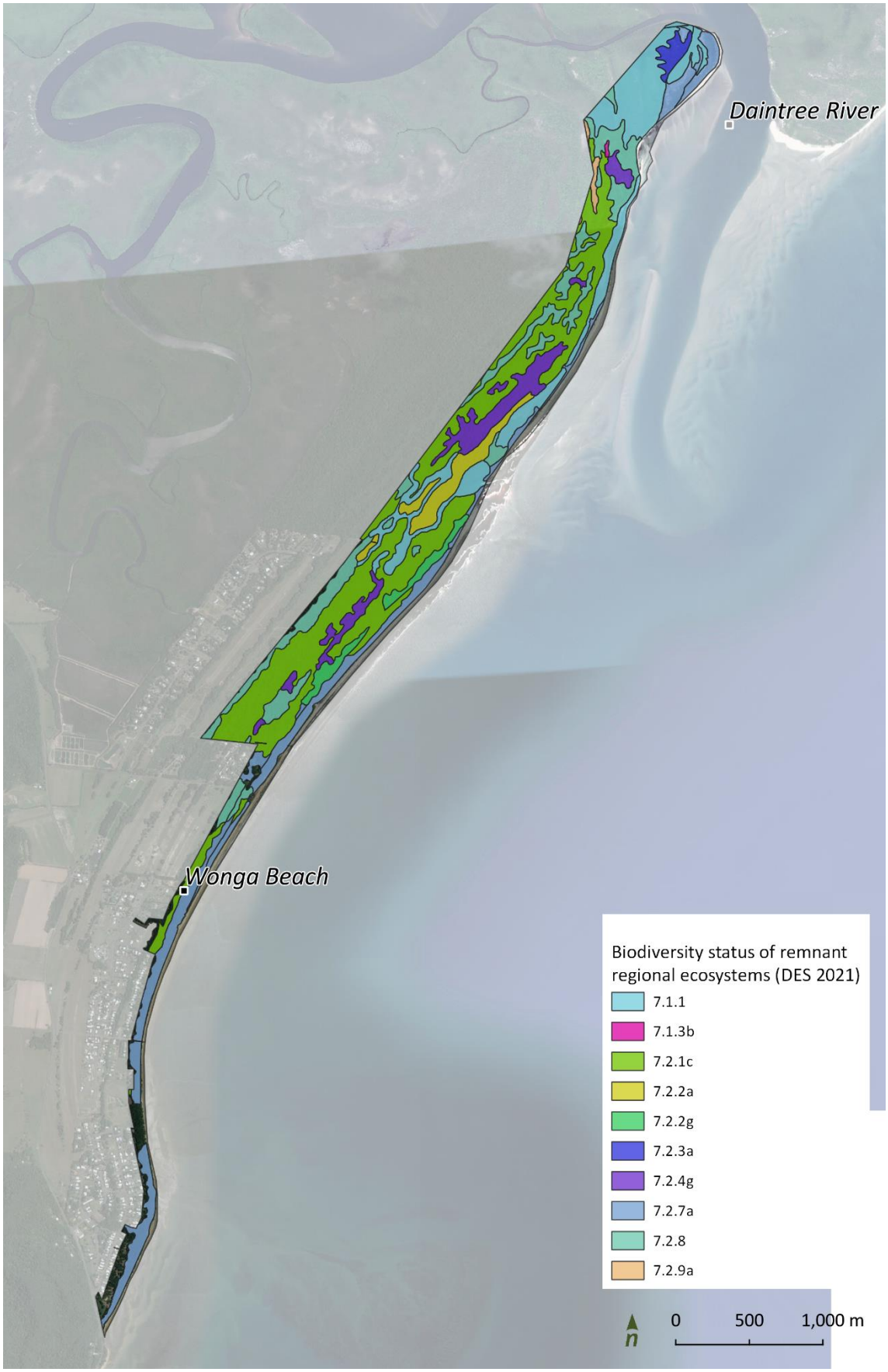

Figure 5. *Remnant regional ecosystems at Wonga Beach (DES 2021).*

Table 3. Dune vegetation composition and condition at Wonga Beach

Zone	Vegetation	Comments
Incipient dune	Beach vines – coastal jack bean (*Canavalia rosea)*, coastal morning glory (*Ipomoea pes-caprae)* and dune bean *(Vigna marina)* Grasses and sedges – *Ischaemum muticum, Thuarea involuta, Paspalum vaginatum* and *Cyperus pedunculatus* Shrubs – sea daisy (*Wollastonia uniflora)* and sea lettuce (*Scaevola taccada)*	• Most exposed area • Prone to atypical erosion – vegetation removed or impacted by anthropogenic activity
Foredune	Trees and shrubs – beach she oak (*Casuarina equestifolia),* beach almonds *(Terminalia catappa, Terminalia arenicola),* beauty leaf (*Calophyllum inophyllum),* boxwood *(Planchenella obovata)* and pandanus *(Pandanus cookii)* Vines – match box bean (*Entada rheedii)* and *Smilax calophyllum*	• Supports larger trees and shrubs
Hind dune	Littoral rainforest and vine forest	• Little vegetation in residential precincts

Conservation significance

A number of conservation significant flora species have been mapped for Wonga Beach. These species are listed as threatened or near threatened by the *Nature Conservation Act (NCA) 1992*, the *Environment Protection and Biodiversity Conservation Act (EPBC Act) 1999* or under an international treaty. The full list of these species is provided in Attachment B.

The remnant vegetation is mapped as 'Essential Habitat' for the southern cassowary. Wonga Beach vegetation is also mapped as a high-risk area for protected plants under the VM Act and vegetation clearing in these areas triggers the requirement for a protected plant survey by a suitably qualified person.

Habitat fragmentation

The foreshore vegetation in the less urbanised areas of Wonga Beach is well connected to surrounding vegetation communities allowing fauna movement within and between these communities and, as a result, minimising impacts that result from population isolation. The altered vegetation in the urbanised areas often lacks the shrub layer that would allow for protected movement of fauna through the coastal vegetation and beach front areas minimising connectivity in these areas. Canopy dwelling and nesting species may still inhabit these areas and the impacts are more likely to be associated with other anthropogenic activity such as noise from recreational vehicles. Vegetation at either end of this narrow strip of vegetation however remains well connected to remnant vegetation that is in good condition.

Towards the southern end of Wonga Beach where the vegetation is more disturbed, there are a number of factors that may be causing this. These factors and their potential impacts on the area's ecology are listed in Table 4.

Table 4. Disturbances and their impacts to the flora and fauna of Wonga Beach

Disturbance	Potential impacts to ecology
Dune erosion	• Further loss of vegetation and fauna habitat • Loss of sea turtle nesting habitat through loss of the foredune vegetation • Increase foredune slope and decreasing suitability for nesting sea turtles • Reduced biodiversity
Vegetation loss	• Increases in foreshore dune erosion • Exposure of hind dune systems and vegetation that are less adapted to extreme weather events • Loss of breeding and roosting habitat for nesting shorebirds and sea turtles • Loss of food trees for southern cassowary
Vehicular/ATV access	• Impacts to vegetation, including removal • Increased potential for erosion within the foreshore area • Damage to turtle nests • Noise disturbance to fauna • Introduction of weed species • Potential petrochemical spills
Weeds	• Compete with native species for resources – light, nutrients, space • Reduced biodiversity of flora • Loss of habitat and food plants for conservation significant species • Create barriers for connectivity and fauna population dispersal • Increased fuel loads
Pest animals	• Predation of native animals • Sea turtle nest predation • Reduced fauna populations and diversity
Stormwater and agricultural runoff	• Impacts to marine fauna • Increased sediment runoff and resulting increases in nearshore turbidity • Increased nutrient loads and subsequent algal blooms
Coconut debris	• Fallen fronds and fruit reduce recruitment of native species • Reduced opportunity for sea turtle nesting • Increase habitat for rodents and potential bird egg predation

Fauna

Wonga Beach provides habitat features for many fauna of conservation significance, including nesting turtles, shorebirds and other notable species. The foreshore vegetation provides a number of ecological services for coastal fauna. Larger tree species within the foredune areas provide marine turtle nesting habitat as the vegetated areas provide the ideal temperature and protection for incubation and hatchling survival. These larger tree species also provide roosting habitat for shorebirds during the intertidal period. The littoral rainforest contains food tree species for the endangered southern cassowary, including *Terminalia sp., Syzigium sp., Barringtonia sp.* and fig species. The full list of these species is provided in Attachment B.

Pest species

During the site inspection, a number of environmental weeds were identified at Wonga Beach, one of which is the coconut palm. According to the most recent audit, there are approximately 3,665 coconut palm specimens on Wonga Beach (DSC 2015). Coconut palms will continue to be managed by the Coconut Management Plan (DSC 2015). Other environmental weeds identified at Wonga Beach are summarised in Table 5. Environment weeds pose a threat to biodiversity by outcompeting native vegetation with respect to available resources such

as nutrients and light, establishing monocultures and increasing fuel loads. This additionally results in reduced habitat value for fauna.

Table 5. Weed species identified at Wonga Beach (BQ 2020, Conn 2021, DSC 2015, Murphy et al. 2016)

Scientific name	Common name	Dispersal Method	Environmental Impacts
Cocos nucifera	Coconut palm	• Large nuts which fall from trees • Nuts germinate if uneaten	• Identified as a transformer weed in littoral (coastal) rainforests • Outcompetes native species for space, light and nutrients • Falling nuts and fronds cause physical damage to species below
Sphagneticola trilobata	Singapore daisy	• Spreads by cuttings from slashing and pruning	• Outcompetes native species for space, light and nutrients • Invades lawns, irrigated areas, and around drains
Sansevieria trifasciata	Mother-in-law's tongue	• Spreads by dumping of garden waste • Seeds spread by birds and other animals	• Forms dense infestations • Outcompetes native species for space, light and nutrients • Tends to form monoculture
Bryophyllum delagoense	Mother of millions	• Spread by floodwaters • Spread by animals, vehicles and garden waste	• Invades coastal dunes, grasslands and woodlands • Outcompetes native species for space, light and nutrients • Very poisonous to humans and livestock
Opuntia sp.	Prickly pear	• Spread by birds and animals eating the fruit • Spread by animals and floods moving broken stems	• Outcompetes native species for space and nutrients, esp. in hot, dry conditions • Can harm animals and prevent them from eating
Cenchrus echinatus	Mossman River grass	• Spreads via spiny burrs which become attached to animals, vehicles and clothing • Burrs can also be dispersed by water	• Outcompetes native plants for light, moisture and nutrients • Burrs can injury or irritate animals and humans

Vegetation management

Douglas Shire Council has a number of instruments to manage the vegetation at Wonga Beach. The Coconut Management Plan (DSC 2015) defines the objectives for the management of coconut palms on Council-controlled land. The plan identifies the coconut trees within a given location and provides an assessment of the potential risk, distribution, impacts and associated costs of management.

The Douglas Shire Biosecurity Plan (2017-2021) guides the management of invasive biosecurity matter as well as locally declared pests (plants and animals) as outlined in the *Biosecurity Act 2014*. Under this plan, there are programs being undertaken by DSC to eradicate pest species. Prioritisation of pest species is based on several factors, including (DSC 2017):

- Existing plans and priorities on a national, state and local level
- Impacts and threats
    - Conservation and biodiversity
    - Riparian or aquatic environment
    - Agricultural or production
    - Residential and urban areas
- Capacity to manage
    - Achievability
    - Current extent

These programs include (relevant to vegetation) (DSC 2017):

- Siam Weed Eradication Program
- Hiptage eradication Program
- Miconia Species (Four Tropical Weeds Eradication Program)

3.3 Amenity and liveability

There are a number of facilities and access points for residents and tourists to engage in recreational activities at Wonga Beach. The accessibility and recreational uses of the Wonga Beach foreshore area are summarised in this section and the management implications are discussed.

Infrastructure

There is limited infrastructure at the northern end of Wonga Beach due to its minimal development. North of Pinnacle Village the only infrastructure is one informal beach access track. South of Pinnacle Village, the number of access tracks increases, including formal, private and informal beach access tracks.

The Old Wonga Esplanade is the closest road running parallel to the beach and forms the landward limit of the foreshore area. There is a stormwater drain along Marlin Drive at the southern end of Wonga Beach. Anecdotally, runoff from the drain appears to be causing erosion along the foreshore and is contributing to vegetation loss, particularly of larger trees.

Boat access at Wonga Beach is limited to the boat ramp at the Council Caravan Park along the Esplanade. Four-wheel drives are able to launch boats from the beach at this point. However, there is the concern that motorists are using this point to illegally access and drive 4WDs and other vehicles along the beach. These vehicles have the potential to cause erosion and negatively impact vegetation and wildlife.

Passive recreation

Wonga Beach also offers the opportunity for residents and tourists to engage in passive recreational activities. Examples of such activities include:

- walking along the beach and foreshore
- bird watching
- horse riding
- fishing at the Daintree River mouth.

These activities are relatively low impact but can still affect the foreshore condition. If foreshore users create informal access tracks through the vegetation to access the foreshore and beach, this can lead to a loss of vegetation, destabilisation of the sand or soil which may lead to erosion or dune destabilisation, and it could also contribute to habitat loss and destruction. Activities such as bird watching and horse riding will have similar

impacts on the foreshore in relation to access. The impact of fishing will largely be a result of vehicle access to the Daintree River mouth, including vegetation clearing for access tracks and driving on the sand where there are important and sensitive wildlife habitats. Dumping of fishing nets or waste may also occur, negative affecting marine animals or attracting wildlife such as crocodiles.

Pedestrian access

There are a number of known access tracks to Wonga Beach. Based on the latest data from a Council survey, there is a total of 48 recorded access beach tracks. Of these 48 tracks, six are formalised access paths, three are private accessways to houses, and the remainder are informal access tracks. The creation of informal access tracks presents challenges to foreshore management, particularly with regards to illegal vegetation clearing and dune destabilisation.

Vehicular use of beaches, trail bikes and horse riding

Wonga Beach residents highly value the freedom to use recreational vehicles on the beach, including ATVs. For many years, residents have been using ATVs along the beach and it is considered a significant aspect of their lifestyle (DSC 2020a). Residents also use ATVs to access the Daintree River mouth, which is a highly valued recreational fishing amenity. Prior to the Interim FMP for Wonga Beach, ATV use had not been approved but was generally accepted within the community. Following community consultation alongside the development of the Interim FMP, ATV use has been allowed along Wonga Beach for residents only through a permit application process which came into effect in July 2021 (DSC 2020a). This permit system is outlined in Subordinate Local Law No. 1, Schedule 26 and is restricted to ATVs only (DSC 2020b).

Vehicle use along the foreshore and beach can impact vegetation, beach condition and wildlife habitats. Vegetation can be impacted through clearing for access as well as direct vehicle impacts when habitats, such as dunes, are driven over. The sand can be more easily eroded when driven over, particularly the soft sand above the intertidal zone (between the low tide mark and HAT). Additionally, faunal habitats are placed under pressure or destroyed if driven over. There is anecdotal evidence of vulnerable wildlife habitats, such as turtles and shorebirds. Therefore, the impacts of vehicle use on the beach could be mitigated by limiting use to the hard sand only and within a certain width of the beach (‘highway’).

Dog off-leash areas

At North Wonga Beach, from Giblin Street to Vixies Road, there is an off-leash dog area along the beach. Dogs pose a risk to fauna as they may attack or scare vulnerable species, particularly when off-leash.

Camping

There are two locations at Wonga Beach where public and private camping may occur. These sites are located outside of the foreshore area, however, visitors to these campgrounds access the foreshore area for a variety of uses. There is a beach access point on the beachfront near Pinnacle Village at the northern end of Wonga Beach Esplanade, which is used by pedestrians and ATVs. There is also a boat ramp and pedestrian beach access points at the Council Caravan Park. These access points may cause loss of vegetation and dune destabilisation. Additionally, there is anecdotal evidence of illegal camping in other areas along the foreshore and rubbish dumping has been observed. Illegal camping may also result further vegetation clearing, and habitat loss and fragmentation.

4 Management precincts

The Wonga Beach foreshore area has been divided into six management precincts to tailor management actions specific to each precinct. The six precincts are (Figure 6):

- Precinct 1 – Daintree River to North Wonga Beach
- Precinct 2 – Native Title area
- Precinct 3 – Pinnacle Village to Giblin St
- Precinct 4 – Giblin St to Wonga Beach Rd
- Precinct 5 – Wonga Beach Rd to Janbal St
- Precinct 6 – Janbal St to Wonga Beach Park.

Figure 6. *Wonga Beach foreshore management precincts.*

The threats and challenges within each management precinct are summarised in Table 6. These threats and challenges have been identified through the background review, site inspections and community engagement feedback.

Table 6. Wonga Beach foreshore precinct threats and challenges

Precinct	Key foreshore threats and challenges
1 – Daintree River to North Wonga Beach Unpopulated precinct and falls under land for conservation.	• ATVs driving on soft sand above the intertidal zone – driving on the hard packed sand between the HAT and low tide marks reduces the likelihood of erosion. • Vehicle, pedestrian and other access along foreshore within potential sensitive and vulnerable habitats, including turtle and shorebird nesting areas – access above the intertidal zone during nesting and hatching season may pose a threat to vulnerable species.
2 – Native Title area Encompasses the Native Title area and is designated to conservation.	• ATVs driving on soft sand above the intertidal zone – driving on the hard packed sand between the HAT and low tide marks reduces the likelihood of erosion. • Informal access tracks through land designated to conservation, including illegal vegetation clearing – these activities may not meet the outcomes of the conservation zone code, including biological diversity, ecological integrity and scenic amenity. • Vehicle, pedestrian and other access along foreshore within potential sensitive and vulnerable habitats, including turtle and shorebird nesting areas – access above the intertidal zone during nesting and hatching season may pose a threat to vulnerable species.
3 – Pinnacle Village to Giblin St Includes land for conservation and recreation and open space.	• ATVs driving on soft sand above the intertidal zone – driving on the hard packed sand between the HAT and low tide marks reduces the likelihood of erosion. • Illegal clearing to create informal beach access tracks through the vegetation in the foreshore area – these activities may not meet the outcomes of the Conservation zone code, including biological diversity, ecological integrity and scenic amenity. • Environmental weeds present – may impact the conservation value within the precinct.
4 – Giblin St to Wonga Beach Rd Land designated for recreation and open space, including Council Caravan Park, and pedestrian and boat access points.	• ATVs and other vehicles driving on soft sand above the intertidal zone – driving on the hard packed sand between the HAT and low tide marks reduces the likelihood of erosion. • Vehicle, pedestrian and other access along foreshore within potential sensitive and vulnerable habitats, including turtle and shorebird nesting areas – access above the intertidal zone during nesting and hatching season may pose a threat to vulnerable species. • Environmental weeds present – may impact the conservation value within the precinct. • Illegal clearing to create informal beach access tracks through the vegetation in the foreshore area – these activities may not meet the outcomes of the Conservation zone code, including biological diversity, ecological integrity and scenic amenity.
5 – Wonga Beach Rd to Janbal St Small area of land for recreation and open space.	• ATVs driving on soft sand above the intertidal zone – driving on the hard packed sand between the HAT and low tide marks reduces the likelihood of erosion. • Vehicle, pedestrian and other access along foreshore within potential sensitive and vulnerable habitats, including turtle and shorebird nesting areas – access above the intertidal zone during nesting and hatching season may pose a threat to vulnerable species. • Illegal clearing to create informal beach access tracks through the vegetation in the foreshore area – these activities may not meet the outcomes of the Conservation zone code, including biological diversity, ecological integrity and scenic amenity.
6 – Janbal St to Wonga Beach Park Includes land designated for recreation and open space.	• Vehicle, pedestrian and other access along foreshore within potential sensitive and vulnerable habitats, including turtle and shorebird nesting areas – access above the intertidal zone during nesting and hatching season may pose a threat to vulnerable species. • Illegal clearing to create informal beach access tracks through the vegetation in the foreshore area and designated Recreation and Open Space land use zone – these activities may impact the biological diversity, ecological integrity and scenic amenity.

5 Management plan

The following section outlines the adaptive management approach to address the threats and challenges that have been identified for the Wonga Beach foreshore area. The objectives for management have been identified in order to inform measures for management success. Priorities have also been set to appropriately guide management of the foreshore threats and challenges over the immediate, medium and longer-term timeframes. The objectives and priorities shape the management actions for each precinct. In addition, any monitoring and evaluation activities that are to take place following the implementation of the actions will also be summarised to measure the progress of the foreshore management.

5.1 Management objectives

Objectives are useful for measuring the success of the management actions undertaken. They are based on the community values identified through the engagement process. The objectives will guide the metrics for monitoring and evaluation of the management actions. They can be applied at the whole of foreshore (community) and precinct scale.

Management objectives for Wonga Beach foreshore

- Maintain the overall natural form and function of the beach.
- Enhance and maintain vegetation condition – littoral rainforests, dune vegetation for vulnerable species and to prevent dune erosion.
- Build positive behaviour change outcomes to minimise adverse impacts of foreshore use.
- Proactively undertake weed management to restore native vegetation habitats.
- Monitor the presence and health of potential turtle and shorebird nesting sites in foreshore areas.
- Enforce illegal clearing local laws to prevent further establishment of unauthorised and informal beach access tracks.

5.2 Management prioritisation

Prioritisation of the management actions has been assigned as immediate, medium-term or future.

1 **Immediate** (recommend implementation within next 12 months)

Actions for immediate prioritisation include sites where weeds are present and it is necessary to eradicate the weeds and revegetate the site with native vegetation cover. Environmental weeds pose a significant threat to the values of the Wonga Beach residents, including the natural habitats and wildlife. Actions also revolve around access and use of the foreshore area, such as for ATVs, fishing or pedestrians and encouraging behaviour changes to reduce the impact of these activities. The uses may pose a threat to the sensitive habitats and management actions are focussed on minimising the impact.

2 **Medium-term** (recommend implementation within next 2-3 years)

Medium term priority actions are recommended to be implemented within the next two to three years. These actions are important for the management of the foreshore precinct, however, they require community engagement and education to understand their benefits. There is an element of community involvement with the medium-term actions.

3 **Future** (recommend implementation within 5 years)

Future management actions are those that first require an evaluation of the outcomes from immediate to medium-term actions that have been undertaken before being implemented. It is recommended that future actions are implemented within five years of the plan's adoption. This timeframe allows sufficient time for immediate actions to be implemented and their progress and success to be evaluated.

Wonga Beach.

5.3 Management actions

Management actions and their priorities for the Wonga Beach foreshore are summarised in Table 7. Maps of the management actions for each precinct are provided in Attachment C. Community consultation will be undertaken prior to the implementation of any management actions.

Table 7. Wonga Beach foreshore precinct management actions

	All precincts	*Precinct 1*	*Precinct 2*	*Precinct 3*	*Precinct 4*	*Precinct 5*	*Precinct 6*
Outcome 1: **Reduce the likelihood of erosion of sand from the foreshore area and impact to vulnerable species and ecosystems resulting from vehicle access.**							
A1.1: Enforce ATV driving to Wonga Beach residents with approved permits under the following conditions: • Driving on hard packed sand only along a corridor between 5 and 15 m below HAT within a two-hour window either side of low tide. • ATVs to be driven in a direct line only to reach destination. No reckless driving across the sand. • Driving during daylight hours only. • Establish diversions around sensitive areas where necessary (e.g., nests). Full details, including Community Group terms of reference, in Attachment D. Local Laws Officers to undertake random beach patrols as part of enforcement to issue warnings and/or fines. Information to be provided directly to permit holders to communicate when there are active nesting sites to avoid.		1	1	1	1	1	
• Speed limit of 20 km/hr along the beach between Janbal Street and Giblin Street and ATV use only for residents in New Wonga for the purpose of accessing the main recreation area north of Giblin Street.					1	1	
• Speed limit of 40 km/hr for the main recreation area (Giblin St north to the Daintree River mouth).		1	1	1			

	All precincts	*Precinct 1*	*Precinct 2*	*Precinct 3*	*Precinct 4*	*Precinct 5*	*Precinct 6*
A1.2: Review ATV use on Wonga Beach following an assessment of two years of beach monitoring to determine the impact of vehicle use on the sensitive flora and faunal habitats and to residents (noise pollution, safety, access, lifestyle).		2	2	2	2	2	
A1.3: Establish a regulated access system for the boat launching area to restrict 4WD access to the beach. Vehicles are strictly prohibited on or around the vegetated area. Formalise boat ramp area with wooden slats and chains if necessary.					1		
A1.4: Retain this precinct as off-limits to ATVs. Install fencing and signs on the beach and at access points to note this is an ATV prohibited zone. Local Laws Officers to undertake random beach patrols as part of enforcement.							1
Outcome 2: **Protect sensitive and vulnerable habitats, including dune vegetation, turtle and shorebird nesting sites, and cultural sites, from the impacts of vehicle, pedestrian and other access in the foreshore area.**							
A2.1: Undertake beach monitoring of turtle and shorebird nesting sites during nesting and hatching seasons to understand the impact foreshore access may have on these habitats. Survey vegetation cover to assess revegetation requirements and progress to support nesting habitats.		2	2	2	2	2	
A2.2: Establish a platform on the DSC Environmental Hub that gives residents and visitors the ability to upload information and photos about flora and fauna species they have noticed in the foreshore.	1						
A2.3: Collaborate with Traditional Owners to maintain and preserve cultural heritage sites within the foreshore area.	1						

	All precincts	*Precinct 1*	*Precinct 2*	*Precinct 3*	*Precinct 4*	*Precinct 5*	*Precinct 6*
A2.4: Establish zones of management along the foreshore at Marlin Drive: 1) Establish a 10 m buffer zone landward of HAT to stabilise the dune and prevent erosion by revegetating with native species. 2) Zone reserved for recreation and open space that is maintained by DSC and establishes a grassed and native vegetation buffer between the dune and residential area. Fencing to restrict access for homeowners and prevent illegal vehicle access to the beach and foreshore. Develop a Memorandum of Understanding (MoU) and undertake community consultation to discuss how the shared management responsibilities will work. Ensure that the area is cleared and maintained free of invasive species and green waste dumping. The MoU will also outline clear guidelines on the infrastructure that will be accepted within the recreation and open space zone.							1
Outcome 3: **Preserve the conservation zone, including biological diversity, ecological integrity and scenic amenity by minimising activities that affect these values.**							
A3.1: Undertake revegetation with native species (see Attachment E) within a 10 m buffer landward of the HAT mark to begin regeneration of land designated to Conservation that has been cleared for informal access and to protect against erosion. Install fencing around the revegetated area to reduce damage or clearing and encourage regrowth.			3	2	2	2	2
A3.2: Formalise and maintain defined access tracks and appropriately sign at beach and land entrances. This is to minimise the impact on the frontal dune. Issue fines for people found to be illegally clearing under Local Law No. 4 (Local Government Controlled Areas, Facilities and Roads).			1	1	1	1	1
A3.3: Undertake an audit of the access points on a yearly basis to determine whether illegal access tracks are being established.	1						

	All precincts	*Precinct 1*	*Precinct 2*	*Precinct 3*	*Precinct 4*	*Precinct 5*	*Precinct 6*
Outcome 4: Restore the conservation value of the foreshore area by reducing the presence and impact of environmental weeds.							
A4.1: Establish a weed eradication and maintenance program in conjunction with the existing Biosecurity Plan to remove environmental weeds present in the foreshore area and undertake revegetation with native species (See Attachment E).				1	1		
Outcome 5: Build positive behaviour change to minimise adverse impacts of foreshore use.							
A5.1: Continue the community awareness program through the Wonga Beach Community Group, including mailouts to ATV users and foreshore signage informing of appropriate speeds, access points and environmental impacts of ATV use on the beach and the region's values. Information also to be provided at campgrounds and tourist-related businesses.	1						
A5.2: Undertake an environmental education session at Wonga Beach State School as part of the Carbon Neutral program to communicate knowledge around foreshore weeds, including transfer and establishment, awareness and management.	1						
A5.3: Include crocodile awareness information when undertaking new programs (e.g., booklets for walks).	1						

5.4 Monitoring and evaluation

The success of the management actions is measured through monitoring and evaluation mechanisms. The monitoring focusses on the sensitive and vulnerable environments, including turtle and shorebird nesting habitats, and key coastal vegetation habitats, as well as the adherence to ATV use in the intertidal zone and boat ramp access.

Nesting habitats

The habitat monitoring should be undertaken to observe where turtle and shorebird nesting habitats are present in the foreshore area and to understand the vegetation composition of these habitats. Turtle monitoring should be undertaken based on the Queensland Marine Turtle Field Guide (Attachment F) between October and May to understand the seasonal use of these habitats by turtles (QPWS, DES 2016). Guidelines for shorebird monitoring will need to be developed based on local knowledge.

It is recommended that the monitoring be undertaken in partnership with the Indigenous Rangers and local community groups. In addition, a platform on the DSC Environmental Hub website should be created for residents and visitors to submit photos and information regarding any turtle or shorebirds they notice when using the foreshore. The purpose of the habitat monitoring is to understand which species are accessing the foreshore area for nesting and hatching, as well as the vegetation composition of these habitats.

Vegetation

The vegetation monitoring is a simple measure for the percentage of cover and survival success. This monitoring should be conducted on a yearly basis to record the survival rate, particularly when undertaking revegetation activities. It is recommended that vegetation is monitored on a yearly basis at the end of the wet season.

The purpose of collecting information about the success of revegetation and other site management issues such as exotic plants (environmental weeds), other threats, habitat quality and connectivity, and significant species values is to be able to refine and direct resources accordingly. Flexibility in program delivery is required to maintain the condition of assets such as plantings, respond to threats as they change through time and account for new values if they emerge during the delivery of the project.

Monitoring and evaluation metrics

Table 8 outlines the monitoring and evaluation metrics for the corresponding management action to evaluate the progress and success of implementation. Detailed methods for turtle monitoring and rapid vegetation assessment are provided in Attachment F.

Table 8. Foreshore management action monitoring and evaluation metrics

Management action	Monitoring	Evaluation	Timing
ATV use	• Compliance of ATV use only in permitted areas • Number of permits issued	• Compliance with location of ATV tracks – whether within or outside of permitted intertidal zone (community group) • Community survey to gauge attitudes around restrictions • Warnings or fines that have been issued	Random compliance and track monitoring, quarterly review of monitoring
Fauna monitoring	• Nesting species • Vegetation composition of nesting habitats	• Turtle tracks, bird nests • Population dynamics • Animal health and numbers	Nesting season

Management action	Monitoring	Evaluation	Timing
Vegetation monitoring	• Species specific observations to identify which species may be doing poorly • Weed cover within each of the canopy layers (top 5 transforming weed species)	• Measure of the percentage survival of revegetation, including key species • Percentage cover over canopy layers of weeds • Percentage of bare/disturbed ground • Natural recruitment • Habitat connectivity • Significant species	Annual

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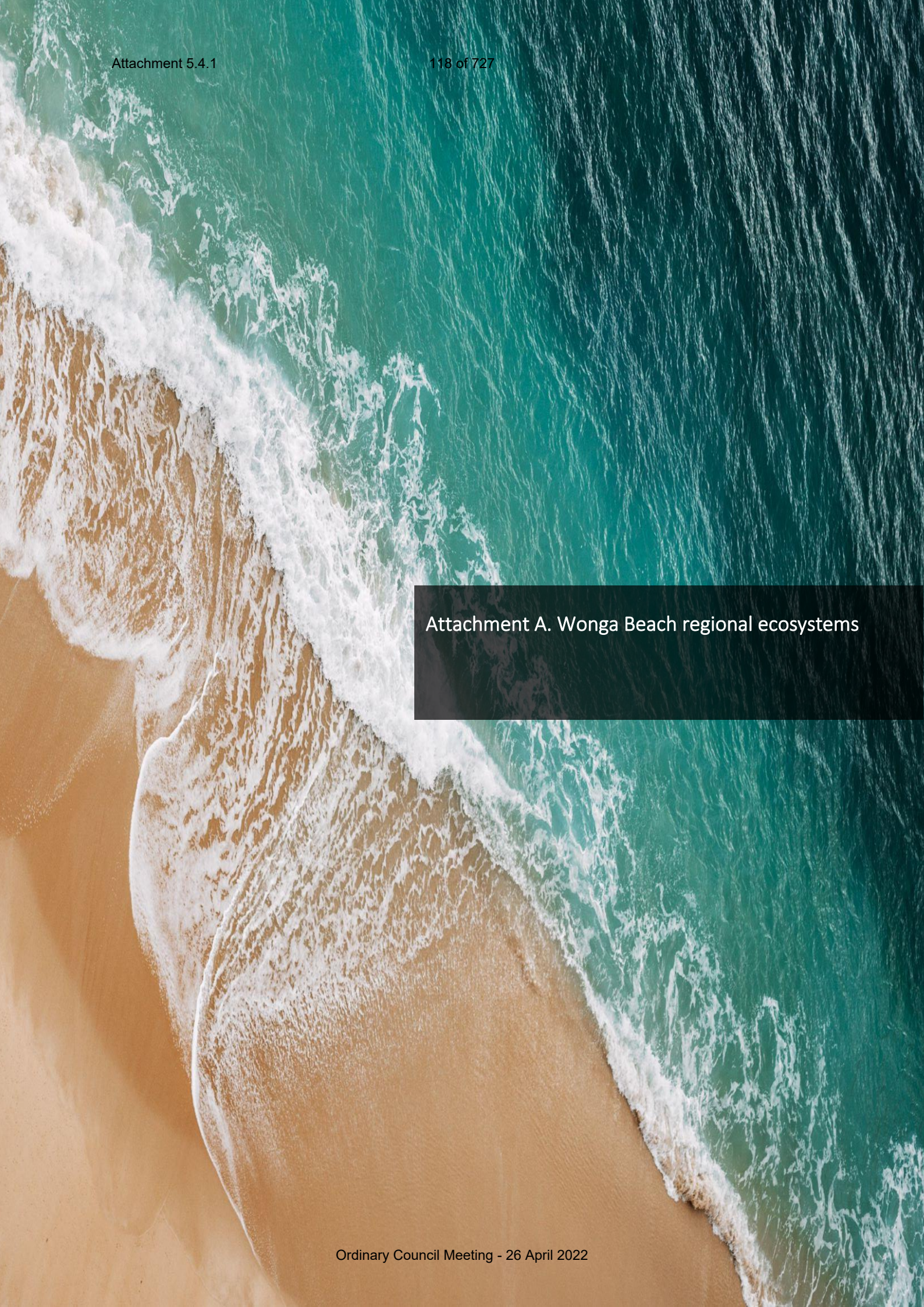
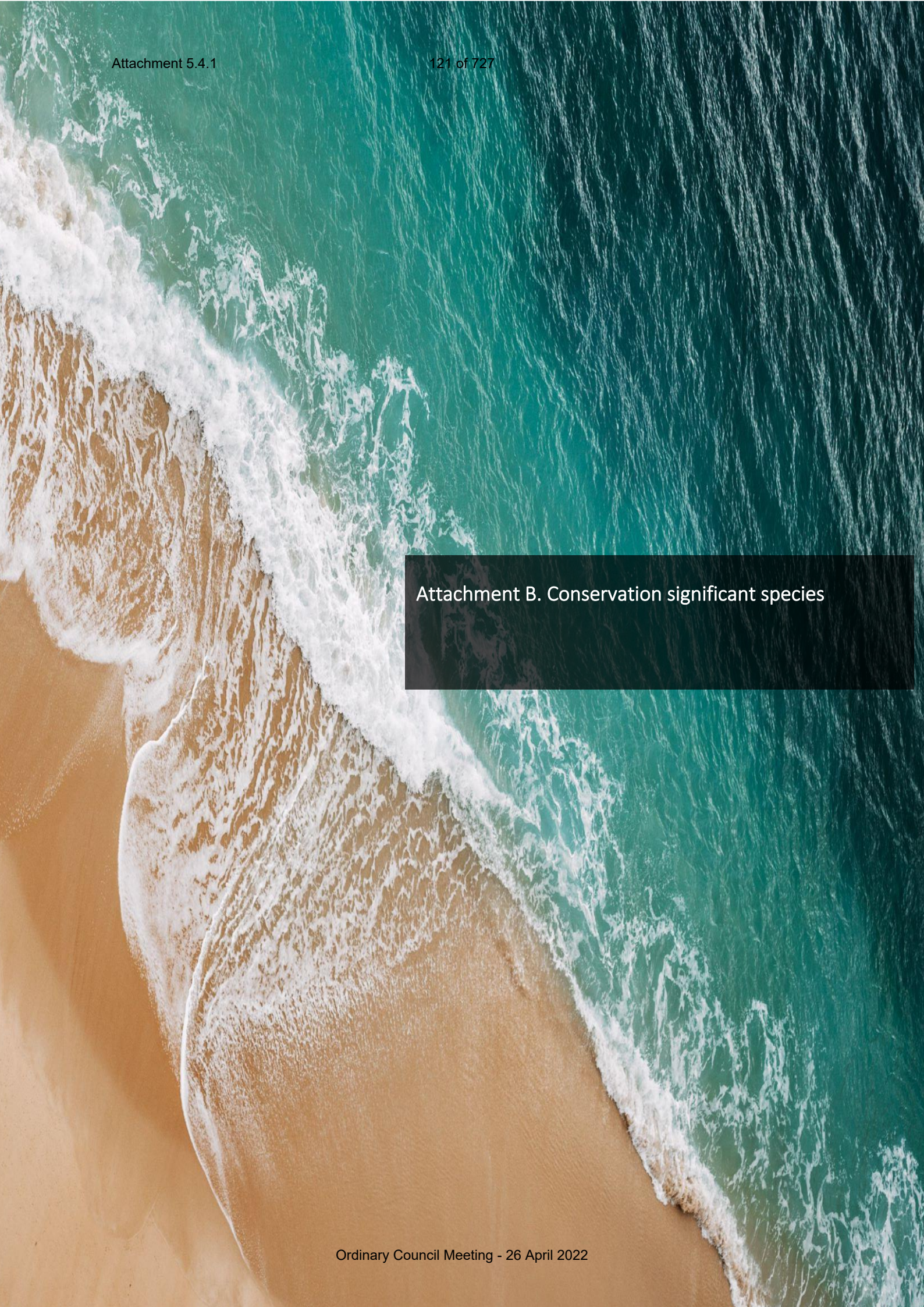


Attachment A. Wonga Beach regional ecosystems

Table 9. Wonga Beach regional ecosystems (REs)

RE	Description	VM Class	BD Status
7.1.1	Mangrove closed scrub to open forest. Sheltered coastlines, estuaries, and deep swales between dunes, on fine anaerobic silts, inundated with saline water at high tide.	LC	NC
7.1.2a	*Sporobolus virginicus* grassland, samphire open forbland to sparse forbland and bare saltpans on plains adjacent to mangroves	OC	OC
7.1.3b	*Melaleuca quinquenervia* open forest to woodland, and shrubland to closed scrub. Transitional saline areas. Palustrine wetland (e.g., vegetated swamp).	OC	E
7.2.1c	Closed forest with *Calophyllum inophyllum*, *Terminalia arenicola*, *Dillenia alata*, *Myristica insipida*, *Planchonella obovata*, *Millettia pinnata*, and *Hibiscus tiliaceus*. Beach ridge deposits adjacent to the foredune, in the very wet rainfall zone.	E	E
7.2.1e	Simple notophyll vine forest with *Syzygium angophoroides*, on sands of beach origin. Dune sands. Floodplain (other than floodplain wetlands)	E	E
7.2.2a	Notophyll vine forests, often with *Acacia* emergents. Species commonly include *Cupaniopsis anacardioides*, *Diospyros geminata*, *Canarium australianum*, *Alphitonia excelsa*, *Acacia crassicarpa*, *Pleiogynium timorense*, *Chionanthus ramiflorus*, *Mimusops elengi*, *Polyalthia nitidissima*, *Millettia pinnata*, *Geijera salicifolia*, *Ficus opposita*, *Sersalisia sericea*, *Terminalia muelleri, T. arenicola*, *Drypetes deplanchei*, and *Exocarpos latifolius*. Lowlands on dune sands, of the moist and dry rainfall zones.	OC	E
7.2.2g	Vine forest with *Hibiscus tiliaceus* and *Calophyllum australianum*. Intermittently inundated narrow dune swales.	OC	E
7.2.3a	*Corymbia tessellaris*, *C. clarksoniana* (and/or *C. intermedia*), *Melaleuca dealbata* +/- *Lophostemon suaveolens* woodland to closed forest, with *Acacia mangium*, *A. crassicarpa*, *Canarium australianum* and *Deplanchea tetraphylla*. Unweathered low prograding beach dunes, predominantly of Holocene age.	OC	OC
7.2.3e	*Corymbia intermedia* open forest, with a very well-developed vine forest understorey (due to infrequent burning). Beach ridges, predominantly of Holocene age. (BVG1M: 9e)	OC	OC
7.2.4g	*Melaleuca dealbata* +/- *M. leucadendra* woodland to open forest. Weathered relict beach ridges. Palustrine wetland (e.g., vegetated swamp).	OC	OC
7.2.7a	Complex of open shrubland to closed shrubland, grassland, low woodland and open forest. Includes pure stands of *Casuarina equisetifolia*, and *Acacia crassicarpa*, *Syzygium forte* subsp. *forte*, *Calophyllum inophyllum* and *Pandanus* spp. woodland to open forest. Beach strand and foredune.	OC	E
7.2.8	*Melaleuca leucadendra* (weeping tea tree) open forest to woodland. Sands of beach origin.	OC	E

7.2.9a	*Melaleuca quinquenervia* open forest to woodland and shrubland. Dune swales and swampy sandplains of beach origin. Palustrine wetland (e.g., vegetated swamp).		
7.3.10f	Simple notophyll vine forest with *Syzygium angophoroides*. Swampy alluvial plains. Floodplain (other than floodplain wetlands).	OC	E
7.3.46	*Lophostemon suaveolens* (swamp mahogany) open forest to woodland. Alluvial plains.	E	E
7.3.5a	*Melaleuca quinquenervia* open forest, woodland and shrubland. Lowlands of the very wet and wet rainfall zone, on poorly drained peaty humic gley soils where the water table is near or above the ground for most of the year. Palustrine wetland (e.g., vegetated swamp).	LC	E
7.3.9b	*Corymbia tessellaris*, *Acacia crassicarpa*, *Melaleuca leucadendra*, *M. viridiflora* woodland to open forest. Coastal flats and broad drainage lines. May include areas with some mixing with marine sediments and dune sands. Floodplain (other than floodplain wetlands).	E	E



Attachment B. Conservation significant species

Flora

Table 10. Conservation significant flora at Wonga Beach

Botanical name	Common name	EPBC Status[3]	NC Act[4]
Acriopsis emarginata	Pale chandelier orchid	V	V
Canarium acutifolium		V	V
Vappodes lithocola	Dwarf butterfly orchid	E	
Carronia pedicellate		E	E
Chingia australis		E	E
Cyclophyllum costatum		V	V
Dendrobium mirbelianum	Dark-stemmed antler orchid	E	E
Dendrobium nindii	Blue antler orchid	E	E
Endiandra cooperana		E	E
Myrmecodia beccarii	Ant plant	V	V
Phaius australis	Lesser swamp orchid	E	E
Phaius pictus	Forest swamp orchid	V	V
Phalaenopsis amabilis subsp. rosenstromiil	Native moth orchid	E	
Phlegmariurus dalhousieanus	Blue tassel-fern	E	CE
Vappodes phalaenopsis	Cooktown orchid		

[3] Environment Protection and Biodiversity Conservation (EPBC) Act score: V – Vulnerable, NT – Near Threatened, E – Endangered, CE – Critically Endangered
[4] Nature Conservation (NC) Act score: V – Vulnerable, NT – Near Threatened, E – Endangered, CE – Critically Endangered

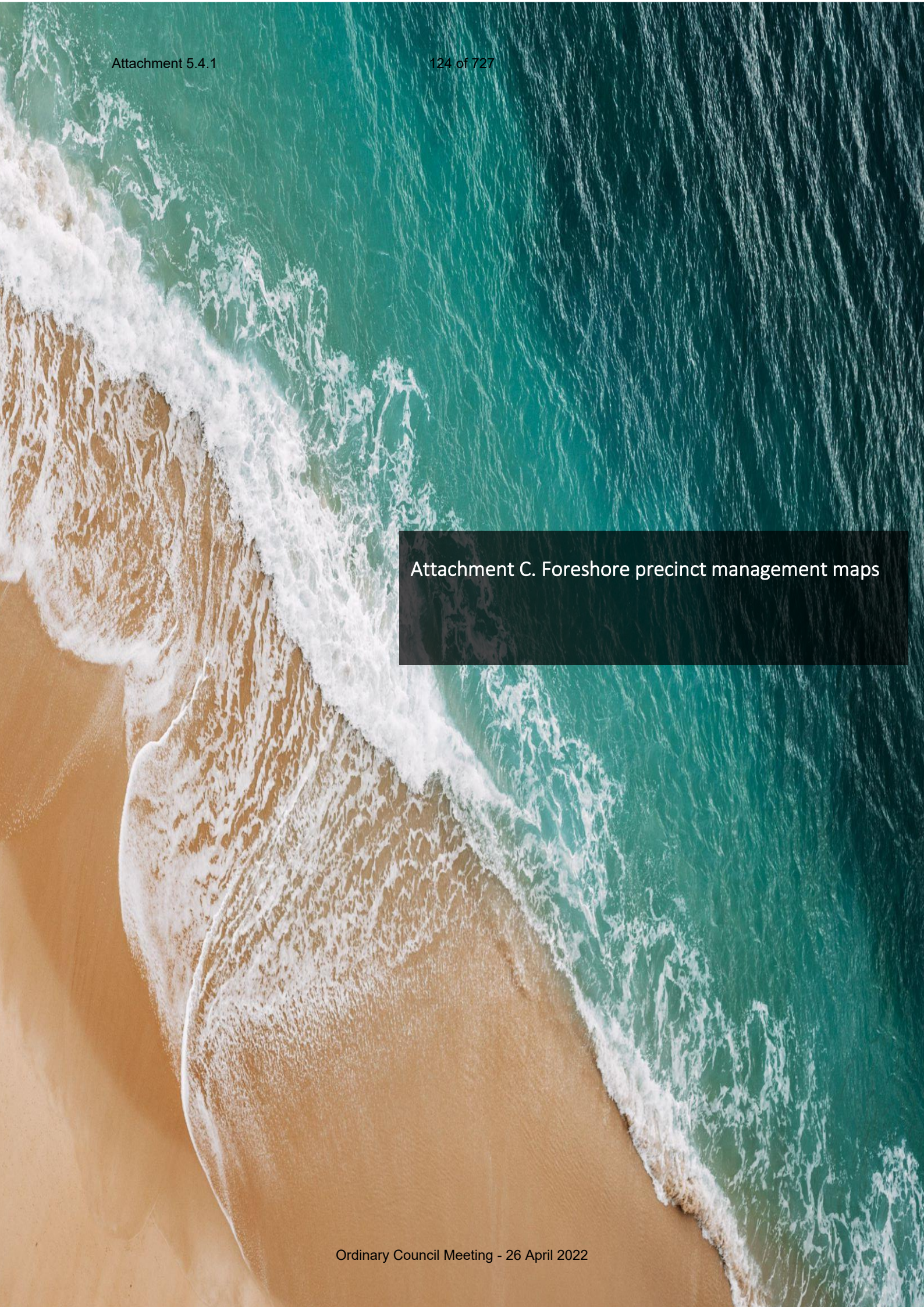
Fauna

Table 11. Conservation significant fauna at Wonga Beach

Scientific name	Common name	EPBC Act[5]	NC Act[6]	Likelihood of occurrence
		Shorebirds		
Esacus magnirostris	Beach-stone curlew	—	V	Likely
Casuarius casuarius johnsonii	Southern cassowary	E	E	Possible
Calidris ferruginea	Curlew sandpiper	CE	CE	Likely
Numenius madagascariensis	Eastern curlew	CE	E	Likely
Charadrius mongolus	Lesser sand plover	E	E	Likely
Charadrius leschenaultii	Greater sand plover	V	V	Likely
Calidris canutus	Red knot	E	E	Likely
		Sea turtles		
Natator depressus	Flatback turtle	V	V	Likely
Chelonia mydas	Green turtle	V	V	Likely
Eretmochelys imbricata	Hawksbill turtle	V	E	Likely
Dermochelys coriacea	Leatherback turtle	E	E	Possible
Caretta caretta	Loggerhead turtle	E	E	Likely
Lepidochelys olivacea	Olive ridley turtle	E	E	Likely
		Other		
Hirundapus caudacutus	White-throated needletail	V	V	Likely
Crocodylus porosus	Estuarine crocodile	—	V	Likely

[5] Environment Protection and Biodiversity Conservation (EPBC) Act score: V – Vulnerable, NT – Near Threatened, E – Endangered, CE – Critically Endangered

[6] Nature Conservation (NC) Act score: V – Vulnerable, NT – Near Threatened, E – Endangered, CE – Critically Endangered



Attachment C. Foreshore precinct management maps

Figure 7. *Wonga Beach foreshore precinct 1 management actions.*

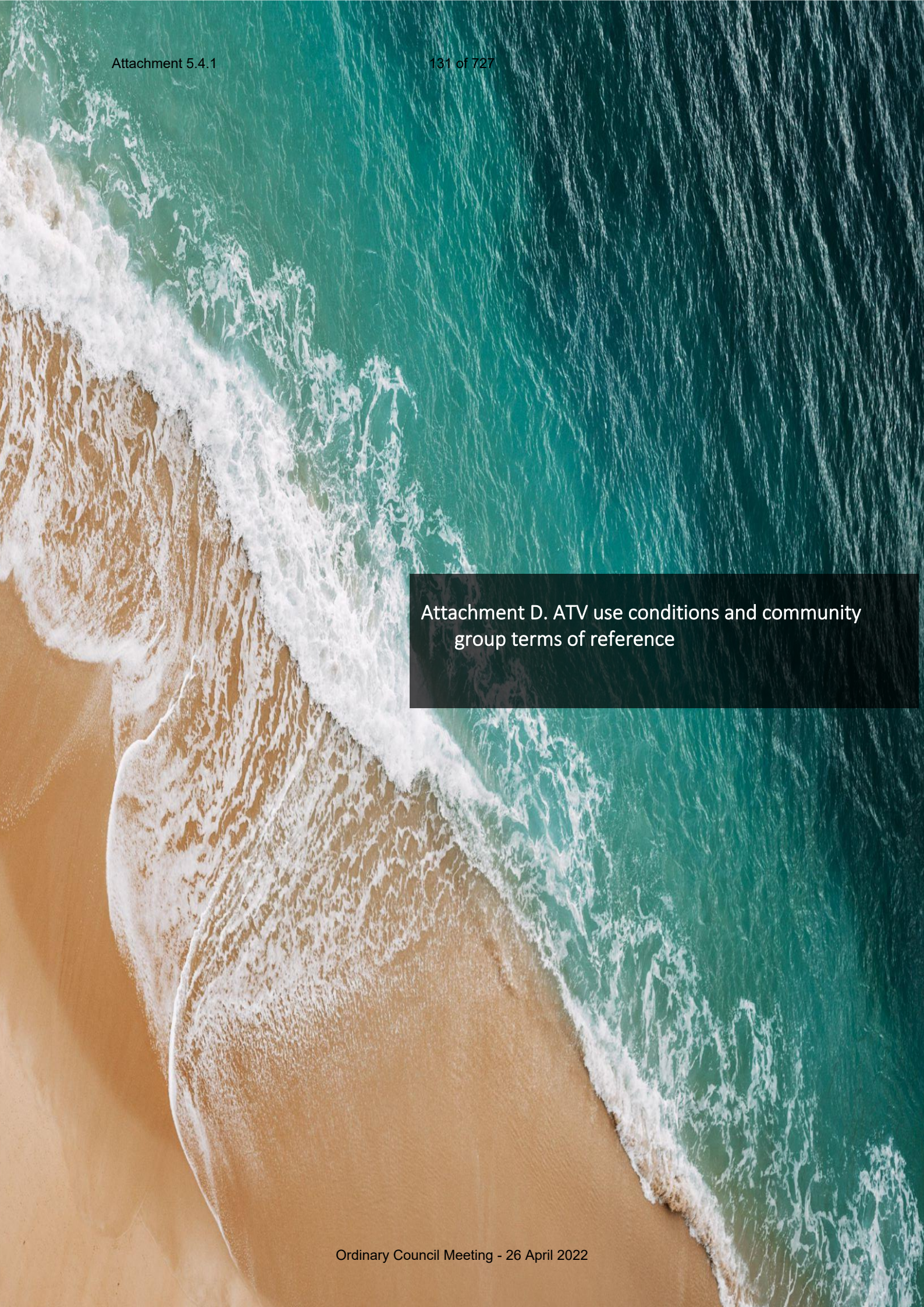
Figure 8. *Wonga Beach foreshore precinct 2 management actions.*

Figure 9. *Wonga Beach foreshore precinct 3 management actions.*

Figure 10. *Wonga Beach foreshore precinct 4 management actions.*

Figure 11. *Wonga Beach foreshore precinct 5 management actions.*

Figure 12. *Wonga Beach foreshore precinct 6 management actions.*



Attachment D. ATV use conditions and community group terms of reference

The following outlines the conditions and approval criteria for ATV use. This information has been adapted from the Interim Wonga Beach Foreshore Management Plan (DSC 2020a).

Table 12. ATV use conditions by foreshore management precinct

Precinct	Conditions
1	• ATV use is permitted by approval only – use prohibited on or near riparian zones, vegetated areas and dune area • ATV use is permitted only on hard packed sand • ATV use to be limited to speeds of 40 km/hr
2	• ATV use is permitted by approval only – use prohibited on or near riparian zones, vegetated areas and dune area • ATV use is permitted only on hard packed sand • ATV use to be limited to speeds of 40 km/hr
3	• No access via Council-controlled land, except for guests of Pinnacle Village Caravan Park • ATV use is permitted by approval only – use prohibited on or near riparian zones, vegetated areas and dune area • ATV use is permitted only on hard packed sand • ATV use to be limited to speeds of 40 km/hr
4	• ATV use is permitted by approval only – use prohibited on or near riparian zones, vegetated areas and dune area • ATV use is permitted only on hard packed sand • ATV use to be limited to speeds of 20 km/hr • ATV use in this precinct limited to residents of New Wonga for the purpose of accessing the main ATV recreation area north of the Giblin St access point
5	• ATV use is permitted by approval only – use prohibited on or near riparian zones, vegetated areas and dune area • ATV use is permitted only on hard packed sand • ATV use to be limited to speeds of 20 km/hr • ATV use in this precinct limited to residents of New Wonga for the purpose of accessing the main ATV recreation area north of the Giblin St access point
6	• No ATV use in this precinct

ATV approval criteria:

- Recreational ATV use limited to Wonga Beach only
- Foreshore and beach access restricted to access points
- Only residents of Wonga Beach are eligible for approval; proof must be provided by a current provisional or full driver's licence with the applicant's current residential address clearly visible
- Only the ATV nominated on the approval is to be driven on the beach
- Two (2) wheeled vehicles, such as trail bikes, or large four wheel drive passenger vehicles will not be considered for approval
- Applicants must have and be able to prove that they have undertaken some form of recognised ATV safety training
- Parents or legal guardians of minors (children 11 years or older) may apply for a permit on behalf of the minor – conditions apply (more details below)

Conditions additional to Subordinate Local Law No. 1, Schedule 26:

- ATVs are not to be driven above the high tide mark, on or over frontal dunes or foreshore areas, except when travelling to and from the beach at designated access points
- ATVs will be restricted to travelling on the beach between 8 am and 6:30 pm
- ATVs must not be driven by persons under the influence of intoxicating liquor or drugs
- Hooning, fishtailing and racing of ATVs is not permitted
- Only the ATV nominated on the approval is to be driven on the beach
- ATVS must give way to pedestrians and wildlife at all times
- ATVs must be kept in a good state of repair or an approval will be revoked
- Approval holders will be issued an approval identification sticker or similar which must be visible on the ATV at all times
- ATVs that cannot be registered and legally driven on a road must be pushed or transported by utility or trailer to the designated access point
- Approval holders operating ATVs must wear an approved motorbike helmet and not carry a passenger unless on a seat designated for that purpose, as per Queensland State Law
- Passengers on a vehicle approved for passengers must be at least 8 years of age, as per Queensland State Law
- Approval holders must carry their drivers licence at all times when conducting the activity and provide to an authorised officer on request

Approval for minors (children 11 years or older):

- Parents or legal guardians of minors (children aged 11 years or older) may apply for an approval on behalf of the minor
- Parents or legal guardians must supervise the minor at all times when the ATV is being used on the beach, including any movement of the ATV between home and the beach
- Parents or legal guardians will be responsible for the conduct and behaviour of the minor at all times when the ATV is being used on the beach, including any movement of the ATV between home and beach
- When making an application for approval for a minor, the parent or legal guardian will become legally liable and responsible for any enforcement action taken by Douglas Shire Council with respect to any breaches of the approval (enforcement action may include the issue of a Penalty Infringement Notice)
- ATVs must be the appropriate size for the user and must not be designed to be operated by an adult
- No passengers will be permitted

Wonga Beach Foreshore Management Plan Community Group - Draft Terms of Reference

Purpose

The purpose of these Terms of Reference is to outline:

1. Function
2. Membership
3. Role of community group members
4. Operation
5. Role of the Chair
6. Evaluation

Function

The Community Group's sole function to assist with the management of any issues arising from the use of vehicles on Wonga Beach.

Membership

There will be nine* members, comprising six Wonga Beach residents, two Council officers and one person from Queensland Police.

- The six Wonga Beach residents will include at least three vehicle permit holders.
- The two Council officers will include a representative from the local laws team and one from the community development team

Residents will be invited to nominate to join the group.

*If more than six residents nominate there are two options:

1. If 7-8 people nominate, there's no reason not to have 11 members, and in this case, all nominations would be accepted.
2. If there lots of people interested, nominees will be invited to vote on who they prefer, and those with the most votes would be appointed.

Role of Community Group Members

- Gather feedback and queries from the community to share in the meetings;
- Raise concerns and issues related to the use of vehicles on Wonga Beach.
- Discuss solutions to issues and indicate preferences
- Share information with other community members
- Make recommendations to Douglas Shire Council relating to the use of vehicles on Wonga Beach.

Members will be asked to:

- Attend three meetings per year in a Wonga Beach location;
- The role is voluntary and there is no remuneration.

Operation

The Community Group will operate in the following way:

- The Chair will determined by members at the first meeting.
- The Draft Terms of Reference will be discussed, finalised and adopted.
- Douglas Shire Council's community development team will provide a secretariat.
- The secretariat will prepare a record of meetings and agreed actions
- Once approved by members, the record of meetings and agreed actions will be published on Douglas Shire Council's Wonga Beach Foreshore Management Plan webpage.
- Alternate delegates are allowed to attend meetings however as a courtesy, attendance should be notified in advance to the secretariate or to the Chair.
- Additional delegates may be invited, as necessary, at the discretion of Douglas Shire Council or the Chair.
- No members can make public statements purporting to represent the views of the Group.
- The Group can make recommendations to Douglas Shire Council related to the use Recreational ATV Approval Process and Conditions.

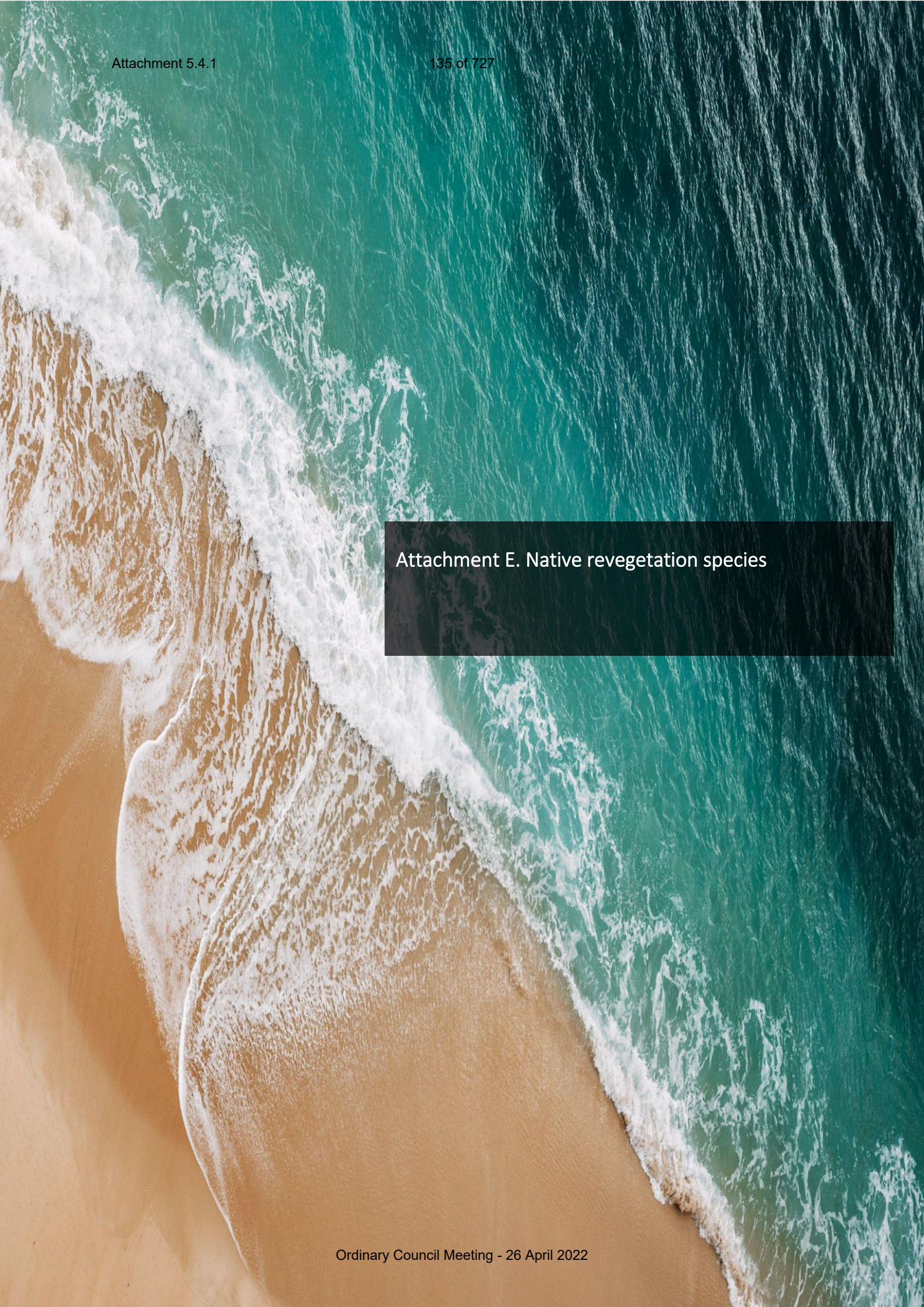
Role of the Chair

The chairperson will be selected by members at the first meeting. The broad responsibilities of the chairperson will be to:

- manage the Community Group meeting in accordance with the agenda
- ensure discussion items reach an agreed conclusion and outcomes are documented and assigned for further action
- review and approve record of meeting notes before distribution to members.

Evaluation

After two years, the need for the continuation of the Community Group will be evaluated.



Attachment E. Native revegetation species

Table 13. Native revegetation species (highlighted species are key components of remnant ecosystems) (Florentine, Pohlman and Westbrooke 2015)

Botanical name[7]	Common name	Precinct 1	Precinct 2	Precinct 3	Precinct 4	Precinct 5	Precinct 6
*Acacia crassicarpa**	Northern golden wattle			✔	✔		
*Acacia mangium**	Broadleaf salwood			✔	✔		
*Acacia oraria**	Coastal wattle			✔	✔		
Aglaia elaeagnoidea	Coastal boodyarra	✔	✔	✔	✔	✔	✔
*Alphitonia petriei**	Sarsaparilla			✔	✔		
Alyxia spicata	Chain fruit	✔	✔	✔	✔	✔	✔
Atractocarpus fitzalanii	Brown gardenia	✔	✔	✔	✔	✔	✔
Barringtonia asiatica	Mango bark, Mango pine	✔	✔	✔	✔	✔	✔
Barringtonia calyptrata	Mango pine	✔	✔	✔	✔	✔	✔
Beilschmiedia obtusifolia	Blush walnut	✔	✔	✔	✔	✔	✔
Blepharocarya involucrigera	Rose butternut	✔	✔	✔	✔	✔	✔
Brachychiton acerifolius	Illawarra flame tree	✔	✔	✔	✔	✔	✔
Breynia cernua	Fart bush	✔	✔	✔	✔	✔	✔
Calophyllum inophyllum	Beach calophyllum	✔	✔	✔	✔	✔	✔
Calophyllum sil	Blush touriga	✔	✔	✔	✔	✔	✔
Canarium vitiense	Canarium	✔	✔	✔	✔	✔	✔
Canavalia rosea	Beach bean	✔	✔	✔	✔	✔	✔
Carallia brachiata	Corky bark, Fresh water mangrove	✔	✔	✔	✔	✔	✔

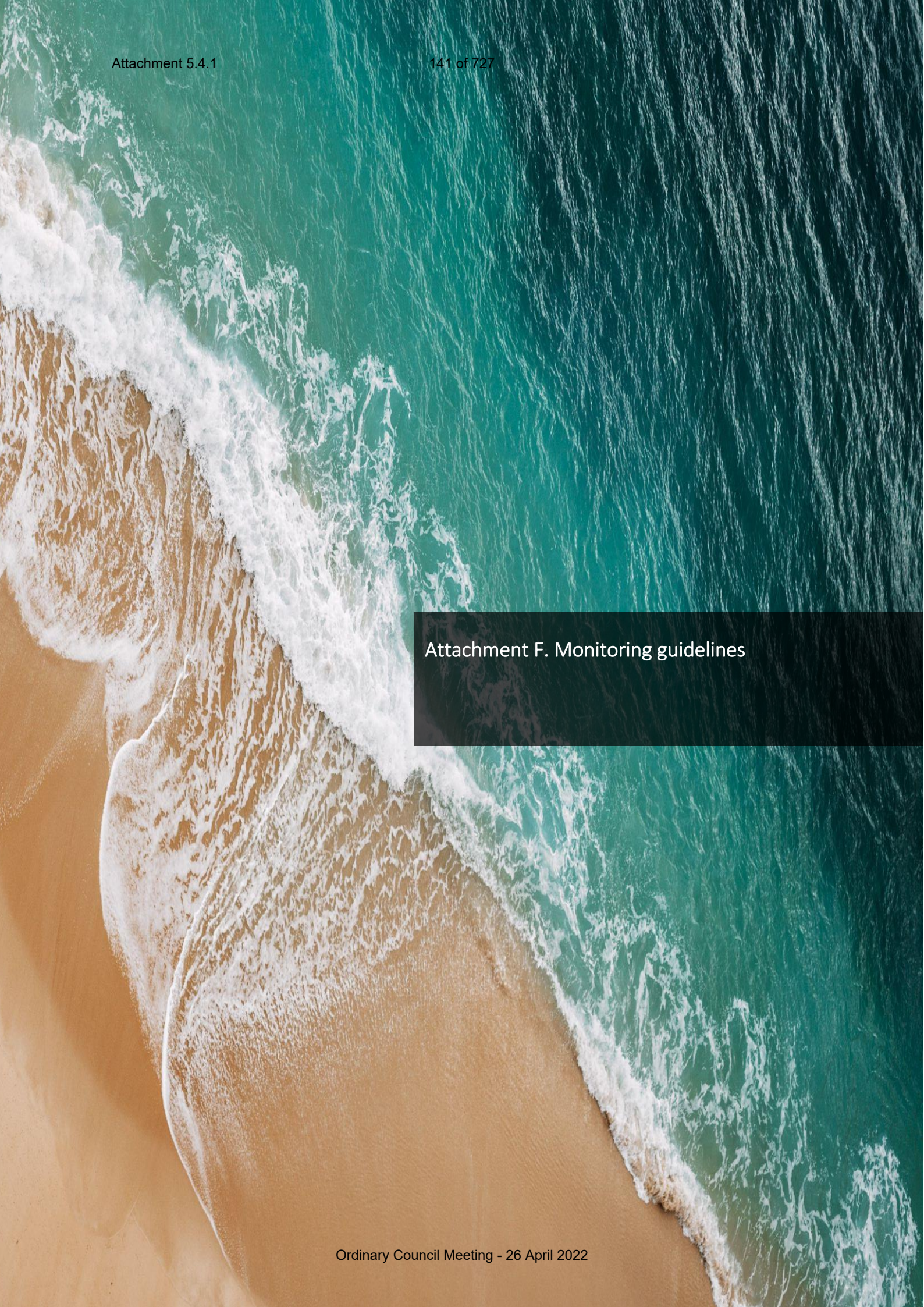
[7] * denotes pioneer species that will grow and establish quickly, allowing for natural recruitment or planting of secondary species.

Botanical name[7]	Common name	Precinct 1	Precinct 2	Precinct 3	Precinct 4	Precinct 5	Precinct 6
*Casuarina equisetifolia**	Beach casuarina			✔	✔		
Cerbera manghas	Dog bane	✔	✔	✔	✔	✔	✔
Chionanthus ramiflora	Native olive	✔	✔	✔	✔	✔	✔
*Clerodendrum floribundum**	Lolly bush			✔	✔		
Clerodendrum inerme	Scrambling clerodendrum	✔	✔	✔	✔	✔	✔
*Clerodendrum longiflorum**	Long flowered clerodendrum			✔	✔		
*Colubrina asiatica**	Beach berry bush			✔	✔		
*Cordia subcordata**	Sea trumpet			✔	✔		
Crinum pedunculatum	Beach lily, Swamp lily	✔	✔	✔	✔	✔	✔
Cupaniopsis anacardioides	Beach Tamarind	✔	✔	✔	✔	✔	✔
Cyperus pedunculatus		✔	✔	✔	✔	✔	✔
Deplanchea tetraphylla	Golden bouquet tree	✔	✔	✔	✔	✔	✔
Dillenia alata	Red beech	✔	✔	✔	✔	✔	✔
Diospyros compacta	Australian ebony	✔	✔	✔	✔	✔	✔
*Dodonea viscosa**	Hop bush			✔	✔		
Elaeodendron melanocarpum	False olive	✔	✔	✔	✔	✔	✔
Eucalyptus plattyphylla	Ghost gum	✔	✔	✔	✔	✔	✔
*Euroschinus falcata**	Pink poplar			✔	✔		
Ficus benjamina	Weeping fig	✔	✔	✔	✔	✔	✔
Ficus drupacea	Drupe fig	✔	✔	✔	✔	✔	✔

Botanical name[7]	Common name	Precinct 1	Precinct 2	Precinct 3	Precinct 4	Precinct 5	Precinct 6
Ficus microcarpa	Small fruited fig	✔	✔	✔	✔	✔	✔
Ficus opposita	Sandpaper fig	✔	✔	✔	✔	✔	✔
Ficus racemosa	Cluster fig	✔	✔	✔	✔	✔	✔
*Ganophyllum falcatum**	Daintree hickory			✔	✔		
Glochidion harveyanum	Harvey's buttonwood	✔	✔	✔	✔	✔	✔
Glochidion philippicum	Daintree cheese tree	✔	✔	✔	✔	✔	✔
Gmelina dalrympleana	White beech	✔	✔	✔	✔	✔	✔
Gomphandra australiana	Buff beech	✔	✔	✔	✔	✔	✔
*Guioa acutifolia**	Glossy tamarind			✔	✔		
Haemodorum coccineum	Blood root	✔	✔	✔	✔	✔	✔
*Hibiscus tiliaceus**	Coast cottonwood			✔	✔		
Intsia bijuga	Kwila	✔	✔	✔	✔	✔	✔
*Ipomoea pes-caprae**	Coastal morning glory			✔	✔		
Jagera pseudorhus	Foambark	✔	✔	✔	✔	✔	✔
Livistona muelleri	Northern Cabbage Tree Palm	✔	✔	✔	✔	✔	✔
Lophostemon suaveolens	Swamp mahogany, swamp box	✔	✔	✔	✔	✔	✔
*Macaranga tanarius**	Kamala, Blush macaranga			✔	✔		
Mallotus philippensis	Red Kamala	✔	✔	✔	✔	✔	✔
Maytenus fasciculiflora	Orangebark	✔	✔	✔	✔	✔	✔

Botanical name[7]	Common name	Precinct 1	Precinct 2	Precinct 3	Precinct 4	Precinct 5	Precinct 6
Melaleuca leucadendra	Weeping paperbark	✔	✔	✔	✔	✔	✔
Melaeuca viridiflora	Broad leaved paperbark	✔	✔	✔	✔	✔	✔
Melia azederach	White cedar	✔	✔	✔	✔	✔	✔
Micromelum minutum	Lime berry	✔	✔	✔	✔	✔	✔
Miliusa brahei	Rasberry jelly plant	✔	✔	✔	✔	✔	✔
*Millettia pinnata**	Pongamia tree			✔	✔		
Mimusops elengi	Red coondoo	✔	✔	✔	✔	✔	✔
Mischocarpus exangulatus	Red bell mischocarp	✔	✔	✔	✔	✔	✔
Morinda citrifolia	Rotten cheesefruit	✔	✔	✔	✔	✔	✔
Pandanus tectorius	Beach pandan	✔	✔	✔	✔	✔	✔
*Pittosporum ferrugineum**	Rusty pittosporum			✔	✔		
Planchonia careya	Cocky apple	✔	✔	✔	✔	✔	✔
Pleiogynium timorense	Burdekin plum	✔	✔	✔	✔	✔	✔
*Polyscias elegans**	Celerywood			✔	✔		
Pouteria chartacea	Thin leaved coondoo	✔	✔	✔	✔	✔	✔
Pouteria obovata	Yellow boxwood	✔	✔	✔	✔	✔	✔
*Premna serratifolia**	Coastal premna			✔	✔		
Ptychosperma elegans	Solitaire palm	✔	✔	✔	✔	✔	✔
Rhus taitensis	Sumac	✔	✔	✔	✔	✔	✔
*Scaevola taccada**	Beach lettuce			✔	✔		

Botanical name[7]	Common name	Precinct 1	Precinct 2	Precinct 3	Precinct 4	Precinct 5	Precinct 6
Schefflera actinophylla	Umbrella tree	✔	✔	✔	✔	✔	✔
Scolopia braunii	Brown birch	✔	✔	✔	✔	✔	✔
Sporobolus virginicus	Salt couch	✔	✔	✔	✔	✔	✔
Sterculia quadrifida	Peanut tree	✔	✔	✔	✔	✔	✔
Syzygium angophoroides	Yarrabah satinash	✔	✔	✔	✔	✔	✔
Syzygium hemilamprum (Syn. Acmena hemilampra)	Blush satinash	✔	✔	✔	✔	✔	✔
Tarenna dallachiana	Tree ixora	✔	✔	✔	✔	✔	✔
Terminalia arenicola	Brown damson	✔	✔	✔	✔	✔	✔
*Terminalia catappa**	Indian almond			✔	✔		
Terminalia microcarpa	Damson plum	✔	✔	✔	✔	✔	✔
Terminalia muelleri	Mueller's damson	✔	✔	✔	✔	✔	✔
*Thespesia populneoides**	Tulip tree			✔	✔		
Thurea involuta	Tropical beachgrass	✔	✔	✔	✔	✔	✔
Timonius timon	False fig	✔	✔	✔	✔	✔	✔
Vitex rotundifolia	Beach vitex	✔	✔	✔	✔	✔	✔
*Vigna marina**	Beach pea			✔	✔		



Attachment F. Monitoring guidelines

Rapid Vegetation Assessment Method Data collection

General survey information	Survey ID	Description of survey					
	Assessor Name/s	Descriptive text					
	Date of record	Date					
	Assessment number	Assessment	1	2	3	4	5
Specific location	General Location	Descriptive text					
	Easting	GPS spatial data					
	Northing	GPS spatial data					
	Spatial uncertainty	GPS spatial data					
Desired cover by year 5							
	Present	1 (1-5)	2 (6-25)	3 (26-50)	4 (51-75)	5 (76-100)	Absent
Under							
Mid							
Over							
Current overall cover							
	Present	1 (1-5)	2 (6-25)	3 (26-50)	4 (51-75)	5 (76-100)	Absent
Under							
Mid							
Over							
Percentage survival of each layer							
	Present	1 (1-5)	2 (6-25)	3 (26-50)	4 (51-75)	5 (76-100)	Absent
Under							
Mid							
Over							
Species specific observations							
	% Understorey		% Mid-storey		% Overstorey		%
Sp. 1							
Sp. 2							
Sp. 3							
Sp. 4							

Sp. 5							
Environmental weeds cover							
	Present	1 (1-5)	2 (6-25)	3 (26-50)	4 (51-75)	5 (76-100)	Absent
Under							
Mid							
Over							
High threat environmental weeds							
	% Understorey		% Mid-storey		% Overstorey		%
Sp. 1							
Sp. 2							
Sp. 3							
Sp. 4							
Sp. 5							
Bare ground created by disturbance							
	Present	1 (1-5)	2 (6-25)	3 (26-50)	4 (51-75)	5 (76-100)	Absent
Vehicles							
People							
Erosion							
Other							
Natural recruitment							
	Absent		Present		%		
Under							
Mid							
Over							
Connectivity							
	Patch size (ha)		Distance (km)		Connection		
Patch 1					H	M	L
Patch 2					H	M	L
Patch 3					H	M	L
Significant species identified							
	Location	Population size	Threat		Proposed response		

Sp. 1				
Sp. 2				
Sp. 3				

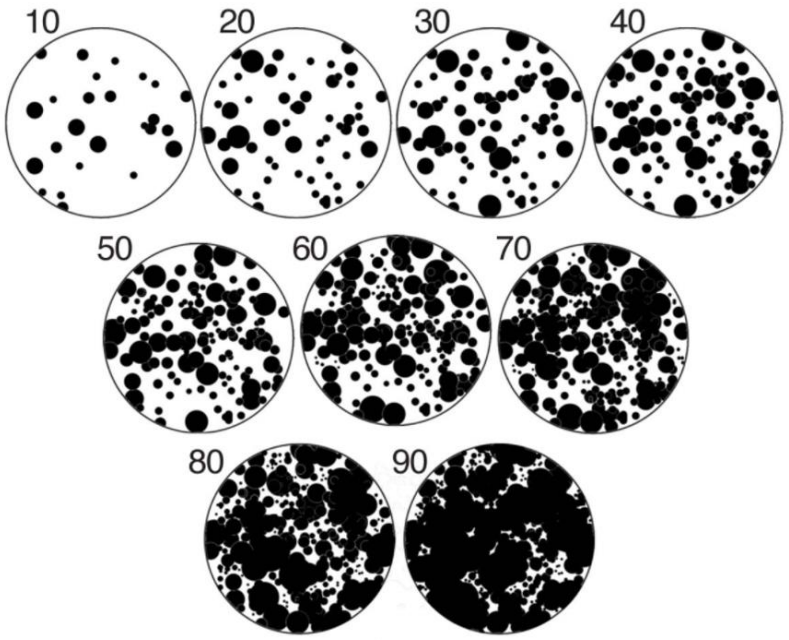
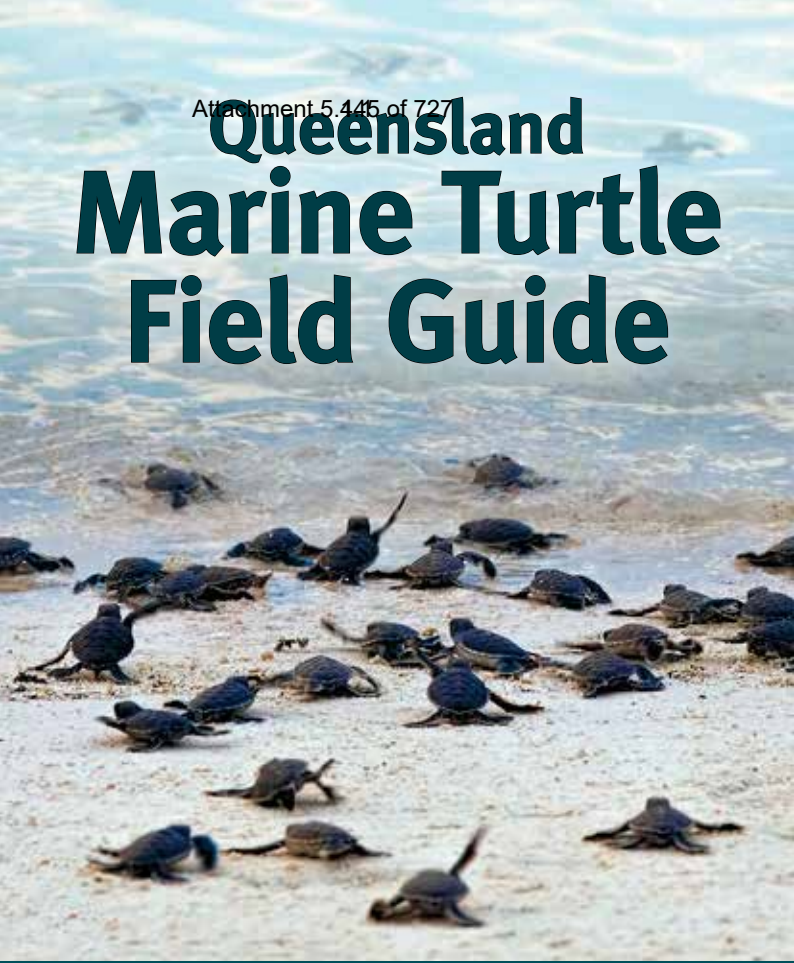


Figure 13. *Schematic representation of percentage cover categories.*

Queensland Marine Turtle Field Guide



Nest to Ocean Turtle Protection Program

Australian Government

Queensland Government


APN

Queensland's coast has some of the most important marine turtle nesting sites in the world. Six species of threatened marine turtles nest along our idyllic beaches. These rookeries support significant nesting populations of green, loggerhead, hawksbill, flatback and olive ridley turtles.

One of the most serious threats to nesting turtle populations is the destruction of their eggs and hatchlings by predators. Feral pigs have been found to be responsible for destroying over 70 per cent of turtle nests at nesting beaches on Cape York, continued loss at this rate is not sustainable. Other predators include foxes, dogs, dingoes and goannas.

To reduce predation on marine turtle nests and help the recovery of threatened marine turtle populations, the Australian and Queensland Governments have together invested nearly $7million in the Nest to Ocean Turtle Protection Program. The program supports predator control and turtle monitoring at priority nesting beaches. It also assists Traditional Owner and community groups to increase their participation in these important activities.

This field guide has been developed as part of the Nest to Ocean Turtle Protection Program. Correctly identifying marine turtles, and the animals that prey on their nests, provides valuable information about turtle populations and shows where predator control activities are most needed.

Nest to Ocean
Turtle Protection Program

Front Cover: Turtle Hatchlings © Kjbarger
Inside Cover: Steven Marpoondin (APN Cape York) © *Brian Ross*

Contents

Marine Turtle Species Identification Key

Indo-Pacific Marine Turtles

Carapace with:
- No continuous ridges
- Large scales
- Claws on flippers

Carapace with:
- 5 distinct continuous ridges
- No large scales
- No claws on flippers

Leatherback Turtle
Dermochelys coriacea

4 pair costal scales

5 pair (rarely 6) costal scales

Carapace longer than wider
Red-brown to brown
No pores in scale of bridge

Loggerhead Turtle
Caretta caretta

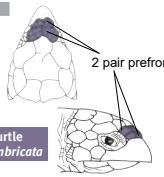
6 pair or more costal scales

Carapace more circular
Grey-green
Pores in scale of bridge

Olive Ridley Turtle
Lepidochelys olivacea

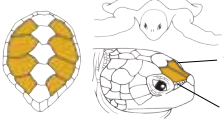
2 pair prefrontal scales
Thick overlapping carapace scales

2 pair prefrontal scales



Hawksbill Turtle
Eretmochelys imbricata

1 pair prefrontal scales
No thick overlapping carapace scales

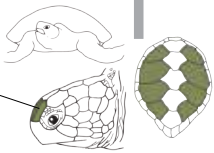


1 pair prefrontal scales

Preocular scales

Low domed carapace with upturned edges
Preocular scales
Olive grey

Flatback Turtle
Natator depressus



High domed carapace
No preocular scales
Light to dark green with dark mottling

Green Turtle
Chelonia mydas

Photographs of Adults and Hatchlings

Green Turtle *Chelonia mydas* Page 10

Olive Ridley Turtle *Lepidochelys olivacea* Page 14

Hawksbill Turtle *Eretmochelys imbricata* Page 18

Loggerhead Turtle *Caretta caretta* Page 12

Flatback Turtle *Natator depressus* Page 16

Leatherback Turtle *Dermochelys coriacea* Page 20

Marine Turtle Track Identification Key

Alternating Stroke

Flipper marks alternate

Track Features

Early morning monitoring is best as tracks will deteriorate over time. The clarity of tracks can be affected by flipper damage, terrain, sand moisture, tides, wind and weather. Look for several key identifying features, along different sections of track.

The key track identification features are:

- Stroke Style
- Track Width
- Hind Flipper Marks
- Front Flipper Marks
- Plastron Drag
- Tail Drag

Loggerhead

Track Width
Less than 1 meter

Hind Flipper

Front Flipper

Plastron Drag

Tail Drag
Not present

Hawksbill

Track Width
Approx. 70-80 cm

Hind Flipper

Front Flipper

Plastron Drag

Tail Drag

Olive Ridley

Track Width
Approx. 70-80 cm

Hind Flipper

Front Flipper

Plastron Drag

Tail Drag

Breast Stroke

Flipper marks side by side

Green

Track Width
Approx. 94-144 cm

Hind Flipper

Front Flipper

Plastron Drag

Tail Drag

Flatback

Track Width
Approx. 90-100 cm

Hind Flipper

Front Flipper

Plastron Drag

Tail Drag

Leatherback

Track Width
Greater than 2 meters

Hind Flipper

Front Flipper

Plastron Drag
Not Visible

Tail Drag

Track Direction

Clues to determine track direction:

Turtles push sand backwards, the higher sand mound is at the back.

If track overlaps, the top track is the returning track.

Sand is always thrown back over the emerging track when digging.

Measuring Width

Measure from outer edge of track. This may be the front or rear flipper, depending on species.

Basic Beach Monitoring

Guidelines on how to **Record** data and implement **Action** during a basic beach survey (see page 9). These may be tailored to suit individual monitoring programs and implemented in accordance with training.

Record

Species Identification: Use track or sighting to identify species.

GPS Nest Location: Note GPS coordinates & waypoint number.

False Crawl: Track with no nest.

Extent of Damage: Partial or complete destruction of nest.

Evidence of Predation: Diggings, tracks, sighting.

Predator Identification: Use track or sighting to identify species.

Hatchlings Emerged: Yes, hatchling tracks or sighting.

Tag Information: Note tag ID number and its location on turtle.

Curved carapace length (CCL): From front (where skin and carapace meet), down midline to back edge of carapace (over tail).

Action

Photograph: To verify species and/or nest damage/predation.

Mark Nest: Install marker to indicate nest location (if required).

Bury Eggshells and Mark Track: To avoid record duplication; mark track line above the high tide mark.

Submit Data: Project manager to submit data to the relevant Queensland Department.

Basic Beach Survey

Traverse beach to locate fresh turtle tracks.
Walk along the high tide line or drive on the wet sand just below the high tide mark

Equipment Checklist

- GPS (Use datum WGS 84 and decimal degrees)
- Data sheets or charged data recording device
- Pencil
- Tape measure
- Camera
- Personal safety gear
- Torch (night monitoring)
- Spare batteries
- Monitoring field guide

Record fresh tracks only

Adult Track No nesting turtle

Identify Species

refer to **Track Identification** (Pages 6-7)

Is there a nest or is it a false crawl?

Nest

Record / Action
- Species ID
- GPS Nest Location
- Mark Nest

Is nest damaged?

No

Yes

Record / Action
- Extent of Damage
- Evidence of Predation
- Predator ID (refer to pages 22-25)
- Photograph
- Bury Eggshells

False Crawl

Record / Action
- Species ID
- False Crawl

Unsure

Record / Action
- Species ID
- GPS Nest Location
- Mark Nest
- Photograph

Adult Track Nesting turtle

Identify Species

refer to **Species Identification** (Pages 3-5, 10-21)

Once female has settled into laying or has completed nesting

Record / Action
- Species ID
- Tag Information
- Curved carapace length
- GPS Nest Location
- Mark Nest

Hatchling Tracks Hatchlings

Identify Species

if hatchling present refer to **Species Identification** (Pages 3-5, 10-21)

Record / Action
- Species ID
- Hatchlings Emerged
- Marked Nest ID or GPS Nest Location
- Evidence of Predation
- Predator ID (refer to pages 22-25)

Refer to Page 8 for Record / Action monitoring protocols

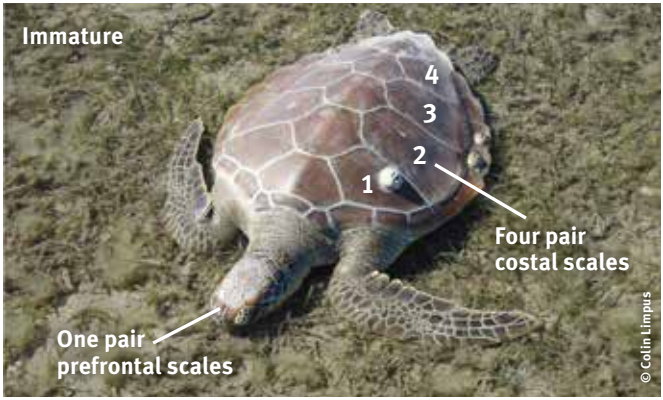
Mark monitored track with a line, above high tide mark, so it's not recorded twice

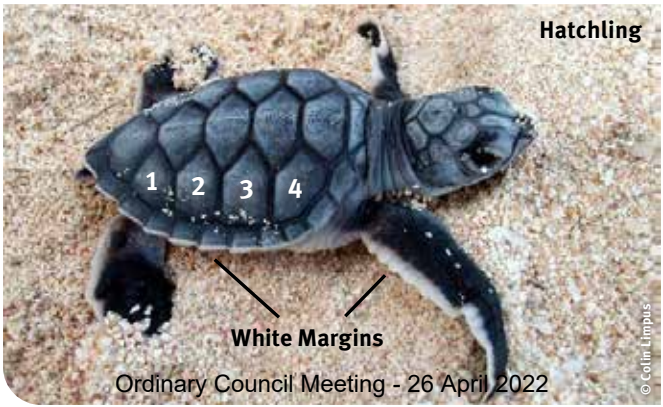
Continue and complete survey

Submit data forms and photographs for verification to project manager

Green Turtle, *Chelonia mydas*

Status: Nationally Vulnerable, Queensland Vulnerable





Key Identification Features

Breast Stroke Track

Carapace Scales

4 Pair Costal Scales

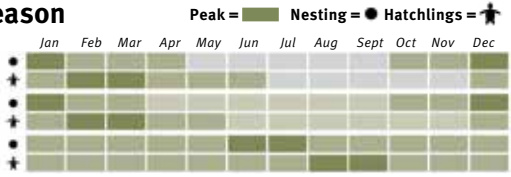
1 Pair Prefrontal Scales

Qld Nesting Sites

Adult: *Carapace is a high dome. Colour is light to dark green with dark mottling. Plastron colour is cream-white.*

Hatchling: *Black-dark brown with white margins, white plastron.*

Breeding Season



Loggerhead Turtle, *Caretta caretta*

Status: Nationally Endangered, Queensland Endangered

Key Identification Features

Alternating Track

Carapace Scales

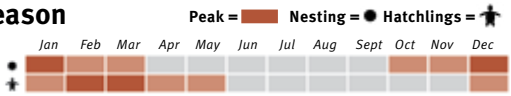
5 Pair Costal Scales

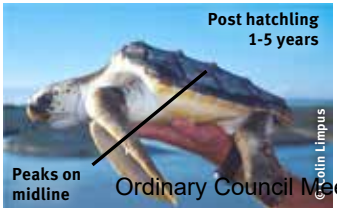
Qld Nesting Sites

Adult: *Carapace is longer than wider. Colour is red-brown to brown. Plastron colour is yellow.*

Hatchling: *Dark brown with 5 costal scales and dark plastron with 3-4 inframarginal scales.*

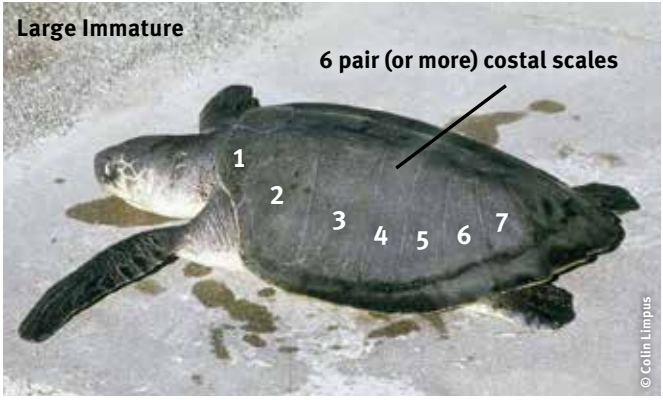
Breeding Season





Olive Ridley Turtle, *Lepidochelys olivacea*

Status: Nationally Endangered, Queensland Endangered

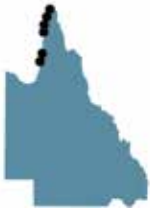


Key Identification Features

Alternating Track

Carapace Scales

6 Pair (or more) Costal Scales

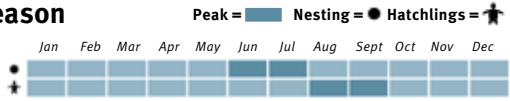


Qld Nesting Sites

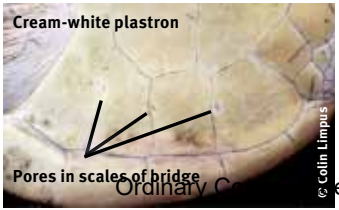
Adult: *Carapace is circular. Colour is grey-green with no conspicuous markings. Plastron colour is cream-white.*

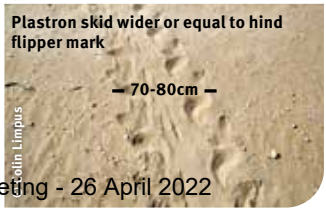
Hatchling*: Charcoal-grey/black-brown on both sides.*

Breeding Season



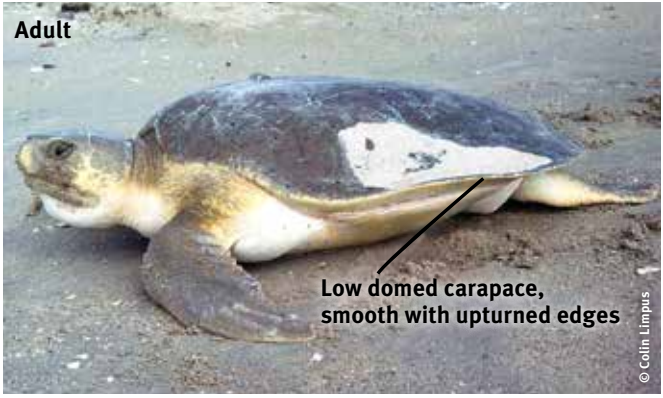
All year, peaks during dry season.

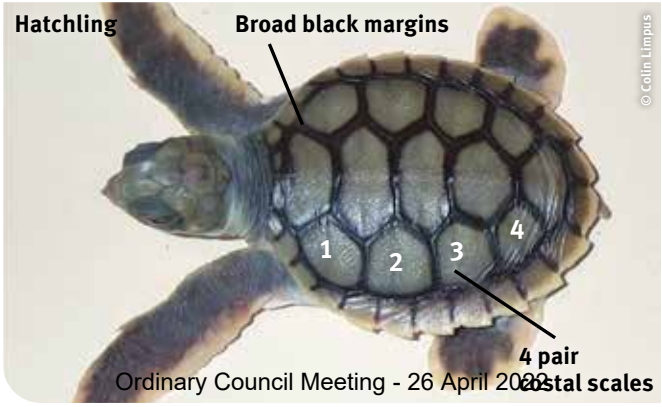




Flatback Turtle, *Natator depressus*

Status: Nationally Vulnerable, Queensland Vulnerable





Key Identification Features

Breast Stroke Track

Carapace Scales

4 Pair Costal Scales

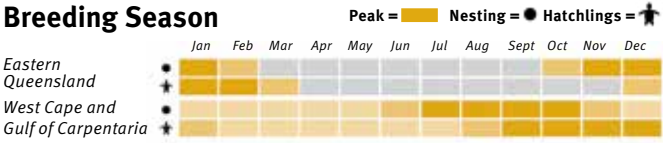
1 Pair Prefrontal Scales

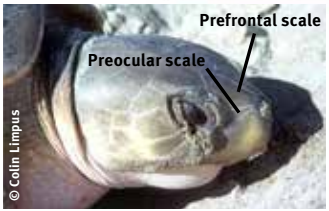
Qld Nesting Sites

Adult: *Carapace is a low dome, smooth with upturned edges. Colour is grey to pale-grey or olive. Preocular scales. Plastron is creamy-yellow.*

Hatchling: *Olive-green, scales with broad black margin. Plastron is a solid white.*

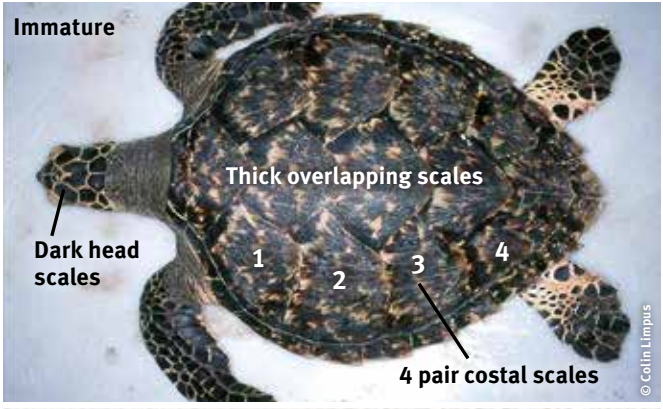
Breeding Season





Hawksbill Turtle, *Eretmochelys imbricata*

Status: Nationally Vulnerable, Queensland Vulnerable



Key Identifcation Features

Alternating Track

Scales Thick Overlapping

4 Pair Costal Scales

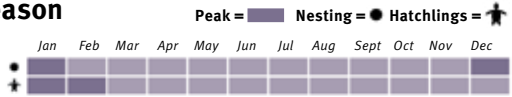
2 Pair Prefrontal Scales

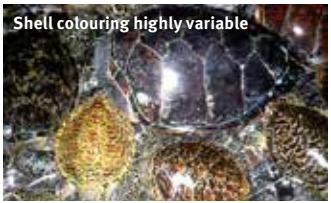
Qld Nesting Sites

Adult: *Carapace has thick overlapping scales. Colour is olive green or brown and is extensively variegated with brown/black markings. Adult plastron is yellow or white with black spots.*

Hatchlings: *Dark brown.*

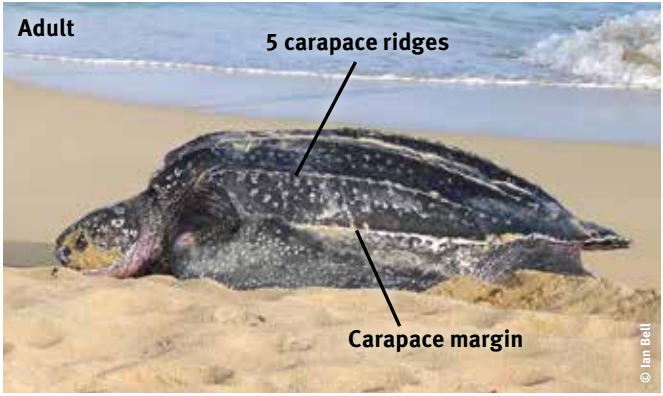
Breeding Season

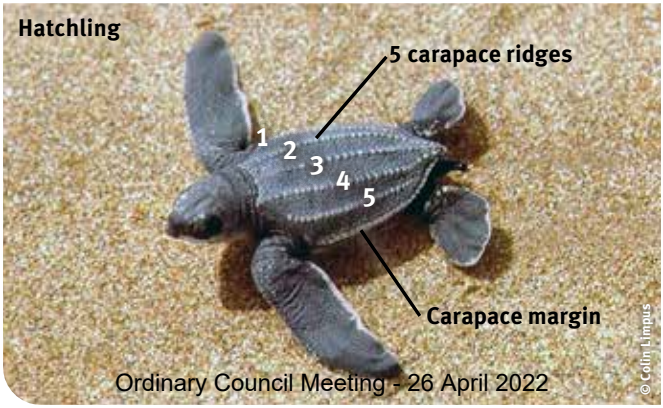




Leatherback Turtle, *Dermochelys coriacea*

Status: Nationally Vulnerable, Queensland Endangered





Key Identification Features

Breast Stroke Track

No Carapace Scales

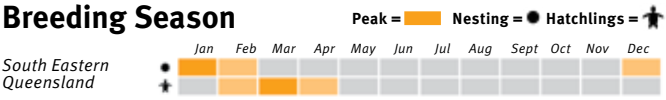
5 Carapace Ridges

Qld Nesting Sites

Adult: *Carapace is long and pointed. Long ridges run down the length of carapace. Colour is a uniform black-brown. Soft leathery skin.*

Hatchlings: *Finely beaded, black with white markings on the carapace ridges and plastron.*

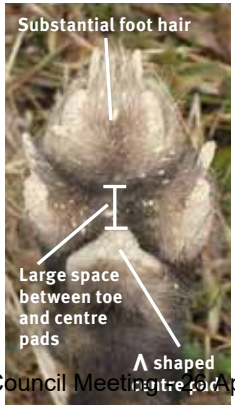
Breeding Season



Fox

Track Identification Features

- Front foot is larger than back foot.
- Elongated oval shaped claws, may not show on track.
- Substantial foot hair, sometimes visible on track impression.
- Large space between centre pad and toe pads.
- Centre pad has a distinct inverted V shape.
- Tracks are straight, hind feet reusing front feet impressions.
- Small track width.



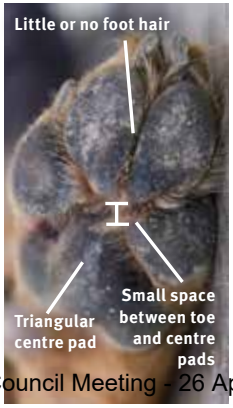
Management Options

- Den detection and fumigation
- Ground shooting
- Trapping
- Baiting
- Exclusion fencing
- Nest protection (cages)

Wild Dog or Dingo

Track Identification Features

- Front foot is larger than back foot.
- Little or no foot hair in between pads.
- Small space between centre pad and toe pads.
- Centre pad almost triangular.
- Foot imprint rounded.
- Tracks are straight but not as neat and aligned as a fox's track.



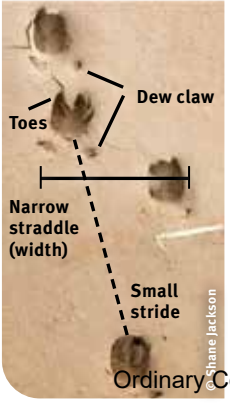
Management Options

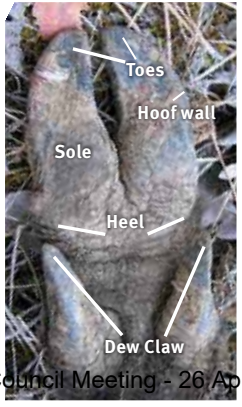
- Ground shooting
- Leg hold trapping
- Baiting (1080 or strychnine)
- Exclusion fencing
- Nest protection (cages)

Feral Pig

Track Identification Features

- Back feet slightly larger than front.
- Foot print consists of a two toe hoof and two dew claws.
- Dew claws distinctive identification feature but may not be present in harder soils.
- Small stride and narrow straddle.





Management Options

- Ground/aerial shooting
- Trapping
- Baiting
- Exclusion fencing
- Nest protection (cages)

Goanna

Track Identification Features

- Both walk and run tracks have alternating foot prints.
- Trail drag usually visable.

Nest Predation Identification

- Goannas burrow into nest at an angle from the side of the nest, not vertical from directly above.
- The burrow is typically domed shape, not circular.

Management Options

- Trapping
- Exclusion fencing
- Nest protection (cages)

Principles of Pest Management

Managing pest animals requires long-term control programs and a variety of approaches. Effective programs are designed around these eight principles:

1. INTEGRATION

Ensuring pest management programs are an integral part of the management of natural areas.

2. PUBLIC AWARENESS

Raising public awareness and knowledge of pests to increase community and individual participation in pest management.

3. COMMITMENT

Gaining a commitment to long term programs by the community, industry groups and government entities.

4. CONSULTATION AND PARTNERSHIP

Establishing partnerships between local communities, industry groups, state government agencies and local governments to achieve a collaborative approach.

5. PLANNING

Consistent planning at local, regional, state and national levels ensures combined resources target the agreed priorities.

6. PREVENTION

Preventing the spread of pests, and using early detection and intervention to control pests.

7. BEST PRACTICE

Using ecologically and socially responsible pest management practices to protect the environment and natural resources.

8. IMPROVEMENT

Research and regular monitoring and evaluating of programs helps improve and refine pest management practices.

Threats to Marine Turtles

Marine turtles are long-lived and slow to mature. Depending on the species they can take anywhere between 8–50 years to reach breeding age. Due to the range of threats, at their different life stages, it is thought that only 1 in 1000 hatchlings will survive to adulthood and then return to the beach to nest. For this reason it is critical to address the range of threats throughout their lifecycle.

Threats include:

- Native and introduced animals predating turtle eggs and hatchlings.
- Vehicles compacting turtle nests or forming tyre ruts that trap hatchlings.
- Humans taking turtle eggs.
- Bycatch of marine turtles in fisheries.
- Marine debris.
- Impact to breeding habitat from coastal development and artificial lighting.
- Deteriorating water quality.
- Unknown and possibly unsustainable levels of turtle harvesting, in and outside Australian waters.

What you can do:

- Support the management of predators such as pigs, dogs and foxes around turtle nesting beaches.
- Report turtle nests and predated turtle nests to your local ranger.
- Keep your dogs on a lead when walking on the beach during nesting/hatchling season.
- Drive slowly on beaches and avoid driving over nests. Drive on the wet sand below the high tide mark to avoid making wheel ruts.
- Pick up marine debris from the beach and waterways.
- Report ghost nets to your local ranger.
- At night, minimise lights on the beach, including campfires.
- Support sustainable, traditional use of turtle and turtle eggs.

Acknowledgements

The Queensland Parks and Wildlife Service Nest to Ocean Turtle Protection Program Team would like to acknowledge the contribution of staff from the following organisations in the development of the field guide: Western Cape Turtle Threat Abatement Alliance supported by Cape York Natural Resource Management, Balkanu Cape York Development Corporation, Aak Puul Ngantam, Feralfix, World Wildlife Fund for Nature, and University of Queensland. Also acknowledged is the input and advice of staff from our partnering Australian and Queensland Government departments.

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Prepared by:
Queensland Parks and Wildlife Service,
Department of Environment and Science.

Newell Beach

FORESHORE MANAGEMENT PLAN

July 2021

DOUGLAS SHIRE COUNCIL

The Eastern Kuku Yalanji and Yirrganydji Peoples are the Traditional Custodians and Owners of the land and sea country that encompass the Douglas Shire region.

Douglas Shire Council acknowledges the 'Bama', the traditional rainforest Aboriginal coastal people of our region who hold the unique position of being the First Peoples of this country. We recognise and respect Bama cultural heritage, values, beliefs and continuing relationships and responsibility to their land and sea country. We honour and respect your Elders past, present and future.

We commit to maintaining and strengthening our partnerships and respectful relationships with Bama in the spirit of reconciliation so that together we can increase the opportunities for successful and positive outcomes to the advantage of everyone in our communities.

Council respectfully acknowledges other Aboriginal and Torres Strait Islander people who call our region 'home'.

This report has been prepared by Alluvium Consulting Australia Pty Ltd and Wild Environmental for Douglas Shire Council under the contract titled 'WO5429 Foreshore Management Plan'.

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Cover image:	Newell Beach foreshore.

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1 Introduction

The coastline is an important place for many Australians, providing significant social and cultural value. This is especially so for many residents of the Douglas Shire who have identified these unique coastal landscapes and natural ecosystems among some of the most important factors attracting people to this coastline (DSC 2019a). The Douglas Shire coastline also has high tourism value, attracting many visitors to the area.

The Eastern Kuku-Yalanji and Yirriganydji Peoples are the Traditional Custodians of the Land and Sea Country within the Douglas Shire. They have lived in and cared for this region for thousands of years, represented in important cultural sites throughout the Shire, and the memories and experiences of its people; past, present and future.

Douglas Shire Council (DSC) has an extensive 111 km long coastline that extends from Degarra in the north to south of Wangetti. The Shire is well known for its diverse coastline and its proximity to the Great Barrier Reef. Much of the Shire is within the Wet Tropics World Heritage Area and its dynamic coast consists of a variety of sandy beaches, rocky headlands and coastal rainforests.

The region's beaches and foreshore areas are important both to people and to the ecosystems around them. Coastal landscapes provide essential habitat for life on the foreshore and provide visual and recreational amenity to the people. Healthy coastal ecosystems are necessary to promote the resilience of plant and animal communities to coastal hazard impacts. Denser vegetation types are also effective in reducing the destructive forces of a storm tide for communities and infrastructure landward of the foreshore.

However, these ecosystems are experiencing ongoing disturbance as a result of erosion, vehicle and pedestrian access, weeds and pest species, illegal dumping, and runoff from stormwater and agricultural land. These factors threatening dune stability and reducing the erosion buffer often result in vegetation loss, impacts to native fauna species, and changes in ecosystem structure.

To help manage and protect these important coastal zones, DSC has developed five Foreshore Management Plans (FMPs) for the Wonga, Newell, Cooya, Four Mile and Oak Beaches.

1.1 Purpose

In 2019, DSC developed the Resilient Coast Strategic Plan 2019-2029 (referred to henceforth as the Strategy) and have committed to undertake actions to reduce the impacts of coastal hazards, such as erosion and coastal flooding, and activities in the coastal zone. A priority outcome of the Strategy is to undertake dune protection, maintenance and monitoring. This encompasses the foreshore area and is the focus of the FMP.

The FMPs will help to guide Council in the protection, maintenance and management of the coastline and foreshore, while maintaining the natural character of the area and respecting ecological, cultural and social values of these coastal reserves. Funding has been secured through the Queensland Government Reef Assist Program which will be used to support the implementation of the management actions outlined in the FMP.

The plans will:

- Ensure there is a **shared understanding** of the social, cultural, environmental and economic values and uses of the foreshore zone
- Identify options for the **proactive management** of vulnerable areas of the foreshore zone over the next 5 years
- Help **improve and maintain** the vegetation cover and condition in the foreshore zone.

1.2 Foreshore Management Plan area

Newell Beach is a coastal community located along a 2.4 km stretch of foreshore between the Saltwater Creek and Mossman River estuaries (Figure 1). It is the head of a barrier spit system. A narrow dune system, approximately 20 to 80 m wide, makes up the foreshore area and has primarily been formed by wave action. The upper and lower beach is steep and the intertidal zone is approximately 10 to 20 m wide.

Figure 1. *Newell Beach foreshore management area.*

The community at Newell Beach is comprised of approximately 200 dwellings, as well as a number of services and tourist facilities. At the 2016 census, there were 336 residents at Newell (ABS 2017). A number of residents are absentee owners who use the foreshore area only seasonally. There are houses located in the foreshore area relatively close to the beach and during the site inspections, it was noted that encroachment and clearing of vegetation on Council land is occurring.

Due to its position between the two estuaries, Newell Beach is a very active system, experiencing changes to the shoreline position, with erosion and accretion documented as early as 1968 (DSC 2000). A rock revetment was constructed along the northern bank of the Mossman River in 1975 to mitigate erosion that was threatening houses (DSC 2000). More recently, beach renourishment and geotextile sandbag groynes have been emplaced at the southern end of Newell Beach during 2016 and the beach condition during the site inspection suggests that the groynes have been effective in retaining sand within that coastal segment.

1.3 Implementation

This FMP has been developed following a series of site inspections, including vegetation mapping, species identification and coastal morphology assessments, as well as public consultation with residents and ratepayers from Newell Beach and the greater Douglas Shire. The site inspections and public engagement have informed the management actions and planning decisions for the Newell Beach foreshore area. The management actions have been tailored to incorporate what the community values about their foreshore and how the foreshore is used.

The plan outlines actions for dune protection, including weed species for removal, native vegetation species for revegetation, and pedestrian and vehicle access management. It also provides a schedule for implementation to allow Council to prioritise actions for the area. This FMP remains non-statutory but provides an informed and proactive guide for the future management of Newell Beach over a 5-year timeframe.

2 Study area and planning context

Newell Beach is a coastal community located along a stretch of foreshore between Saltwater Creek and Mossman River. The coastline is bordered by the Great Barrier Reef Marine Park. There are a variety of land zoning uses and ecological communities at Newell Beach. The following section will outline and illustrate the DSC land zoning and vegetation and faunal communities that have been identified by a literature review and during site visits and surveys.

2.1 Legislative, policy and strategy setting

Coastal management is guided by Commonwealth, State and local legislation. The legislation results in a complex structure of rights and responsibilities. Key legislation, plans, policies and strategies relevant to foreshore management are summarised in Table 1.

Table 1. Summary of legislation, policy, plans and strategies relevant to foreshore management

Legislation	Relevance

Biosecurity Act 2014	• This Act provides a comprehensive biosecurity framework to manage the impacts of animal and plant diseases and pests.
	• The purpose of this Act is to:
	  o Provide a framework for an effective biosecurity system for Queensland.
	  o Ensure the safety and quality of animal feed, fertilisers and other agricultural inputs.
	  o Help align responses to biosecurity risks in the State with national and international obligations and requirements.
	• The purpose of the Act is also to manage risks associated with emerging, endemic and exotic pests and diseases.

Coastal Protection and Management Act 1995	• This Act aims to provide for the protection, conservation, rehabilitation and management of the coastal zone, including its resources and biological diversity. • This Act considers the goal, core objectives and guiding principles of the National Strategy for Ecologically Sustainable Development in the use of the coastal zone. • This Act ensures that decisions about land use and development safeguard life and property from the threat of coastal hazards. • This Act encourages the enhancement of knowledge of coastal resources and the effect of human activities on the coastal zone.

Planning Act 2016	• This Act provides for an efficient, effective, transparent, integrated, coordinated and accountable systems of land use planning and development assessment to facilitate the achievement of ecological sustainability by:
	  o Coordinating and integrating planning at the local (i.e., planning schemes), regional and State scales
	  o Managing the process and effects of development on the environment (including managing the use of premises).

Native Title Act 1993	• The purpose of this Act is for the recognition and protection of native title.
	• It covers:
	  o Acts affecting native title.
	  o Determining whether native title exists and compensation for acts affecting native title.

Legislation	Relevance
Aboriginal Cultural Heritage Act 2003	• The main purpose of this Act is to provide effective recognition, protection and conservation of Aboriginal cultural heritage.
Vegetation Management Act 1999	• This Act aims to regulate the clearing of vegetation by: o Managing the environmental effects of clearing. o Regulating clearing in a way that conserves remnant vegetation that is an endangered regional ecosystem, an of concern ecosystem, or a least concern regional ecosystem. o Ensuring clearing does not cause land degradation and allows for sustainable land use. o Preventing the loss of biodiversity, maintain ecological processes, and reduce greenhouse gas emissions.
Environmental Protection Act 1994	• This Act aims to protect Queensland's environment while allowing for development that improves the total quality of life, both now and in the future, and that maintains the ecological processes on which life depends. • The Act defines environmental value, environmental harm and best practice environmental management.
Nature Conservation Act 1992	• This Act aims to conserve nature while allowing for the involvement of indigenous people in the management of protected areas. • This is to be achieved by a conservation strategy for Queensland that declares and manages protected areas, protects native wildlife and habitats, ensures use of protected wildlife and areas to be ecologically sustainable, and allows cooperative involvement of Aboriginal and Torres Strait Islander people.
Environment Protection and Biodiversity Conservation Act 1999	• This Act aims to provide protection of the environment, promote ecologically sustainable development and the conservation of biodiversity. • The Act aims to promote the use of indigenous knowledge of biodiversity through a cooperative approach to the protection and management of environments.
Queensland Local Government Act 2009	• This Act provides a system of local government in Queensland, including: o The way in which a local government is constituted and the nature and extent of its responsibilities and powers o A system of local government in Queensland that is accountable, effective, efficient and sustainable.
Marine Parks Act 2004	• The main purpose of this Act is to provide for conservation of the marine environment. • This purpose as it relates to this plan can be achieved through: o Cooperative involvement of public authorities and other interested groups and persons, including members of Aboriginal and Torres Strait Islander communities. o Recognition of the cultural, economic, environmental and social relationships between marine parks and other areas, whether of water or land.

Legislation	Relevance
Local Laws	• Local laws sit within the *Local Government Act 2009* and under the Act a local government may make and enforce any local law that is necessary or convenient for the good rule and local government of its local government area. • This legislation sets out the laws for the DSC area, including animal management, community and environmental management, local government areas, and facilities.

2.2 Zoning

Land use

The DSC Planning Scheme (2018) has been used to understand the boundaries between different land uses (Figure 2) (DSC 2018). At Newell Beach, the primary land uses within or immediately adjacent to the foreshore area are conservation, low density residential, recreation and open space, and rural. These land uses have implications for the management of the foreshore area. Changes within these zones can have flow-on impacts to the foreshore area, including:

- habitat fragmentation (loss of habitat into smaller, isolated areas)
- runoff
- illegal clearing and planting, including weed dispersal and growth
- impacts on fauna (light and noise pollution, road/beach kills)

Conservation zone

The conservation zone provides for the protection, restoration and management of areas identified to support significant biological diversity and ecological integrity (DSC 2018). Relevant outcomes identified in the Douglas Planning Scheme for the conservation zone include (DSC 2018):

- Protection of biological diversity, ecological integrity and scenic amenity.
- Recreational or other uses of areas are consistent with the management plans of the controlling authority so that conservation and scenic values of these areas are not adversely affected.
- Any use of land in private ownership does not affect the environmental, habitat, conservation or scenic values of that land or surrounding area.
- Any low intensity facilities based on the appreciation of the natural environment or nature based recreation only establish where there is a demonstrated need and provided they have a minimal impact on the environmental and scenic amenity values of the site or surrounding area.
- The provisions of the Return to Country Local Plan facilitate economic and social opportunities on traditional Indigenous lands.
- Further lot reconfigurations other than amalgamations, boundary realignments to resolve encroachments, or for the practical needs of essential community infrastructure, or to facilitate Return to Country outcomes do not occur.

Recreation and open space zone

The purpose of the recreation and open space zone is to provide for informal recreation where the built form is not essential to the enjoyment of the space, parks that serve the recreational needs of residents and visitors, and a range of organised activities that require a level of built infrastructure (DSC 2018). Relevant outcomes to the recreation and open space zone include (DSC 2018):

- Areas are provided for active sport and recreation to meet community needs.
- Open space is accessible to the general public for a range of outdoor sport and recreation activities.
- A range of functional and accessible open spaces, including local and regional parks and linkages, are available for the use and enjoyment of residents and visitors.

- Ancillary structures and buildings such as shelters, amenity facilities, picnic tables and playgrounds are provided where necessary.
- Sport and recreation areas are planned and designed to enhance community liveability, scenic amenity and provide a retreat from developed areas.
- The use of sport and recreation areas does not unduly affect the amenity of adjacent areas particularly residential areas.

Residential zone

Within Newell Beach, there are low density and rural residential areas adjacent to the foreshore area. Low density residential areas provide for predominantly dwelling houses supported by community uses and small-scale services and facilities that cater for local residents (DSC 2018). The purpose of the low density residential zone will be achieved through the following relevant outcomes (DSC 2018):

- Development maintains a high level of residential amenity having regard to traffic, noise, dust, odour, lighting and other locally specific impacts.
- Development reflects and enhances the existing low density scale and character of the area.
- Development is reflective and responsive to the environmental constraints of the land.
- Development is supported by necessary community facilities, open space and recreational areas and appropriate infrastructure to support the needs of the local community.

Rural zone

There is rural land adjacent to the foreshore area at Newell Beach with the purpose to provide for cropping, intensive horticulture, intensive animal industries, animal husbandry, animal keeping and other primary production activities. This land use can also provide for the protection or management of significant natural resources and processes to maintain the capacity for primary production. Outcomes relevant to the foreshore area include (DSC 2018):

- Areas for use for primary production are conserved and fragmentation is avoided.
- Development embraces sustainable land management practices and contributes to the amenity and landscape of the area.
- Adverse impacts of land use, both on-site and on adjoining areas, are avoided and any unavoidable impacts are minimised through location, design, operation and management.
- Areas of remnant and riparian vegetation are retained and rehabilitated.

Great Barrier Reef Coast Marine Park Zoning

The Great Barrier Reef (GBR) Coast Marine Park Zoning classifies the land and waters below the low tide mark at the southern end of the Newell Beach FMP area near the boat ramp as an Estuarine Conservation Zone (Figure 2). This zoning enables the for the protection of areas of the GBR Coast Marine Park in a natural state while continuing to allow the public to enjoy the relatively undisturbed nature of those areas. The use of this area also includes providing for traditional hunting and gathering.

Wet Tropics World Heritage Area

Land classified under the Wet Tropics World Heritage Area is located well inland of Newell Beach (Figure 2). While this is a consideration for the environmental values of the foreshore area, the World Heritage Area is not directly impacted by the management of the Newell Beach foreshore.

Figure 2. *Newell Beach foreshore area land use zoning (DSC 2018, GBRMPA 2021).*

2.3 Coastal hazards

The entire length of Newell Beach is vulnerable to coastal erosion (DSC 2019b). This erosion may be temporary or permanent. Temporary erosion is generally caused by storms, winds or waves, and the beach rebuilds during calmer periods. Permanent erosion is more likely to occur over the longer-term due to rising sea levels or significant changes to sediment transport dynamics where sand becomes lost to the coastal system. Erosion may impact the foreshore area, including the vegetation, wildlife habitats, infrastructure, recreational uses or values.

Large geotextile sandbag groynes have been placed at the southern end of Newell Beach and sand renourishment has also taken place. This was undertaken in 2016 to address erosion and a recent site inspection suggests that the groynes have been effective in retaining sand along that segment of the coast.

Foreshore management precinct

The foreshore zone at Newell Beach extends from the highest astronomical tide (HAT) line to the road reserve limit of the Conservation zone at the northern end of Marine Parade and to the seaward boundary of the low-density residential zone for the remaining length of the Newell Beach foreshore (Figure 3).

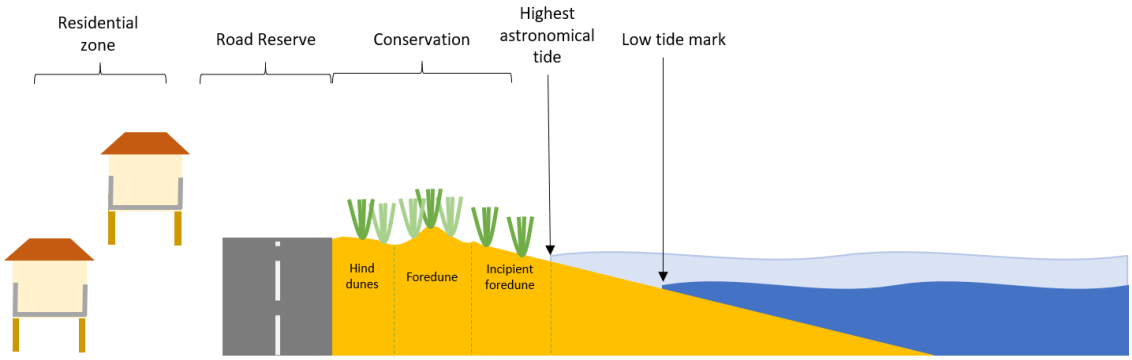


Figure 3. *Graphic representation of the Newell Beach foreshore management precinct.*

The foreshore area includes the dune system behind the beach, immediately landward of the HAT mark and is made up of the following three key sections (Figure 3):

- **Incipient foredune:** a windblown platform that forms in front of the foredune, however is not present on all beaches. This is where vegetation such as grasses and creepers first establish and provides a protective buffer to erosion, and storm effects, including winds and waves.
- **Foredune:** the main sandy formation and is of greater height than the incipient dune. Larger vegetation species establish here, including shrubs, which provide greater wind protection.
- **Hind dune:** a smaller dune system behind the foredune. These systems tend to be well established, including larger vegetation species such as trees.

Newell Beach foreshore

3 Foreshore values

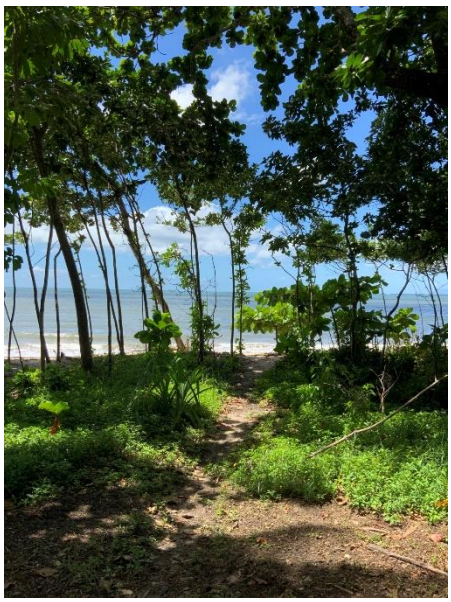
The Newell Beach foreshore is valued by residents and visitors for a number of reasons. These values play a role in the management of the foreshore area. The following section outlines the social, cultural and environmental values that have been identified for the Newell Beach foreshore area, as well as describing any threats or challenges to these values.

3.1 Knowledge sharing and community engagement

There have been several opportunities in recent years for knowledge sharing regarding coastal hazards and the foreshore environment, primarily through the Strategy and Foreshore Community Consultation.

Community consultation was undertaken at Newell Beach regarding improvements to the foreshore amenities (DSC 2020). A survey was circulated to residents throughout the shire to gather feedback, with a focus of residents at Newell Beach. The Council received 97 responses with the majority of respondents living at Newell Beach. While the focus of the survey was around infrastructure and amenities, some points of consideration for the foreshore management plan were raised. These include:

- disability access
- leaving much of the esplanade as open space
- better and more regular maintenance of vegetation (including clearing of undergrowth and palm fronds)
- constructing a footpath above high tide mark and to connect facilities
- revegetation to prevent beach erosion and provide a wind block for beachfront houses.



Vegetation clearing for an access track.

Some of the feedback also included preventing illegal clearing and the creation of new, informal access paths through the vegetation. The survey also highlighted illegal green waste dumping that is occurring along the foreshore and covering the dunes. Overwhelmingly, there is a desire within the Newell Beach community to keep formalised structures to a minimum to maintain the natural amenity.

As part of the current FMP, a survey was distributed to the Newell Beach community and wider Douglas Shire residents and ratepayers. The aim of the survey was to understand how they use and what they value about the foreshore zone, and how they would like to see it managed. The survey was advertised through the Council Foreshore Management Plans website, Facebook, community noticeboards, emails to residents and community groups, and physical copies were made available at Council offices. The survey ran from 31st March to 23rd April 2021 and a total of 317 responses from residents and community groups were received from throughout the Douglas Shire. Newell Beach residents accounted for 43 responses, most respondents being permanent residents (homeowners).

In addition to the survey, there was also a four-week public comment period following the release of the draft FMP for Newell Beach. During this time, residents and ratepayers were given the opportunity to submit feedback on the draft FMP. A number of open house drop-in sessions were also held at numerous locations throughout the Shire, including at the Mossman Golf Club, to allow people to discuss the FMP in greater detail. Feedback from the public engagement has been used to further understand the values and shape the management actions for the final FMP.

Social values

Three quarters of the respondents live adjacent to or within 1 km of the Newell Beach foreshore. Seventeen percent of the remaining respondents live more than 5 km from the foreshore. This information indicates that the foreshore area is significant to residents and ratepayers at Newell Beach. Most of the respondents visit Newell Beach at least once a week and small proportion visit on a monthly basis.

People predominantly use the Newell Beach foreshore for exercise and relaxation (Figure 4). The next most common uses for the foreshore area are meeting friends or family, walking the dog, fishing and picnicking. In some cases, the residents use the foreshore as an extension of their yard.

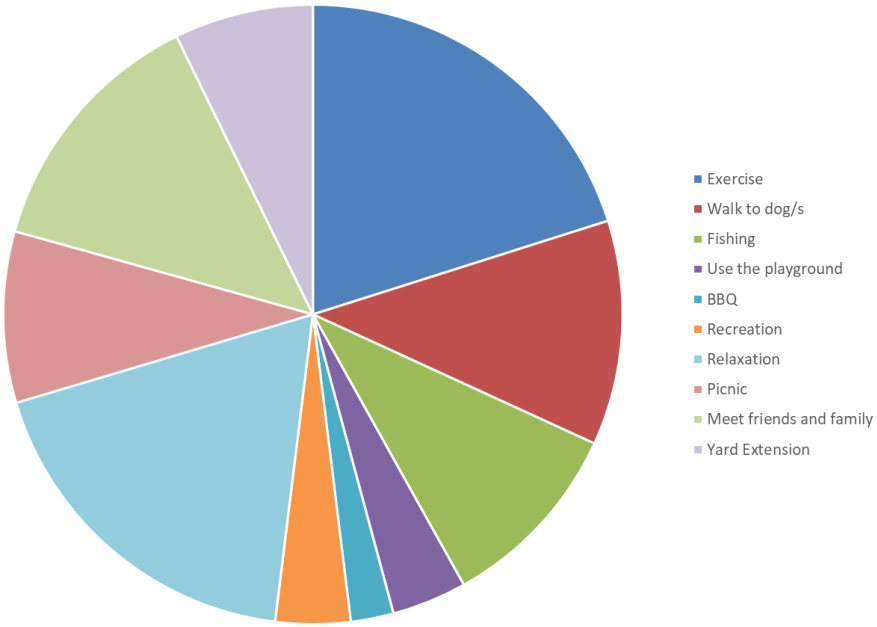


Figure 4. *The most common uses of the foreshore area at Newell Beach.*

Sense of place

Newell Beach residents most value the natural beauty of the beach and the wildlife. The foreshore and beach are also highly valued for recreation, including exercising, fishing and walking dogs. The most meaningful aspect of the foreshore to Newell Beach residents is maintaining the natural and untouched beauty, habitat and vegetation such as the littoral rainforest, ease of access and views of the ocean and nearby islands.

The residents identified a number of environmentally significant areas along the Newell Beach foreshore. An example of an environmentally significant habitat is the littoral rainforests along the foreshore. These are sensitive environments that provide important habitats for animals but may be impacted by vegetation clearing, beach access and weeds. There may also be turtle nesting sites at the northern end of Newell Beach, however, this requires further investigation and monitoring. A number of plant species have been identified as significant, including beauty leaf (*Calophyllum inophyllum*) and the coconut palms.

"One of the most important issues in Newell Beach is the vegetation degradation on the foreshore. This is imperative and tree planting should be implemented as soon as possible." – Newell Beach resident.

Concerns and threats

Respondents had several concerns about the Newell Beach foreshore. They noted issues of vegetation clearing by residents to create access tracks and windows for ocean views, as well as an abundance of weeds taking over native dune species. Collectively, these issues increase the susceptibility of the beach to erosion, which has already been observed to occur at Newell Beach. Respondents also noted concerns of sea level rise. Respondents would like to see better management of this foreshore buffer, perhaps with the involvement of community groups and volunteers to manage weeds and revegetate with native species.

Another common concern was the issue of rubbish on the beach. Some noted that foreshore bins were often overflowing, especially during tourist season, and that more rubbish bins are needed. There was also a suggestion to include recycling and fishing tackle bins along the foreshore.

3.2 Environmental values

Vegetation along the Newell Beach foreshore has historically been heavily impacted by vegetation removal to maintain views and access, such that much of the vegetation of the foreshore is mapped as non-remnant and only a few patches of remnant vegetation remain. The coastal vegetation reserve at Newell Beach ranges from only 12 m wide to a maximum of 80 m and remnant vegetation is highly altered along its length. Vegetation on the northernmost end is intact remnant and to the south there are areas mapped as regrowth protecting the creek banks.

Flora composition

A desktop assessment of the vegetation mapping indicates that, with exception of the intact mangrove, hind dune and foreshore vegetation adjoining Saltwater Creek at the northern end, most of the foreshore vegetation of Newell Beach is considered non-remnant (DOR 2020). Four REs are indicated as being present and foreshore vegetation is mapped as a mix of complex open shrub and closed foredune forest, confirmed by on-site vegetation mapping. The descriptions, Vegetation Management (VM) Class, Biodiversity (BD) status and local representation of the two dominant REs are summarised in Table 2 and Figure 5. A full list of the REs at Newell Beach is provided in Attachment A. As most of the impacts relate to the residential area, vegetation ground-truthing was only undertaken in these areas.

Table 2. Regional Ecosystems of the assessed impact areas within Newell Beach

RE	Mapped RE description	VM Class	BD Status	Local representation
7.2.1c	Closed forest with *Calophyllum inophyllum*, *Terminalia arenicola*, *Dillenia alata*, *Myristica insipida*, *Planchonella obovata*, *Millettia pinnata*, and *Hibiscus tiliaceus*. Beach ridge deposits adjacent to the foredune, in the very wet rainfall zone.	E	E	Highly modified canopies with coconuts frequently replacing large trees. *Calophyllum inophyllum* and *Terminalia* sp. present as mature trees but recruiting saplings frequently absent or disturbed.
7.2.7a	Complex of open shrubland to closed shrubland, grassland, low woodland and open forest. Includes pure stands of *Casuarina equisetifolia*, and Acacia *crassicarpa*, *Syzygium forte* subsp. *forte*, *Calophyllum inophyllum* and *Pandanus* spp. woodland to open forest. Beach strand and foredune.	OC	E	Where *Scaevola taccada* would typically form a thickened shrub layer at the front of the foredune area this strata is heavily impacted through removal. Beach vines and grasses have been mown in some cases. The *Casuarina* and *Calophyllum* are regularly limited to aligning with property boundaries and coconuts dominate this layer.

Figure 5. *Remnant regional ecosystems at Newell Beach (DES 2021).*

Conservation significance

The remnant vegetation of Newell Beach is mapped as 'Essential Habitat' for several conservation significant species, including the endangered southern cassowary (*Casuarius casuarius johnsonii*); eastern curlew (*Numenius madagascariensis*); great knot (*Calidris tenuirostris*); curlew sandpiper (*Calidris ferruginea*) and lesser sand plover (*Charadrius mongolus*) and the vulnerably listed bar-tailed godwit (*Limosa lapponica baueri*). Essential habitat is regulated under the Vegetation Management Act 1999 (VM Act). There are no areas mapped as high risk for protected plants in the Newell Beach area.

Habitat fragmentation

The are no hind dune vine thickets or littoral rainforest in the main Newell Beach foreshore area and connectivity between one end of the beach and the other is impacted by open canopies in many places. This would likely limit the endangered southern cassowary (*Casuarius casuarius johnsonii*) (southern population) to the northern end of the beach, however the pocket of vegetation itself is limited to narrow strips of connecting remnant vegetation.

There have been a number of disturbances to the foreshore area and vegetation at Newell Beach. Residential areas adjacent to the foreshore are becoming increasingly exposed to coastal hazards as a result of diminishing dune vegetation. This loss of vegetation has largely been the result of illegal clearing through the understorey. Table 3 summarises the disturbances and their potential impacts to the foreshore flora and fauna.

Table 3. Disturbances and the potential impacts to flora and fauna

Disturbance	Potential impacts to ecology
Dune erosion	• Further loss of vegetation and fauna habitat • Loss of sea turtle nesting habitat through loss of the foredune vegetation • Increase foredune slope and decreasing suitability for nesting sea turtles • Reduced biodiversity
Vegetation loss	• Increases in foreshore dune erosion • Exposure of hind dune systems and vegetation that are less adapted to extreme weather events • Loss of breeding and roosting habitat for nesting shorebirds and sea turtles • Loss of food trees for southern cassowary
Weeds	• Compete with native species for resources – light, nutrients, space • Reduced biodiversity of flora • Loss of habitat and food plants for conservation significant species • Create barriers for connectivity and fauna population dispersal • Increased fuel loads
Pest animals	• Predation of native animals • Sea turtle nest predation • Reduced fauna populations and diversity
Green waste and illegal dumping	• Impacts to marine fauna • Damage to sea turtle nesting areas through suffocation or preventing nesting • Introduction of weed species to natural areas • Increased atypical fire risk
Stormwater and agricultural runoff	• Impacts to marine fauna • Increased sediment runoff and resulting increases in nearshore turbidity • Increased nutrient loads and subsequent algal blooms

Disturbance	Potential impacts to ecology
Coconut debris	• Fallen fronds and fruit to reduce recruitment of native species • Reduced opportunity for sea turtle nesting • Increase habitat for rodents and potential bird egg predation

Fauna

Newell Beach provides habitat features for many fauna of conservation significance, including nesting turtles, shorebirds and other notable species such as the endangered southern cassowary (*Casuarius casuarius johnsonii*) (southern population). The foredune areas are typically vegetated with larger tree species once fully established. It is amongst this vegetation above the high tide mark that marine turtles prefer as nesting areas. The vegetated areas provide the ideal temperature and protection for incubation and hatchling survival. Larger trees in the foredunes also provide a roosting habitat for shorebirds during the intertidal period. The thinned vegetation at Newell Beach reduces suitable nesting and roosting sites for sea turtles and shorebirds. The full list of these species is provided in Attachment B.

Pest species

A number of environmental weeds species were identified during the site inspection. Coconut palm trees are one of the pest species present within the foreshore zone at Newell Beach. There are approximately 475 specimens present at Newell Beach (DSC 2015). Coconut palms will continue to be managed by the Coconut Management Plan (DSC 2015). The following additional environmental weeds were identified at Newell Beach (Table 4). Environment weeds pose a threat to biodiversity by outcompeting native vegetation with respect to available resources such as nutrients and light, establishing monocultures and increasing fuel loads. This additionally results in reduced habitat value for fauna.

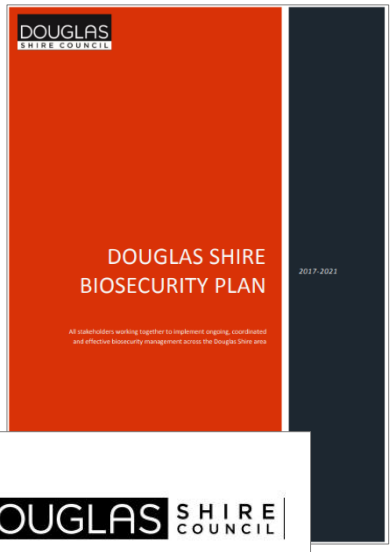
Table 4. Weed species identified at Newell Beach (BQ 2020, Conn 2021, DSC 2015, Murphy et al. 2016)

Scientific name	Common name	Dispersal Method	Environmental Impacts
Cocos nucifera	Coconut palm	• Large nuts which fall from trees • Nuts germinate if uneaten	• Identified as a transformer weed in littoral (coastal) rainforests • Outcompetes native species for space, light and nutrients • Falling nuts and fronds cause physical damage to species below
Sphagneticola trilobata	Singapore daisy	• Spreads by cuttings from slashing and pruning	• Outcompetes native species for space, light and nutrients • Invades lawns, irrigated areas, and around drains
Sansevieria trifasciata	Mother-in-law's tongue	• Spreads by dumping of garden waste • Seeds spread by birds and other animals	• Forms dense infestations • Outcompetes native species for space, light and nutrients • Tends to form monoculture
Bryophyllum delagoense	Mother of millions	• Spread by floodwaters • Spread by animals, vehicles and garden waste	• Invades coastal dunes, grasslands and woodlands • Outcompetes native species for space, light and nutrients • Very poisonous to humans and livestock
Cenchrus echinatus	Mossman River grass	• Spreads via spiny burrs which become attached to animals, vehicles and clothing • Burrs can also be dispersed by water	• Outcompetes native plants for light, moisture and nutrients • Burrs can injury or irritate animals and humans

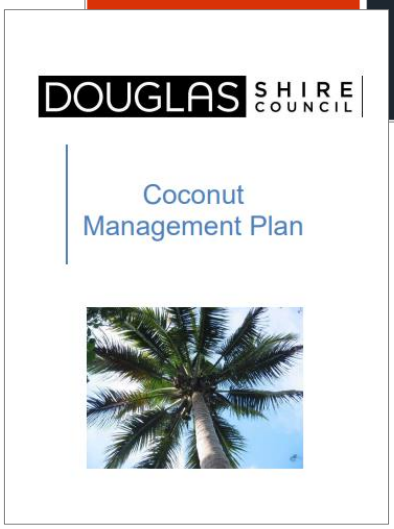
Scientific name	Common name	Dispersal Method	Environmental Impacts
Agave sp.	Agave	• Spread by vegetative reproduction, where a new plant grows from fragments • Planted intentionally as part of a garden	• Does not naturally grow in QLD, though 10 related species have naturalised • Potentially invasive to native species
Tradescantia sp.	Rhoea	• Spreads from stem segments dispersed by water and dumped garden waste	• Outcompetes native species for space, light and nutrients • Completely covers ground layer to form dense mats up to 1m deep • Causes dermatitis in dogs that roll in it
Urochloa mutica	Paragrass	• Spreads seeds by floodwater and animals	• Aggressively invades disturbed remnant vegetation and cane-growing areas • Strongly outcompetes native plants for space

Vegetation management

Douglas Shire Council has a number of instruments to manage the vegetation at Newell Beach. The Coconut Management Plan (DSC 2015) defines the objectives for the management of coconut palms on Council-controlled land. The plan identifies the coconut trees within a given location and provides an assessment of the potential risk, distribution, impacts and associated costs of management.



The Douglas Shire Biosecurity Plan (2017-2021) guides the management of invasive biosecurity matter as well as locally declared pests (plants and animals) as outlined in the Biosecurity Act 2014. Under this plan, there are programs being undertaken by DSC to eradicate pest species. Prioritisation of pest species is based on several factors, including (DSC 2017):



- Existing plans and priorities on a national, state and local level
- Impacts and threats
  - Conservation and biodiversity
  - Riparian or aquatic environment
  - Agricultural or production
  - Residential and urban areas
- Capacity to manage
  - Achievability
  - Current extent

These programs include (relevant to vegetation) (DSC 2017):

- Siam Weed Eradication Program
- Hiptage eradication Program
- Miconia Species (Four Tropical Weeds Eradication Program)

3.3 Amenity and liveability

There is a number of facilities and access points for residents and visitors to engage in recreational activities along the Newell Beach foreshore. The accessibility and recreational uses of Newell Beach are summarised in this section and the management implications are discussed.

Infrastructure

Along approximately 290 m of foreshore, there is several recreational amenities, including barbeque facilities, a basketball court and children's playground. The use of these facilities may make people more likely to also visit the foreshore, influencing the availability of access tracks.

Boat access is available at the northern and southern ends of Newell Beach. There is a road off Marine Parade providing access to launch boats at Saltwater Creek. There are signs along the road to prevent illegal dumping of green waste and other items. There is also a boat ramp and jetty at the southern end of Newell Beach which is owned and managed by the Department of Transport and Main Roads (TMR). An upgrade is planned for the boat ramp at the southern end and has been well received by the community but is yet to be completed by TMR. Vehicles launching boats have the potential to cause erosion and negatively impact vegetation and essential wildlife habitats.

Passive recreation

Newell Beach also offers the opportunity for residents and visitors to engage in passive recreational activities. Examples of such activities include:

- walking along the beach and foreshore
- bird watching
- fishing at Saltwater Creek and Mossman River

These activities are relatively low impact but can still affect the foreshore condition. If foreshore users create informal access tracks through the vegetation to access the foreshore and beach, this can lead to a loss of vegetation, destabilisation of the sand which may lead to erosion or dune destabilisation, and it could also contribute to habitat loss and destruction. Activities such as bird watching will have similar impacts on the foreshore in relation to access. The impact of fishing will largely be a result of vehicle access to Saltwater Creek or Mossman River, including vegetation clearing for access and driving on the sand where there are important and sensitive wildlife habitats. Dumping of fishing nests or waste may also occur.

Pedestrian access

According to a recent audit of beach accessways in the Douglas Shire, there are 53 access paths at Newell Beach. Seven of these are formalised access paths, 13 are private accessways to houses, and the remainder are informal access paths. The creation of informal access tracks present challenges to foreshore management, particularly with regards to illegal vegetation clearing, which may result in dune destabilisation.

Dog off-leash areas

There is an off-leash dog area at the northern end of Newell Beach, including the foreshore area to the end of Marine Parade north of Phillip Street. Dogs pose a risk to fauna as they may attack vulnerable species, particularly when off-leash.

4 Management precincts

The Newell Beach foreshore area has been divided into six management precincts to tailor management actions specific to the concerns within each precinct. The six precincts are:

- Precinct 1 – Saltwater Creek access
- Precinct 2 – Saltwater Creek access to Phillips St
- Precinct 3 – Phillips St to Pacific St
- Precinct 4 – Pacific St to Newell Beach Park
- Precinct 5 – Newell Beach Park to Short St
- Precinct 6 – Short St to Mossman River

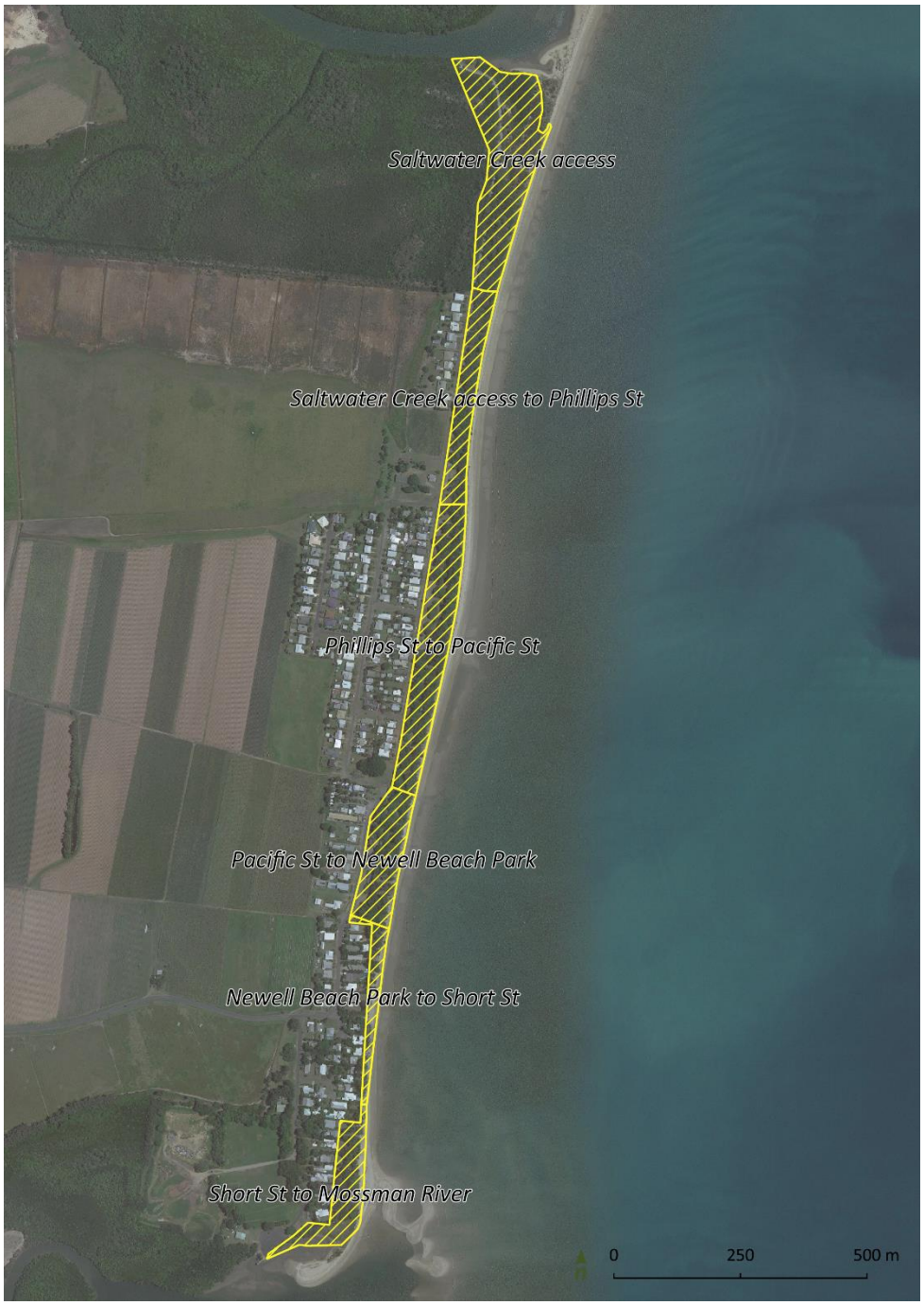


Figure 6. *Newell Beach foreshore management precincts.*

The threats and challenges within each management precinct are summarised in Table 5. These threats and challenges have been identified through the background review, site inspections and community engagement.

Table 5. Newell Beach foreshore precincts threats and challenges

Precinct	Key foreshore threats and challenges
1 – Saltwater Creek Unpopulated precinct and falls under land for conservation.	• Illegal dumping, including green waste – this may be contributing to the spread and establishment of weeds that are present and can negatively impact native vegetation communities and does not meet the outcomes of the Conservation zone code, including biological diversity and ecological integrity. • Environmental weeds present – may impact the conservation value within the precinct. • Informal access tracks through land designated to Conservation, including illegal vegetation clearing – these activities may not meet the outcomes of the Conservation zone code, including biological diversity, ecological integrity and scenic amenity.
2 – Saltwater Creek to Phillips St Sparsely populated precinct with land designated to conservation.	• Informal access tracks and viewing windows, including illegal vegetation clearing – these activities may not meet the outcomes of the Conservation zone code, including biological diversity, ecological integrity and scenic amenity. • Environmental weeds present – may impact the conservation value within the precinct. • Foreshore access within potential sensitive and vulnerable habitats, including turtle and shorebird nesting areas
3 – Phillips St to Pacific St Land designated to conservation and more densely populated residential zone adjacent.	• Informal access tracks, including illegal vegetation clearing and sparse vegetation cover – these activities may not meet the outcomes of the Conservation zone code, including biological diversity, ecological integrity and scenic amenity. • Environmental weeds present – may impact the conservation value within the precinct.
4 – Pacific St to Newell Beach Park Foreshore along Marine Parade with land dedicated to conservation.	• Informal access tracks, including illegal vegetation clearing and sparse vegetation cover – these activities may not meet the outcomes of the Conservation zone code, including biological diversity, ecological integrity and scenic amenity. • Environmental weeds present – may impact the conservation value within the precinct.
5 – Newell Beach Park to Short St Land designated to conservation and residential area immediately adjacent.	• Environmental weeds present – may impact the conservation value within the precinct. • Illegal vegetation clearing and sparse vegetation cover – these activities may not meet the outcomes of the Conservation zone code, including biological diversity, ecological integrity and scenic amenity.
6 – Short St to Mossman River Land designated to conservation and community facilities, including boat ramp.	• Pedestrian and other access along foreshore within potential sensitive and vulnerable habitats – access may pose a threat to vulnerable species. • Environmental weeds present – may impact the conservation value within the precinct.

5 Management plan

The following section outlines the adaptive management approach to address the threats and challenges that have been identified for the Newell Beach foreshore area. The objectives for management have been identified in order to inform measurements for management success. Priorities have also been set to appropriately guide management of the foreshore threats and challenges over the immediate, medium and longer-term timeframes. The objectives and priorities shape the management actions for each precinct. In addition, any monitoring and evaluation activities that are to take place following the implementation of the actions will also be summarised to measure the progress of the foreshore management.

5.1 Management objectives

Objectives are useful for measuring the success of the management actions undertaken. They are based on the community values identified through the engagement process. The objectives will guide the metrics for monitoring and evaluation of the management actions. They can be applied at the whole of foreshore (community) and precinct scale.

Management objectives for Newell Beach foreshore

- Maintain the overall natural form and function of the beach.
- Enhance and maintain vegetation condition – littoral rainforests, dune vegetation for vulnerable species and to prevent dune erosion.
- Build positive behaviour change outcomes to minimise adverse impacts of foreshore use.
- Proactively undertake weed management to restore native vegetation habitats.
- Monitor the presence and health of potential turtle and shorebird nesting sites in foreshore areas.
- Enforce illegal clearing local laws to prevent further establishment of unauthorised and informal beach access tracks.

5.2 Management prioritisation

Prioritisation of the management actions has been assigned as immediate, medium-term or future.

1 **Immediate** (recommend implementation within next 12 months)

Actions for immediate prioritisation include sites where weeds are present and it is necessary to eradicate the weeds and revegetate the site with native vegetation cover. Environmental weeds pose a significant threat to the values of the Newell Beach residents, including the natural ecosystems and wildlife. Actions also revolve around access and use of the foreshore area, such as for fishing or pedestrians. The uses may pose a threat to the sensitive habitats and management actions are focussed on minimising the impact.

2 **Medium-term** (recommend implementation within next 2-3 years)

Medium term priority actions are recommended to be implemented within the next two to three years. These actions are important for the management of the foreshore precinct, however, they require community engagement and education to understand their benefits. There is an element of community involvement with the medium-term actions.

3 **Future** (recommend implementation within 5 years)

Future management actions are those that first require an evaluation of the outcomes from immediate to medium-term actions that have been undertaken before being implemented. It is recommended that future actions are implemented within five years of the plan's adoption. This timeframe allows sufficient time for immediate actions to be implemented and their progress and success to be evaluated.

Newell Beach.

5.3 Management actions

Management actions and their priorities for the Newell Beach foreshore are summarised in Table 6. Maps of the management actions for each precinct are provided in Attachment C. It should be noted that management actions will not be implemented without prior community consultation.

Table 6. Newell Beach foreshore precinct management actions

	All precincts	*Precinct 1*	*Precinct 2*	*Precinct 3*	*Precinct 4*	*Precinct 5*	*Precinct 6*
Outcome 1: **Protect sensitive and vulnerable habitats, including dune vegetation, and turtle and shorebird nesting sites.**							
A1.1: Undertake beach monitoring of turtle and shorebird nesting sites during nesting and hatching seasons to understand the impact foreshore access may have on these habitats. Survey vegetation cover to assess revegetation requirements and progress to support nesting habitats.	3						
A1.2: Establish a platform on the DSC Environmental Hub giving residents and visitors the ability to upload information and photos about flora and fauna species they have noticed in the foreshore.	1						
A1.3: Formalise and maintain defined access tracks to include and install appropriate signage at the beach and land entrances. This is to minimise the impact on the frontal dune. Issue fines for people found to be illegally clearing under Local Law No. 4 (Local Government Controlled Areas, Facilities and Roads).	1						
Outcome 2: **Restore the biological diversity, ecological integrity, scenic amenity and dune stability of the foreshore by reducing the presence and impact of environmental weeds.**							
A2.1: Commence a dune protection and maintenance program in partnership with the local community using Newell Beach as a pilot site. Undertake dune revegetation with native species (see Attachment D) within a 10 m buffer landward of the HAT mark with low-growing species to maintain views, and regenerate land that has been cleared and to stabilise the dune protecting against erosion. Install fencing around the revegetated area to reduce damage or clearing and encourage regrowth.			2	2	2	1	

	All precincts	*Precinct 1*	*Precinct 2*	*Precinct 3*	*Precinct 4*	*Precinct 5*	*Precinct 6*
A2.2: Establish a weed eradication and maintenance program in conjunction with the Biosecurity Plan through collaboration with local community groups to remove environmental weeds present in the foreshore area and undertake revegetation with native species (see Attachment D).	1						
A2.3: Assess the need for continued sand nourishment and repair of geotextile sandbags to maintain a healthy beach profile and a stable groyne.							3
Outcome 3: Build positive behaviour change outcomes to minimise adverse impacts of foreshore use.							
A3.1: Undertake a community education program to communicate knowledge around foreshore weeds, including transfer and establishment, awareness and management, and the benefits of dune vegetation. Extend this education to include contractors engaged by private landholders.	1						
A3.2: Include crocodile awareness information when undertaking new programs (e.g., booklets for walks).	1						
A3.3: Install bins for general waste and fishing tackle.	1						

5.4 Monitoring and evaluation

The success of the management actions is measured through monitoring and evaluation mechanisms. The monitoring focusses on the sensitive and vulnerable environments, including turtle nesting and key coastal vegetation habitats.

Nesting habitats

The habitat monitoring should be undertaken to observe where turtle and shorebird nesting habitats are present in the foreshore area and to understand the vegetation composition of these habitats. Turtle monitoring should be undertaken based on the Queensland Marine Turtle Field Guide (Attachment E) between October and May to understand the seasonal use of these habitats by turtles (QPWS, DES 2016). Guidelines for shorebird monitoring will need to be developed based on local knowledge.

It is recommended that the monitoring be undertaken in partnership with Indigenous Rangers and local community groups. In addition, a platform on the DSC Environmental Hub website should be created for residents and visitors to submit photos and information regarding any turtles or shorebirds they notice when using the foreshore. The purpose of the habitat monitoring is to understand which species are accessing the foreshore area for nesting and hatching, as well as the vegetation composition of these habitats.

Vegetation

The vegetation monitoring is a simple measure for the percentage of cover and survival success. This monitoring should be undertaken on a yearly basis to record the survival rate. It is recommended that vegetation is monitored on a yearly basis as the end of the wet season.

The purpose of collecting information about the success of revegetation and other site management issues such as exotic plants (environmental weeds), other threats, habitat quality and connectivity, and significant species values is to be able to refine and direct resources accordingly. Flexibility in program delivery is required to maintain the condition of assets such as plantings, respond to threats as they change through time and account for new values if they emerge during the delivery of the project.

Monitoring and evaluation metrics

Table 7 outlines the monitoring and evaluation metrics for the corresponding management action to evaluate the progress and success of implementation. A detailed method for rapid vegetation assessment is supplied in Attachment E.

Table 7. Foreshore management action monitoring and evaluation metrics

Management action	Monitoring	Evaluation	Timing
Fauna monitoring	• Nesting species • Vegetation composition of nesting habitats	• Turtle tracks, bird nests • Population dynamics • Animal health	Nesting season
Vegetation monitoring	• Species specific observations to identify which species may be doing poorly • Weed cover within each of the canopy layers (top 5 transforming weed species)	• Measure of the percentage survival of revegetation • Percentage survival of key species • Percentage cover over canopy layers of weeds • Percentage of bare/disturbed ground • Natural recruitment • Habitat connectivity • Significant species	Annual

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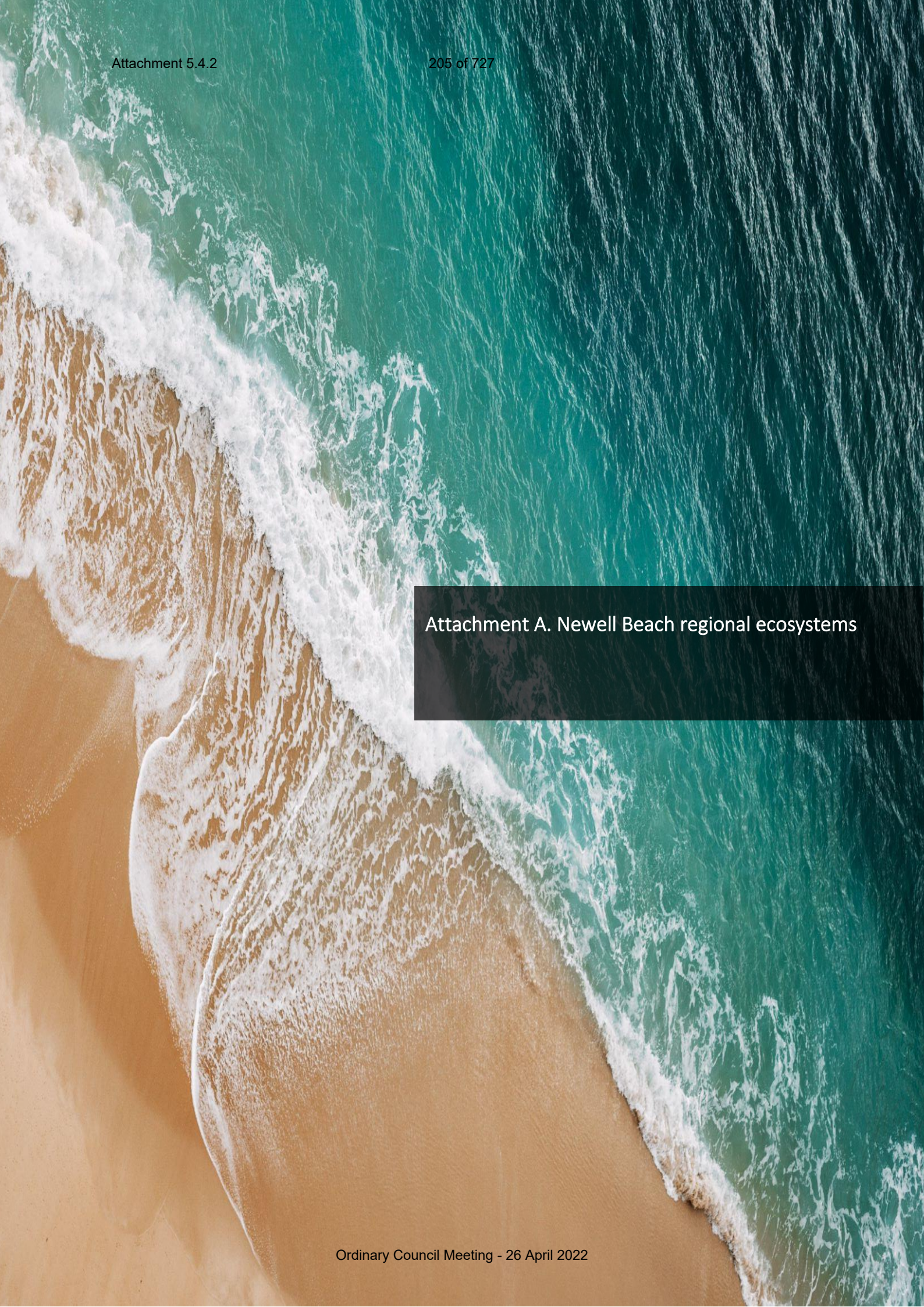
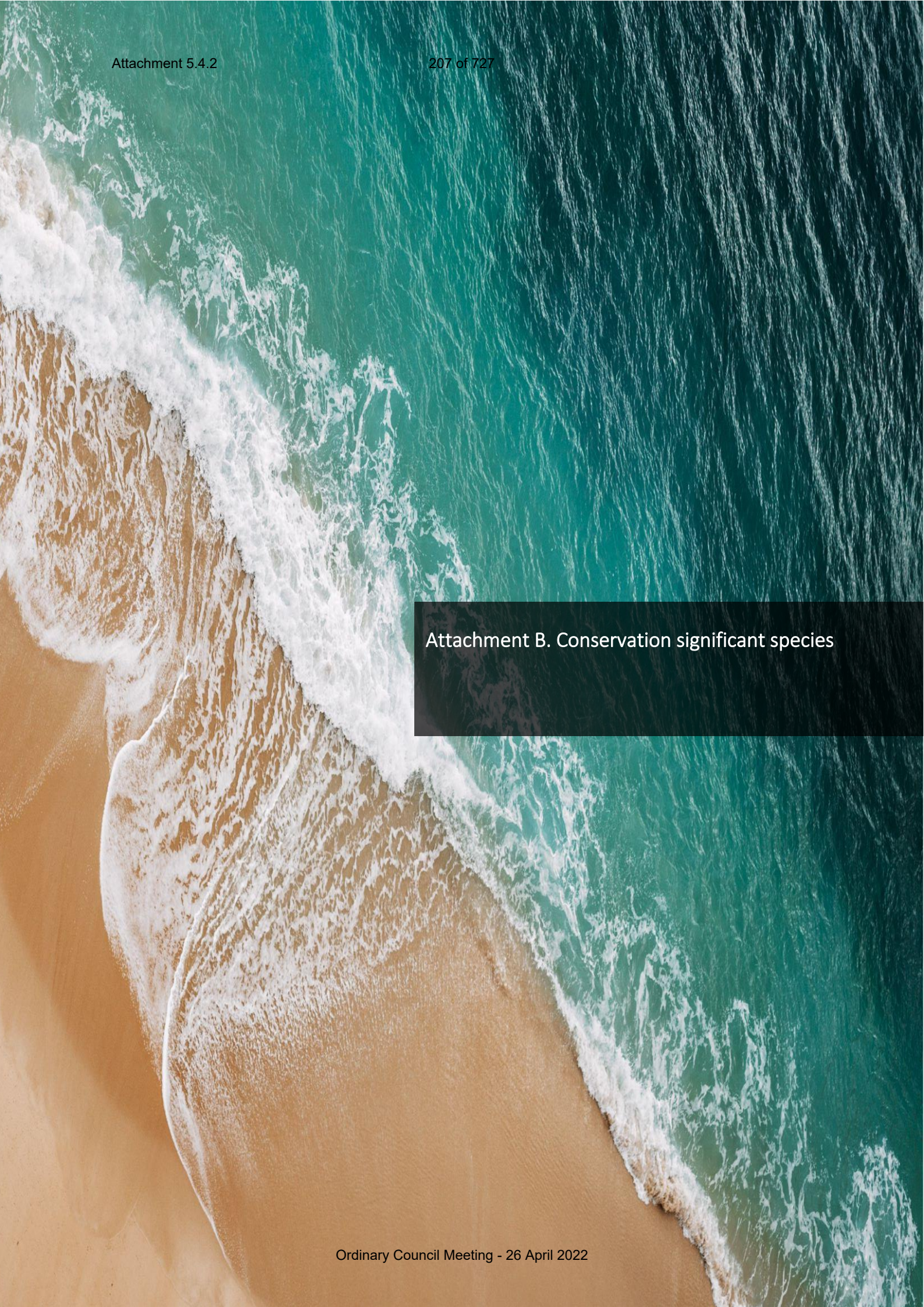


Attachment A. Newell Beach regional ecosystems

Table 8. Newell Beach regional ecosystems (REs)

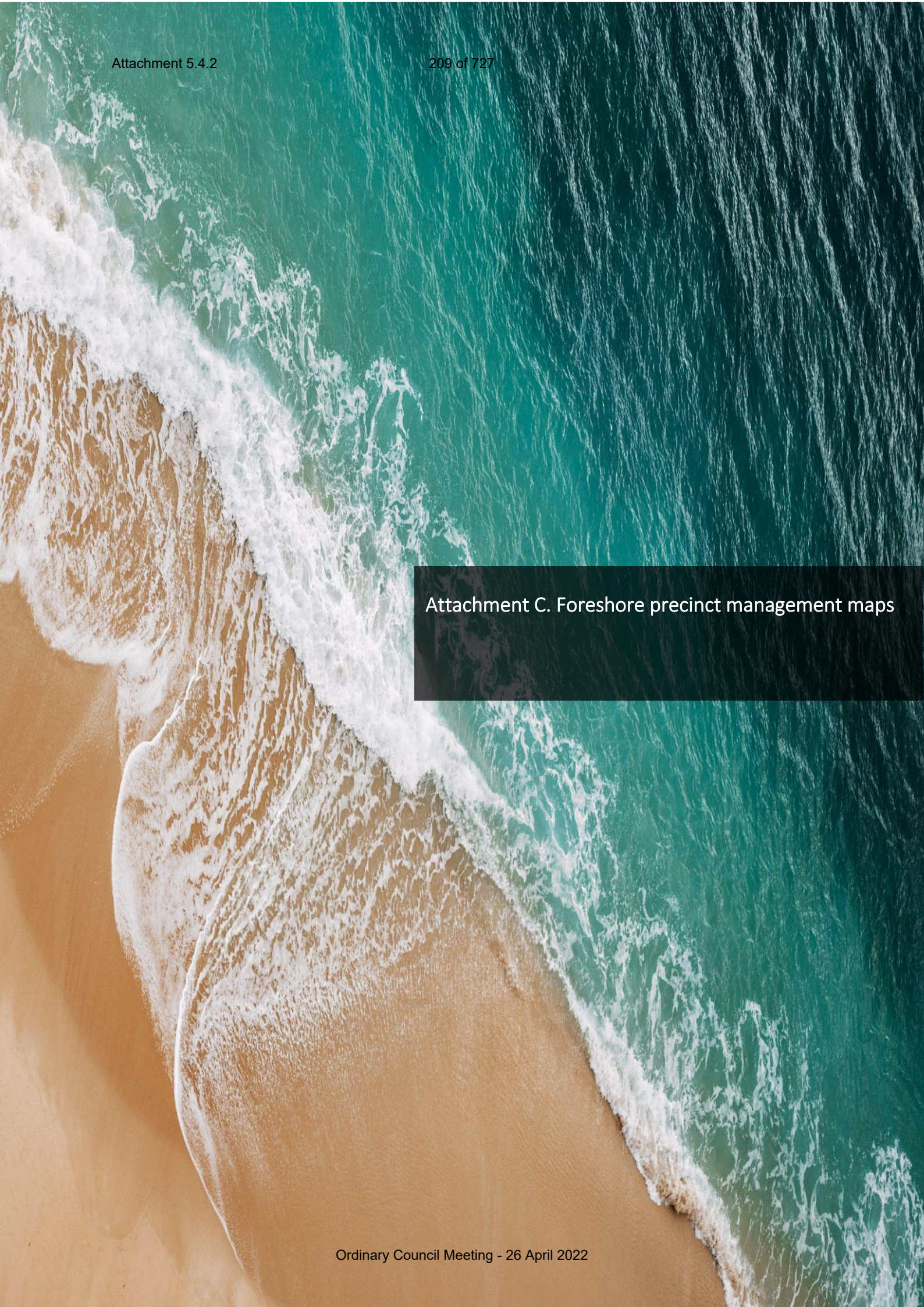
RE	Description	VM Class	BD Status
7.1.1	Mangrove closed scrub to open forest. Sheltered coastlines, estuaries, and deep swales between dunes, on fine anaerobic silts, inundated with saline water at high tide.	LC	NC
7.2.1	Mesophyll vine forest on beach ridges and sand plains of beach origin	E	E
7.2.3a	Corymbia *tessellaris*, *C. clarksoniana* (and/or *C. intermedia*), *Melaleuca dealbata* +/- *Lophostemon suaveolens* woodland to closed forest, with *Acacia mangium*, *A. crassicarpa*, *Canarium australianum* and *Deplanchea tetraphylla*. Unweathered low prograding beach dunes, predominantly of Holocene age.	OC	OC
7.2.7	*Casuarina equisetifolia* +/- *Corymbia tessellaris* open forest +/- groved vine forest shrublands on strand and foredunes	OC	E



Attachment B. Conservation significant species

Table 9. Conservation significant fauna at Newell Beach and likelihood of occurrence

Scientific name	Common name	EPBC Act	NC Act	Likelihood of occurrence
		Shorebirds		
Esacus magnirostris	Beach-stone curlew	—	V	Likely
Casuarius casuarius johnsonii	Southern cassowary	E	E	Possible
Calidris ferruginea	Curlew sandpiper	CE	CE	Likely
Numenius madagascariensis	Eastern curlew	CE	E	Likely
Charadrius mongolus	Lesser sand plover	E	E	Likely
Charadrius leschenaultii	Greater sand plover	V	V	Likely
Calidris canutus	Red knot	E	E	Likely
		Sea turtles		
Natator depressus	Flatback turtle	V	V	Likely
Chelonia mydas	Green turtle	V	V	Likely
Eretmochelys imbricata	Hawksbill turtle	V	E	Likely
Dermochelys coriacea	Leatherback turtle	E	E	Possible
Caretta caretta	Loggerhead turtle	E	E	Likely
Lepidochelys olivacea	Olive ridley turtle	E	E	Likely
		Other		
Hirundapus caudacutus	White-throated needletail	V	V	Likely
Cyclopsitta diophthalma macleayana	Macleay's fig-parrot	—	V	Likely
Crocodylus porosus	Estuarine crocodile	—	V	Likely



Attachment C. Foreshore precinct management maps

Figure 7. *Newell Beach foreshore precinct 1 management actions.*

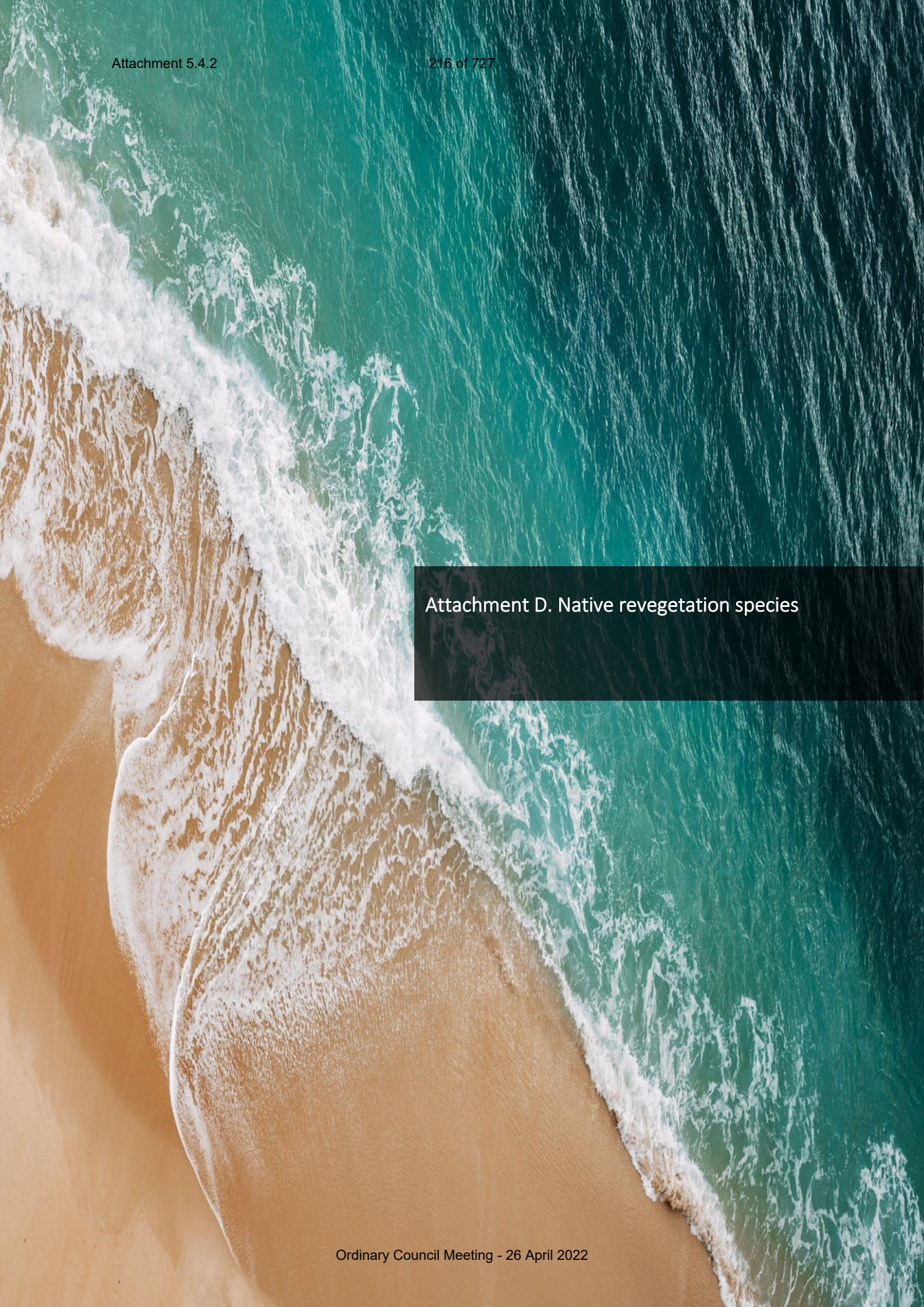
Figure 8. *Newell Beach foreshore precinct 2 management actions.*

Figure 9. *Newell Beach foreshore precinct 3 management actions.*

Figure 10. *Newell Beach foreshore precinct 4 management actions.*

Figure 11. *Newell Beach foreshore precinct 5 management actions.*

Figure 12. *Newell Beach foreshore precinct 6 management actions.*



Attachment D. Native revegetation species

Table 10. Native revegetation species (highlighted species are key components of remnant ecosystems) (Florentine, Pohlman and Westbrooke 2015)

Botanical name[1]	Common name	Precinct 1	Precinct 2	Precinct 3	Precinct 4	Precinct 5	Precinct 6
*Acacia crassicarpa**	Northern golden wattle		✔				
*Acacia mangium**	Broadleaf salwood		✔				
*Acacia oraria**	Coastal wattle		✔				
Aglaia elaeagnoidea	Coastal boodyarra		✔				
*Alphitonia petriei**	Sarsaparilla		✔				
Alyxia spicata	Chain fruit		✔				
Atractocarpus fitzalanii	Brown gardenia		✔				
Barringtonia asiatica	Mango bark, Mango pine		✔				
Barringtonia calyptrata	Mango pine		✔				
Beilschmiedia obtusifolia	Blush walnut		✔				
Blepharocarya involucrigera	Rose butternut		✔				
Brachychiton acerifolius	Illawarra flame tree		✔				
Breynia cernua	Fart bush		✔				
Calophyllum inophyllum	Beach calophyllum		✔				
Calophyllum sil	Blush touriga		✔				
Canarium vitiense	Canarium		✔				
Canavalia rosea	Beach bean		✔	✔	✔	✔	✔
Carallia brachiata	Corky bark, Fresh water mangrove		✔				

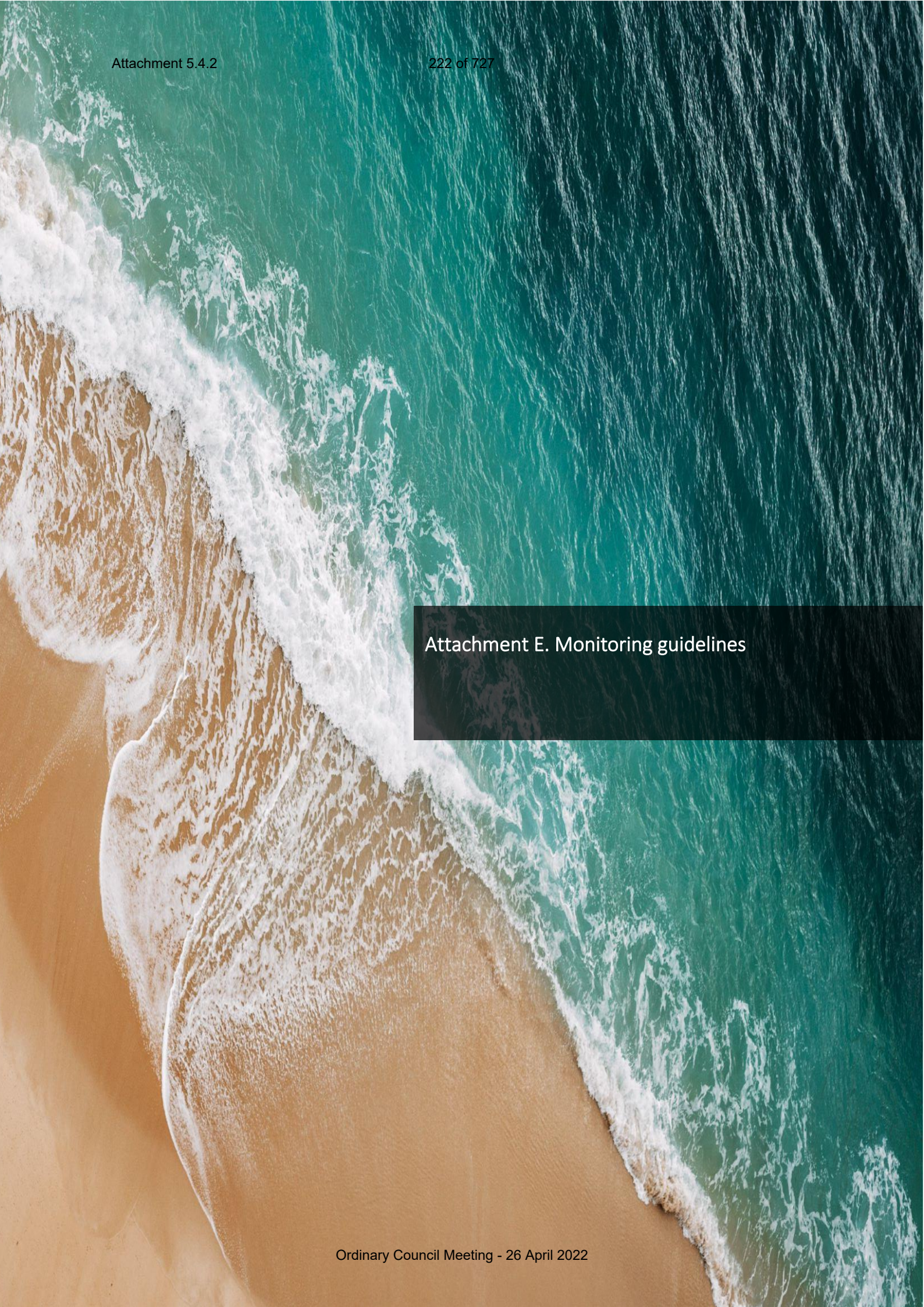
[1] * denotes pioneer species that will grow and establish quickly, allowing for natural recruitment or planting of secondary species.

Botanical name[1]	Common name	Precinct 1	Precinct 2	Precinct 3	Precinct 4	Precinct 5	Precinct 6
*Casuarina equisetifolia**	Beach casuarina		✔				
Cerbera manghas	Sea mango		✔				
Chionanthus ramiflora	Native olive		✔				
*Clerodendrum floribundum**	Lolly bush		✔				
Clerodendrum inerme	Scrambling clerodendrum		✔				
*Clerodendrum longiflorum**	Long flowered clerodendrum		✔				
*Colubrina asiatica**	Beach berry bush		✔				
*Cordia subcordata**	Sea trumpet		✔				
Crinum pedunculatum	Beach lily, Swamp lily		✔				
Cupaniopsis anacardioides	Beach Tamarind		✔				
Cyperus pedunculatum			✔	✔	✔	✔	✔
Deplanchea tetraphylla	Golden bouquet tree		✔				
Dillenia alata	Red beech		✔				
Diospyros compacta	Australian ebony		✔				
*Dodonea viscosa**	Hop bush		✔				
Elaeodendron melanocarpum	False olive		✔				
Eucalyptus plattyphylla	Ghost gum		✔				
*Euroschinus falcata**	Pink poplar		✔				
Ficus benjamina	Weeping fig		✔				

Botanical name[1]	Common name	Precinct 1	Precinct 2	Precinct 3	Precinct 4	Precinct 5	Precinct 6
Ficus drupacea	Drupe fig		✔				
Ficus microcarpa	Small fruited fig		✔				
Ficus opposita	Sandpaper fig		✔				
Ficus racemosa	Cluster fig		✔				
*Ganophyllum falcatum**	Daintree hickory		✔				
Glochidion harveyanum	Harvey's buttonwood		✔				
Glochidion philippicum	Daintree cheese tree		✔				
Gmelina dalrympleana	White beech		✔				
Gomphandra australiana	Buff beech		✔				
*Guioa acutifolia**	Glossy tamarind		✔				
Haemodorum coccineum	Blood root		✔	✔	✔	✔	✔
*Hibiscus tiliaceus**	Coast cottonwood		✔				
Intsia bijuga	Kwila		✔				
*Ipomoea pes-caprae**	Coastal morning glory		✔	✔	✔	✔	✔
Jagera pseudorhus	Foambark		✔				
Livistona muelleri	Northern Cabbage Tree Palm		✔				
Lophostemon suaveolens	Swamp mahogany, swamp box		✔				
*Macaranga tanarius**	Kamala, Blush macaranga		✔				
Mallotus philippensis	Red Kamala		✔				

Botanical name[1]	Common name	Precinct 1	Precinct 2	Precinct 3	Precinct 4	Precinct 5	Precinct 6
Maytenus fasciculiflora	Orangebark		✔				
Melaleuca leucadendra	Weeping paperbark		✔				
Melaeuca viridiflora	Broad leaved paperbark		✔				
Melia azederach	White cedar		✔				
Micromelum minutum	Lime berry		✔				
Miliusa brahei	Rasberry jelly plant		✔				
*Millettia pinnata**	Pongamia tree		✔				
Mimusops elengi	Red coondoo		✔				
Mischocarpus exangulatus	Red bell mischocarp		✔				
Morinda citrifolia	Rotten cheesefruit		✔				
Pandanus tectorius	Beach pandan		✔				
*Pittosporum ferrugineum**	Rusty pittosporum		✔				
Planchonia careya	Cocky apple		✔				
Pleiogynium timorense	Burdekin plum		✔				
*Polyscias elegans**	Celerywood		✔				
Pouteria chartacea	Thin leaved coondoo		✔				
Pouteria obovata	Yellow boxwood		✔				
*Premna serratifolia**	Coastal premna		✔				
Ptychosperma elegans	Solitaire palm		✔				
Rhus taitensis	Sumac		✔				

Botanical name[1]	Common name	Precinct 1	Precinct 2	Precinct 3	Precinct 4	Precinct 5	Precinct 6
*Scaevola taccada**	Beach lettuce		✔	✔	✔	✔	✔
Schefflera actinophylla	Umbrella tree		✔				
Scolopia braunii	Brown birch		✔				
Sporobolus virginicus	Salt couch		✔	✔	✔	✔	✔
Sterculia quadrifida	Peanut tree		✔				
Syzygium angophoroides	Yarrabah satinash		✔				
Syzygium hemilamprum (Syn. Acmena hemilampra)	Blush satinash		✔				
Tarenna dallachiana	Tree ixora		✔				
Terminalia arenicola	Brown damson		✔				
*Terminalia catappa**	Indian almond		✔				
Terminalia microcarpa	Damson plum		✔				
Terminalia muelleri	Mueller's damson		✔				
*Thespesia populneoides**	Tulip tree		✔				
Thurea involuta	Tropical beachgrass		✔	✔	✔	✔	✔
Timonius timon	False fig		✔				
Vitex rotundifolia	Beach vitex		✔				
*Vigna marina**	Beach pea		✔	✔	✔	✔	✔



Attachment E. Monitoring guidelines

Rapid Vegetation Assessment Method Data collection

General survey information	Survey ID	Description of survey					
	Assessor Name/s	Descriptive text					
	Date of record	Date					
	Assessment number	Assessment	1	2	3	4	5
Specific location	General Location	Descriptive text					
	Easting	GPS spatial data					
	Northing	GPS spatial data					
	Spatial uncertainty	GPS spatial data					
Desired cover by year 5							
	Present	1 (1-5)	2 (6-25)	3 (26-50)	4 (51-75)	5 (76-100)	Absent
Under							
Mid							
Over							
Current overall cover							
	Present	1 (1-5)	2 (6-25)	3 (26-50)	4 (51-75)	5 (76-100)	Absent
Under							
Mid							
Over							
Percentage survival of each layer							
	Present	1 (1-5)	2 (6-25)	3 (26-50)	4 (51-75)	5 (76-100)	Absent
Under							
Mid							
Over							
Species specific observations							
	% Understorey		% Mid-storey		% Overstorey		%
Sp. 1							
Sp. 2							
Sp. 3							
Sp. 4							

Sp. 5							
Environmental weeds cover							
	Present	1 (1-5)	2 (6-25)	3 (26-50)	4 (51-75)	5 (76-100)	Absent
Under							
Mid							
Over							
High threat environmental weeds							
	% Understorey		% Mid-storey		% Overstorey		%
Sp. 1							
Sp. 2							
Sp. 3							
Sp. 4							
Sp. 5							
Bare ground created by disturbance							
	Present	1 (1-5)	2 (6-25)	3 (26-50)	4 (51-75)	5 (76-100)	Absent
Vehicles							
People							
Erosion							
Other							
Natural recruitment							
	Absent		Present		%		
Under							
Mid							
Over							
Connectivity							
	Patch size (ha)		Distance (km)		Connection		
Patch 1					H	M	L
Patch 2					H	M	L
Patch 3					H	M	L
Significant species identified							
	Location	Population size	Threat		Proposed response		

Sp. 1				
Sp. 2				
Sp. 3				

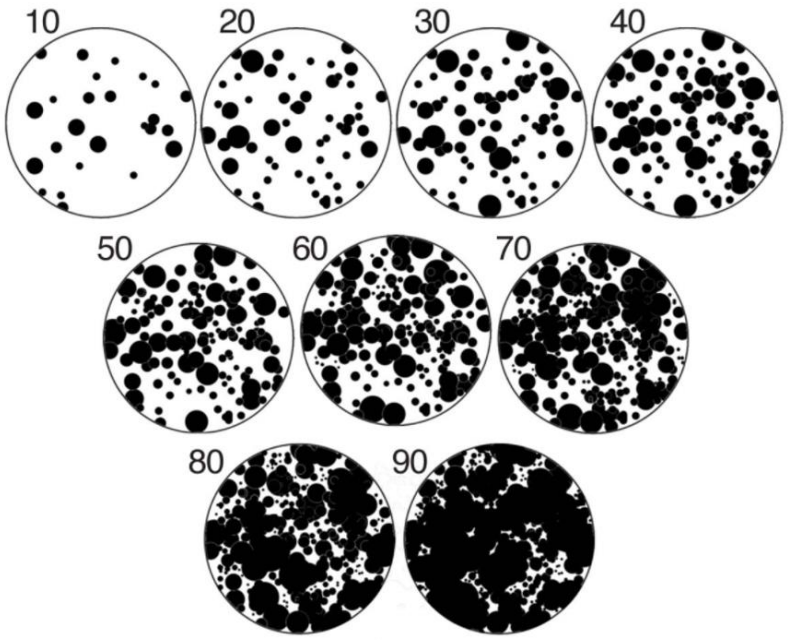


Figure 13. *Schematic representation of percentage cover categories.*

Queensland Marine Turtle Field Guide

Nest to Ocean Turtle Protection Program

Australian Government

Queensland Government


APN

Queensland's coast has some of the most important marine turtle nesting sites in the world. Six species of threatened marine turtles nest along our idyllic beaches. These rookeries support significant nesting populations of green, loggerhead, hawksbill, flatback and olive ridley turtles.

One of the most serious threats to nesting turtle populations is the destruction of their eggs and hatchlings by predators. Feral pigs have been found to be responsible for destroying over 70 per cent of turtle nests at nesting beaches on Cape York, continued loss at this rate is not sustainable. Other predators include foxes, dogs, dingoes and goannas.

To reduce predation on marine turtle nests and help the recovery of threatened marine turtle populations, the Australian and Queensland Governments have together invested nearly $7million in the Nest to Ocean Turtle Protection Program. The program supports predator control and turtle monitoring at priority nesting beaches. It also assists Traditional Owner and community groups to increase their participation in these important activities.

This field guide has been developed as part of the Nest to Ocean Turtle Protection Program. Correctly identifying marine turtles, and the animals that prey on their nests, provides valuable information about turtle populations and shows where predator control activities are most needed.

Nest to Ocean
Turtle Protection Program

Front Cover: Turtle Hatchlings © Kyburgh
Inside Cover: Steven Marpoondin (APN Cape York) © *Brian Ross*

Contents

Indo-Pacific Marine Turtles

Carapace with:
- No continuous ridges
- Large scales
- Claws on flippers

Carapace with:
- 5 distinct continuous ridges
- No large scales
- No claws on flippers

Leatherback Turtle
Dermochelys coriacea

4 pair costal scales

5 pair (rarely 6) costal scales

Carapace longer than wider
Red-brown to brown
No pores in scale of bridge

Loggerhead Turtle
Caretta caretta

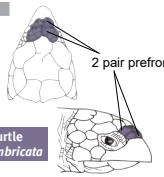
6 pair or more costal scales

Carapace more circular
Grey-green
Pores in scale of bridge

Olive Ridley Turtle
Lepidochelys olivacea

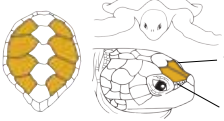
2 pair prefrontal scales
Thick overlapping carapace scales

2 pair prefrontal scales



Hawksbill Turtle
Eretmochelys imbricata

1 pair prefrontal scales
No thick overlapping carapace scales

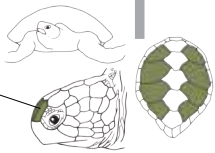


1 pair prefrontal scales

Preocular scales

Low domed carapace with upturned edges
Preocular scales
Olive grey

Flatback Turtle
Natator depressus



High domed carapace
No preocular scales
Light to dark green with dark mottling

Green Turtle
Chelonia mydas

Photographs of Adults and Hatchlings

Green Turtle *Chelonia mydas* Page 10

Olive Ridley Turtle *Lepidochelys olivacea* Page 14

Hawksbill Turtle *Eretmochelys imbricata* Page 18

Marine Turtle Track Identification Key

Alternating Stroke

Flipper marks alternate

Track Features

Early morning monitoring is best as tracks will deteriorate over time. The clarity of tracks can be affected by flipper damage, terrain, sand moisture, tides, wind and weather. Look for several key identifying features, along different sections of track.

The key track identification features are:

- Stroke Style
- Track Width
- Hind Flipper Marks
- Front Flipper Marks
- Plastron Drag
- Tail Drag

Loggerhead

Track Width
Less than 1 meter

Hind Flipper

Front Flipper

Plastron Drag

Tail Drag
Not present

Hawksbill

Track Width
Approx. 70-80 cm

Hind Flipper

Front Flipper

Plastron Drag

Tail Drag

Olive Ridley

Track Width
Approx. 70-80 cm

Hind Flipper

Front Flipper

Plastron Drag

Tail Drag

Breast Stroke

Flipper marks side by side

Green

Track Width
Approx. 94-144 cm

Hind Flipper

Front Flipper

Plastron Drag

Tail Drag

Flatback

Track Width
Approx. 90-100 cm

Hind Flipper

Front Flipper

Plastron Drag

Tail Drag

Leatherback

Track Width
Greater than 2 meters

Hind Flipper

Front Flipper

Plastron Drag
Not Visible

Tail Drag

Track Direction

Clues to determine track direction:

Turtles push sand backwards, the higher sand mound is at the back.

If track overlaps, the top track is the returning track.

Sand is always thrown back over the emerging track when digging.

Measuring Width

Measure from outer edge of track. This may be the front or rear flipper, depending on species.

Guidelines on how to **Record** data and implement **Action** during a basic beach survey (see page 9). These may be tailored to suit individual monitoring programs and implemented in accordance with training.

Record

Species Identification: Use track or sighting to identify species.

GPS Nest Location: Note GPS coordinates & waypoint number.

False Crawl: Track with no nest.

Extent of Damage: Partial or complete destruction of nest.

Evidence of Predation: Diggings, tracks, sighting.

Predator Identification: Use track or sighting to identify species.

Hatchlings Emerged: Yes, hatchling tracks or sighting.

Tag Information: Note tag ID number and its location on turtle.

Curved carapace length (CCL): From front (where skin and carapace meet), down midline to back edge of carapace (over tail).

Action

Photograph: To verify species and/or nest damage/predation.

Mark Nest: Install marker to indicate nest location (if required).

Bury Eggshells and Mark Track: To avoid record duplication; mark track line above the high tide mark.

Submit Data: Project manager to submit data to the relevant Queensland Department.

Basic Beach Survey

Traverse beach to locate fresh turtle tracks.
Walk along the high tide line or drive on the wet sand just below the high tide mark

Equipment Checklist

- GPS (Use datum WGS 84 and decimal degrees)
- Data sheets or charged data recording device
- Pencil
- Tape measure
- Camera
- Personal safety gear
- Torch (night monitoring)
- Spare batteries
- Monitoring field guide

Record fresh tracks only

Adult Track No nesting turtle

Identify Species

refer to **Track Identification** (Pages 6-7)

Is there a nest or is it a false crawl?

Nest

Record / Action
- Species ID
- GPS Nest Location
- Mark Nest

Is nest damaged?

No

Yes

Record / Action
- Extent of Damage
- Evidence of Predation
- Predator ID (refer to pages 22-25)
- Photograph
- Bury Eggshells

False Crawl

Record / Action
- Species ID
- False Crawl

Unsure

Record / Action
- Species ID
- GPS Nest Location
- Mark Nest
- Photograph

Adult Track Nesting turtle

Identify Species

refer to **Species Identification** (Pages 3-5, 10-21)

Once female has settled into laying or has completed nesting

Record / Action
- Species ID
- Tag Information
- Curved carapace length
- GPS Nest Location
- Mark Nest

Hatchling Tracks Hatchlings

Identify Species

if hatchling present refer to **Species Identification** (Pages 3-5, 10-21)

Record / Action
- Species ID
- Hatchlings Emerged
- Marked Nest ID or GPS Nest Location
- Evidence of Predation
- Predator ID (refer to pages 22-25)

Refer to Page 8 for Record / Action monitoring protocols

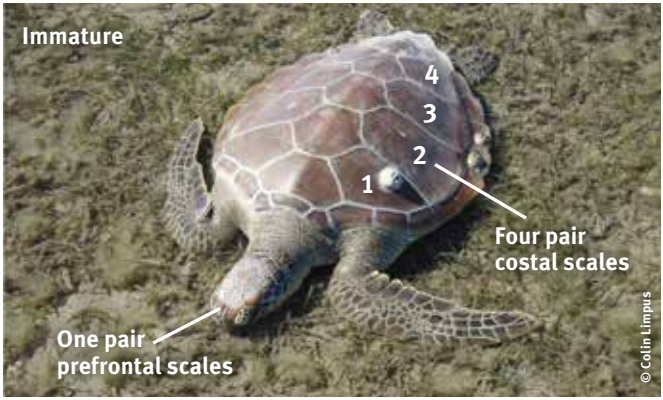
Mark monitored track with a line, above high tide mark, so it's not recorded twice

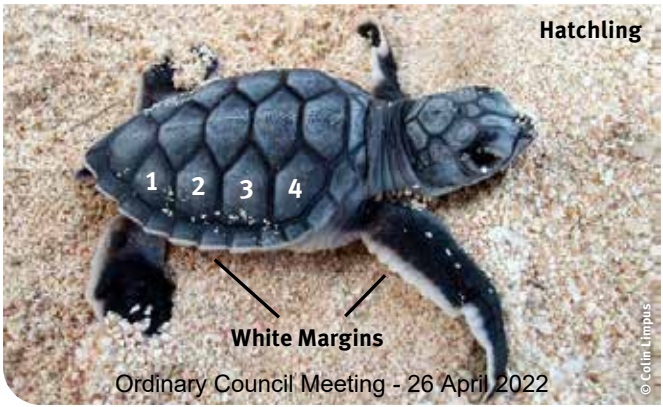
Continue and complete survey

Submit data forms and photographs for verification to project manager

Green Turtle, *Chelonia mydas*

Status: Nationally Vulnerable, Queensland Vulnerable





Key Identification Features

Breast Stroke Track

Carapace Scales

4 Pair Costal Scales

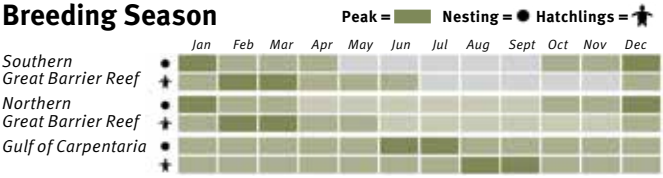
1 Pair Prefrontal Scales

Qld Nesting Sites

Adult: *Carapace is a high dome. Colour is light to dark green with dark mottling. Plastron colour is cream-white.*

Hatchling: *Black-dark brown with white margins, white plastron.*

Breeding Season



Loggerhead Turtle, *Caretta caretta*

Status: Nationally Endangered, Queensland Endangered

Key Identification Features

Alternating Track

Carapace Scales

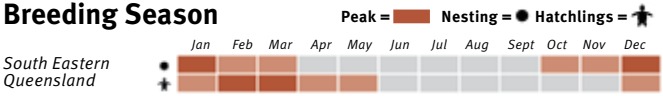
5 Pair Costal Scales

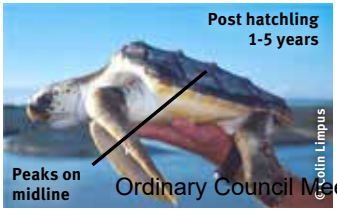
Qld Nesting Sites

Adult: *Carapace is longer than wider. Colour is red-brown to brown. Plastron colour is yellow.*

Hatchling: *Dark brown with 5 costal scales and dark plastron with 3-4 inframarginal scales.*

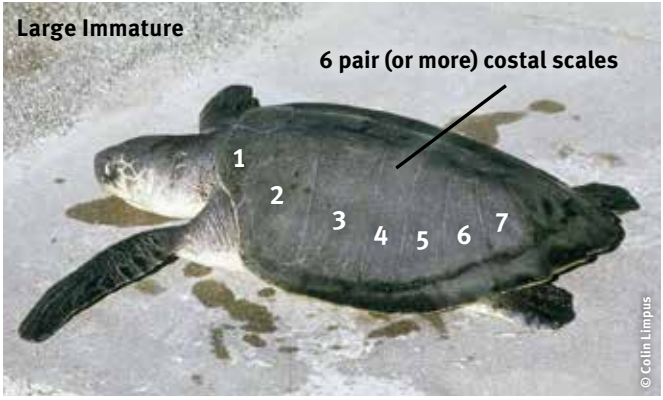
Breeding Season





Olive Ridley Turtle, *Lepidochelys olivacea*

Status: Nationally Endangered, Queensland Endangered



Key Identification Features

Alternating Track

Carapace Scales

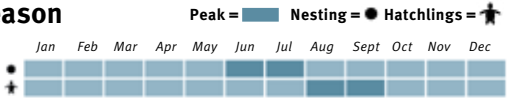
6 Pair (or more) Costal Scales

Qld Nesting Sites

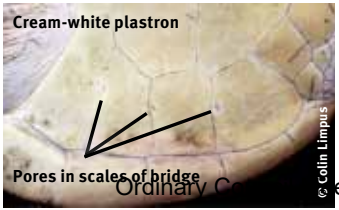
Adult: *Carapace is circular. Colour is grey-green with no conspicuous markings. Plastron colour is cream-white.*

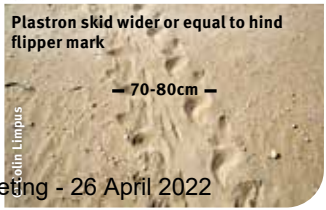
Hatchling*: Charcoal-grey/black-brown on both sides.*

Breeding Season



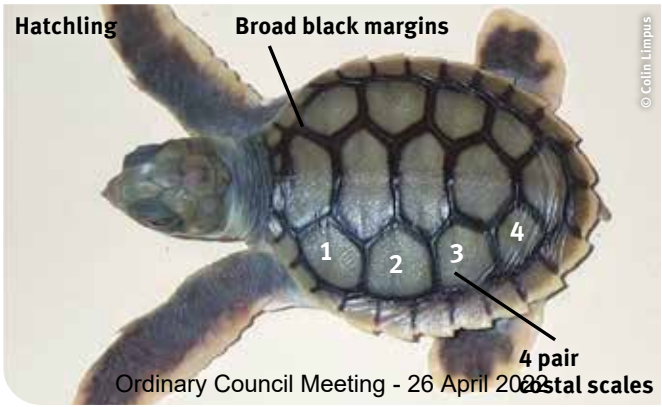
All year, peaks during dry season.





Flatback Turtle, *Natator depressus*

Status: Nationally Vulnerable, Queensland Vulnerable



Key Identification Features

Breast Stroke Track

Carapace Scales

4 Pair Costal Scales

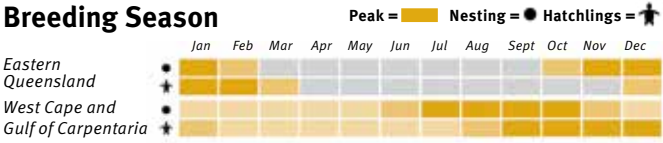
1 Pair Prefrontal Scales

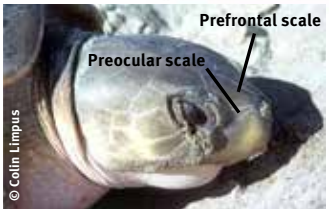
Qld Nesting Sites

Adult: *Carapace is a low dome, smooth with upturned edges. Colour is grey to pale-grey or olive. Preocular scales. Plastron is creamy-yellow.*

Hatchling: *Olive-green, scales with broad black margin. Plastron is a solid white.*

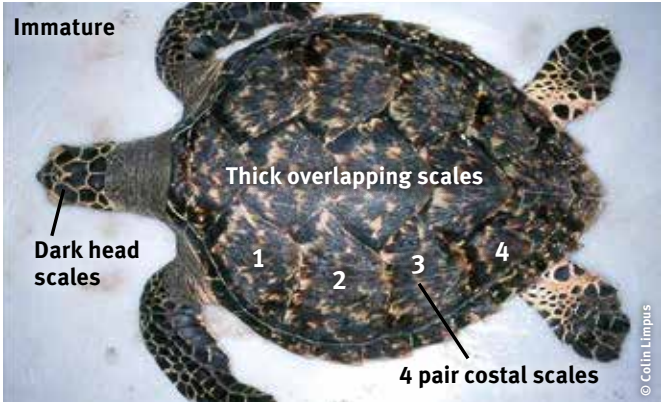
Breeding Season





Hawksbill Turtle, *Eretmochelys imbricata*

Status: Nationally Vulnerable, Queensland Vulnerable



Key Identifcation Features

Alternating Track

Scales Thick Overlapping

4 Pair Costal Scales

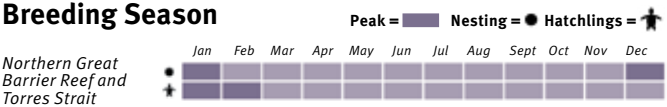
2 Pair Prefrontal Scales

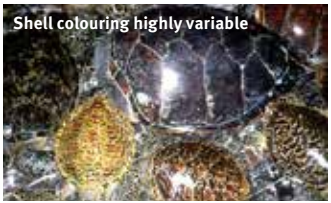
Qld Nesting Sites

Adult: *Carapace has thick overlapping scales. Colour is olive green or brown and is extensively variegated with brown/black markings. Adult plastron is yellow or white with black spots.*

Hatchlings: *Dark brown.*

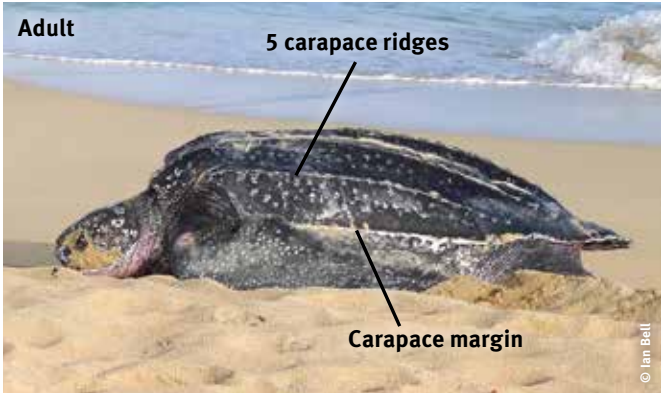
Breeding Season

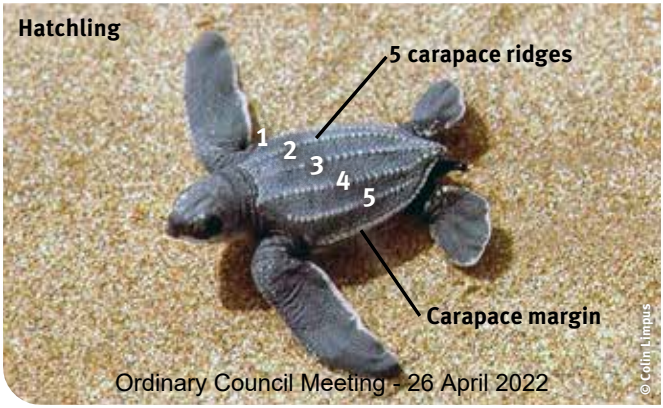




Leatherback Turtle, *Dermochelys coriacea*

Status: Nationally Vulnerable, Queensland Endangered





Key Identification Features

Breast Stroke Track

No Carapace Scales

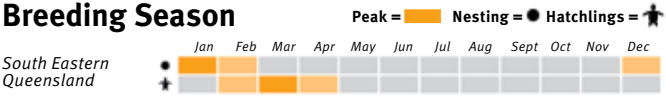
5 Carapace Ridges

Qld Nesting Sites

Adult: *Carapace is long and pointed. Long ridges run down the length of carapace. Colour is a uniform black-brown. Soft leathery skin.*

Hatchlings: *Finely beaded, black with white markings on the carapace ridges and plastron.*

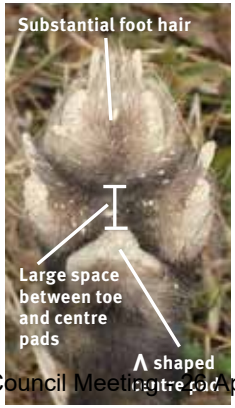
Breeding Season



Fox

Track Identification Features

- Front foot is larger than back foot.
- Elongated oval shaped claws, may not show on track.
- Substantial foot hair, sometimes visible on track impression.
- Large space between centre pad and toe pads.
- Centre pad has a distinct inverted V shape.
- Tracks are straight, hind feet reusing front feet impressions.
- Small track width.



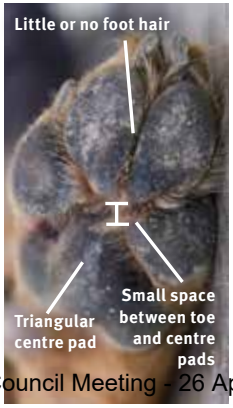
Management Options

- Den detection and fumigation
- Ground shooting
- Trapping
- Baiting
- Exclusion fencing
- Nest protection (cages)

Wild Dog or Dingo

Track Identification Features

- Front foot is larger than back foot.
- Little or no foot hair in between pads.
- Small space between centre pad and toe pads.
- Centre pad almost triangular.
- Foot imprint rounded.
- Tracks are straight but not as neat and aligned as a fox's track.



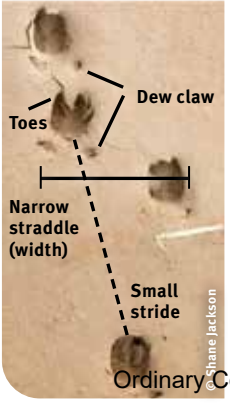
Management Options

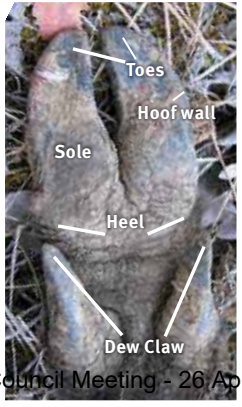
- Ground shooting
- Leg hold trapping
- Baiting (1080 or strychnine)
- Exclusion fencing
- Nest protection (cages)

Feral Pig

Track Identification Features

- Back feet slightly larger than front.
- Foot print consists of a two toe hoof and two dew claws.
- Dew claws distinctive identification feature but may not be present in harder soils.
- Small stride and narrow straddle.





Management Options

- Ground/aerial shooting
- Trapping
- Baiting
- Exclusion fencing
- Nest protection (cages)

Goanna

Track Identification Features

- Both walk and run tracks have alternating foot prints.
- Trail drag usually visable.

Nest Predation Identification

- Goannas burrow into nest at an angle from the side of the nest, not vertical from directly above.
- The burrow is typically domed shape, not circular.

Management Options

- Trapping
- Exclusion fencing
- Nest protection (cages)

Principles of Pest Management

Managing pest animals requires long-term control programs and a variety of approaches. Effective programs are designed around these eight principles:

1. INTEGRATION

Ensuring pest management programs are an integral part of the management of natural areas.

2. PUBLIC AWARENESS

Raising public awareness and knowledge of pests to increase community and individual participation in pest management.

3. COMMITMENT

Gaining a commitment to long term programs by the community, industry groups and government entities.

4. CONSULTATION AND PARTNERSHIP

Establishing partnerships between local communities, industry groups, state government agencies and local governments to achieve a collaborative approach.

5. PLANNING

Consistent planning at local, regional, state and national levels ensures combined resources target the agreed priorities.

6. PREVENTION

Preventing the spread of pests, and using early detection and intervention to control pests.

7. BEST PRACTICE

Using ecologically and socially responsible pest management practices to protect the environment and natural resources.

8. IMPROVEMENT

Research and regular monitoring and evaluating of programs helps improve and refine pest management practices.

Threats to Marine Turtles

Marine turtles are long-lived and slow to mature. Depending on the species they can take anywhere between 8–50 years to reach breeding age. Due to the range of threats, at their different life stages, it is thought that only 1 in 1000 hatchlings will survive to adulthood and then return to the beach to nest. For this reason it is critical to address the range of threats throughout their lifecycle.

Threats include:

- Native and introduced animals predating turtle eggs and hatchlings.
- Vehicles compacting turtle nests or forming tyre ruts that trap hatchlings.
- Humans taking turtle eggs.
- Bycatch of marine turtles in fisheries.
- Marine debris.
- Impact to breeding habitat from coastal development and artificial lighting.
- Deteriorating water quality.
- Unknown and possibly unsustainable levels of turtle harvesting, in and outside Australian waters.

What you can do:

- Support the management of predators such as pigs, dogs and foxes around turtle nesting beaches.
- Report turtle nests and predated turtle nests to your local ranger.
- Keep your dogs on a lead when walking on the beach during nesting/hatchling season.
- Drive slowly on beaches and avoid driving over nests. Drive on the wet sand below the high tide mark to avoid making wheel ruts.
- Pick up marine debris from the beach and waterways.
- Report ghost nets to your local ranger.
- At night, minimise lights on the beach, including campfires.
- Support sustainable, traditional use of turtle and turtle eggs.

Acknowledgements

The Queensland Parks and Wildlife Service Nest to Ocean Turtle Protection Program Team would like to acknowledge the contribution of staff from the following organisations in the development of the field guide: Western Cape Turtle Threat Abatement Alliance supported by Cape York Natural Resource Management, Balkanu Cape York Development Corporation, Aak Puul Ngantam, Feralfix, World Wildlife Fund for Nature, and University of Queensland. Also acknowledged is the input and advice of staff from our partnering Australian and Queensland Government departments.

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Prepared by:
Queensland Parks and Wildlife Service,
Department of Environment and Science.

Cooya Beach

FORESHORE MANAGEMENT PLAN

July 2021

DOUGLAS SHIRE COUNCIL

The Eastern Kuku Yalanji and Yirrganydji Peoples are the Traditional Custodians and Owners of the land and sea country that encompass the Douglas Shire region.

Douglas Shire Council acknowledges the 'Bama', the traditional rainforest Aboriginal coastal people of our region who hold the unique position of being the First Peoples of this country. We recognise and respect Bama cultural heritage, values, beliefs and continuing relationships and responsibility to their land and sea country. We honour and respect your Elders past, present and future.

We commit to maintaining and strengthening our partnerships and respectful relationships with Bama in the spirit of reconciliation so that together we can increase the opportunities for successful and positive outcomes to the advantage of everyone in our communities.

Council respectfully acknowledges other Aboriginal and Torres Strait Islander people who call our region 'home'.

This report has been prepared by Alluvium Consulting Australia Pty Ltd and Wild Environmental for Douglas Shire Council under the contract titled 'WO5429 Foreshore Management Plan'.

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Cover image:	Cooya Beach foreshore.

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Tables

1 Introduction

The coastline is an important place for many Australians, providing significant social and cultural value. This is especially so for many residents of the Douglas Shire who have identified these unique coastal landscapes and natural ecosystems among some of the most important factors attracting people to this coastline (DSC 2019a). The Douglas Shire coastline also has high tourism value, attracting many visitors to the area.

The Eastern Kuku-Yalanji and Yirriganydji Peoples are the Traditional Custodians of the Land and Sea Country within the Douglas Shire. They have lived in and cared for this region for thousands of years, represented in important cultural sites throughout the Shire, and the memories and experiences of its people; past, present and future.

Douglas Shire Council (DSC) has an extensive 111 km long coastline extending from Degarra in the north to south of Wangetti. The Shire is well known for its diverse coastline and its proximity to the Great Barrier Reef. Much of the Shire is within the Wet Tropics World Heritage Area and its dynamic coast consists of a variety of sandy beaches, rocky headlands and coastal rainforests.

The region's beaches and foreshore areas are important both to people and to the ecosystems around them. Coastal landscapes provide essential habitat for life on the foreshore and provide visual and recreational amenity to the people. Healthy coastal ecosystems are necessary to promote the resilience of plant and animal communities to coastal hazard impacts. Denser vegetation types are also effective in reducing the destructive forces of a storm tide for communities and infrastructure landward of the foreshore.

However, these ecosystems are experiencing ongoing disturbance as a result of erosion, vehicle and pedestrian access, weeds and pest species, illegal dumping, and runoff from stormwater and agricultural land. These factors threatening dune stability and reducing the erosion buffer often result in vegetation loss, impacts to native fauna species, and changes in ecosystem structure.

To help manage and protect these important coastal zones, DSC has developed five Foreshore Management Plans (FMPs) for the Wonga, Newell, Cooya, Four Mile and Oak Beaches.

1.1 Purpose

In 2019, DSC developed the Resilient Coast Strategic Plan 2019-2029 (referred to henceforth as the Strategy) and has committed to undertake actions to reduce the impacts of coastal hazards, such as erosion and coastal flooding, and activities in the coastal zone. A priority outcome of the Strategy is to undertake dune protection, maintenance and monitoring. This encompasses the foreshore area and is the focus of the FMPs.

The FMPs will help to guide Council in the protection, maintenance and management of the coastline and foreshore, while maintaining the natural character of the area and respecting ecological, cultural and social values of these coastal reserves. Funding has been secured through the Queensland Government Reef Assist Program which will be used to support some of the implementation of the management actions outlined in the FMP.

The plans will:

- Ensure there is a **shared understanding** of the social, cultural, environmental and economic values and uses of the foreshore zone
- Identify options for the **proactive management** of vulnerable areas of the foreshore zone over the next 5 years
- Help **improve and maintain** the vegetation cover and condition in the foreshore zone.

1.2 Foreshore Management Plan area

Cooya Beach is a coastal community located along an embayment between Rocky Point and Port Douglas that is part of a larger beach ridge system that is vegetated along this section of beach (Figure 1) (DSC 2019b). Ridges and swales are evident in the backshore environment. The beach is located south of the Mossman River estuary and is the last section of sandy beach that transitions to an extensive estuarine mangrove system south towards the headland at Port Douglas. The intertidal zone is up to 500 m wide in some places.

Cooya Beach settlement comprises of over 200 dwellings and is located on the coast, east of Mossman. The most recent census data from 2016 indicates there are approximately 546 residents in Cooya Beach (ABS 2017). However, it is likely that there has been an increase in the population since this census. Cooya Beach is largely a residential area, with a neighbourhood centre and childcare centre. There does not appear to be any tourism infrastructure at Cooya Beach. Residents of Mossman frequently visit the coastal settlements, including Cooya Beach due to its close proximity.

Figure 1. *Cooya Beach foreshore management area.*

1.3 Implementation

This FMP has been developed following a series of site inspections, including vegetation mapping, species identification and coastal morphology assessments, as well as public engagement with residents and ratepayers from Cooya Beach and the greater Douglas Shire. The site inspections, survey results and feedback from public engagement sessions have informed the management actions and planning decisions for the Cooya Beach foreshore area. The management actions have been tailored to incorporate what the community values about their foreshore and how the foreshore is used.

The Cooya FMP outlines actions for dune protection, including weed species for removal, native vegetation species for regeneration, and pedestrian and vehicle access management. It also provides a schedule for implementation to allow Council to prioritise actions for the area. This FMP remains non-statutory but once approved by Council provides an informed and proactive guide for the future management of Cooya Beach over a five-year timeframe.

2 Study area and planning context

Cooya Beach is a coastal community located along a sandy embayment between Rocky Point and Port Douglas. The coastline of Cooya Beach is bordered by the Great Barrier Reef Marine Park. There are a variety of land zoning uses and ecological communities at Cooya Beach. The following section outlines relevant information for the study area, including DSC land zoning and vegetation and faunal communities identified in literature review and validated during site visits and surveys.

2.1 Legislative, policy and strategy setting

Coastal management is guided by Commonwealth, State and local legislation. The legislation results in a complex structure of rights and responsibilities. Key legislation, plans, policies and strategies relevant to foreshore management are summarised in Table 1.

Table 1. Summary of the legislation, policy, plans and strategies relevant to foreshore management

Legislation	Relevance

Biosecurity Act 2014	• This Act provides a comprehensive biosecurity framework to manage the impacts of animal and plant diseases and pests.
	• The purpose of this Act is to:
	  ○ Provide a framework for an effective biosecurity system for Queensland.
	  ○ Ensure the safety and quality of animal feed, fertilisers and other agricultural inputs.
	  ○ Help align responses to biosecurity risks in the State with national and international obligations and requirements.
	• The purpose of the Act is also to manage risks associated with emerging, endemic and exotic pests and diseases.

Coastal Protection and Management Act 1995	• This Act aims to provide for the protection, conservation, rehabilitation and management of the coastal zone, including its resources and biological diversity. • This Act considers the goal, core objectives and guiding principles of the National Strategy for Ecologically Sustainable Development in the use of the coastal zone. • This Act ensures that decisions about land use and development safeguard life and property from the threat of coastal hazards. • This Act encourages the enhancement of knowledge of coastal resources and the effect of human activities on the coastal zone.

Planning Act 2016	• This Act provides for an efficient, effective, transparent, integrated, coordinated and accountable systems of land use planning and development assessment to facilitate the achievement of ecological sustainability by:
	  ○ Coordinating and integrating planning at the local (i.e., planning schemes), regional and State scales
	  ○ Managing the process and effects of development on the environment (including managing the use of premises).

Native Title Act 1993	• The purpose of this Act is for the recognition and protection of native title.
	• It covers:
	  ○ Acts affecting native title.
	  ○ Determining whether native title exists and compensation for acts affecting native title.

Legislation	Relevance
Aboriginal Cultural Heritage Act 2003	• The main purpose of this Act is to provide effective recognition, protection and conservation of Aboriginal cultural heritage.
Vegetation Management Act 1999	• This Act aims to regulate the clearing of vegetation by: o Managing the environmental effects of clearing. o Regulating clearing in a way that conserves remnant vegetation that is an endangered regional ecosystem, an of concern ecosystem, or a least concern regional ecosystem. o Ensuring clearing does not cause land degradation and allows for sustainable land use. o Preventing the loss of biodiversity, maintain ecological processes, and reduce greenhouse gas emissions.
Environmental Protection Act 1994	• This Act aims to protect Queensland's environment while allowing for development that improves the total quality of life, both now and in the future, and that maintains the ecological processes on which life depends. • The Act defines environmental value, environmental harm and best practice environmental management.
Nature Conservation Act 1992	• This Act aims to conserve nature while allowing for the involvement of indigenous people in the management of protected areas. • This is to be achieved by a conservation strategy for Queensland that declares and manages protected areas, protects native wildlife and habitats, ensures use of protected wildlife and areas to be ecologically sustainable, and allows cooperative involvement of Aboriginal and Torres Strait Islander people.
Environment Protection and Biodiversity Conservation Act 1999	• This Act aims to provide protection of the environment, promote ecologically sustainable development and the conservation of biodiversity. • The Act aims to promote the use of indigenous knowledge of biodiversity through a cooperative approach to the protection and management of environments.
Queensland Local Government Act 2009	• This Act provides a system of local government in Queensland, including: o The way in which a local government is constituted and the nature and extent of its responsibilities and powers • A system of local government in Queensland that is accountable, effective, efficient and sustainable.
Marine Parks Act 2004	• The main purpose of this Act is to provide for conservation of the marine environment. • This purpose as it relates to this plan can be achieved through: o Cooperative involvement of public authorities and other interested groups and persons, including members of Aboriginal and Torres Strait Islander communities. o Recognition of the cultural, economic, environmental and social relationships between marine parks and other areas, whether of water or land.

Legislation	Relevance
Local Laws	• Local laws sit within the *Local Government Act 2009* and under the Act a local government may make and enforce any local law that is necessary or convenient for the good rule and local government of its local government area. • This legislation sets out the laws for the DSC area, including animal management, community and environmental management, local government areas, and facilities.

2.2 Zoning

Land use

The DSC Planning Scheme (2018) has been used to understand the boundaries between different land uses (Figure 2) (DSC 2018a). At Cooya Beach, the primary land uses within or immediately adjacent to the foreshore area are conservation, community facilities and low density residential. These land uses have implications for the management of the foreshore area. Changes within these zones can have flow-on impacts to the foreshore area, including:

- habitat fragmentation (loss of habitat into smaller, isolated areas)
- runoff
- illegal clearing and planting, including weed dispersal and growth
- impacts on fauna (light and noise pollution, road/beach kills).

Conservation zone

The conservation zone provides for the protection, restoration and management of areas identified to support significant biological diversity and ecological integrity (DSC 2018a). Relevant outcomes identified in the Douglas Planning Scheme for the conservation zone include (DSC 2018a):

- Protection of biological diversity, ecological integrity and scenic amenity.
- Recreational or other uses of areas are consistent with the management plans of the controlling authority so that conservation and scenic values of these areas are not adversely affected.
- Any use of land in private ownership does not affect the environmental, habitat, conservation or scenic values of that land or surrounding area.
- Any low intensity facilities based on the appreciation of the natural environment or nature based recreation only establish where there is a demonstrated need and provided they have a minimal impact on the environmental and scenic amenity values of the site or surrounding area.
- The provisions of the Return to Country Local Plan facilitate economic and social opportunities on traditional Indigenous lands.
- Further lot reconfigurations other than amalgamations, boundary realignments to resolve encroachments, or for the practical needs of essential community infrastructure, or to facilitate Return to Country outcomes do not occur.

Community facilities zone

The community facilities zone provides for community related activities and facilities under public or private ownership (DSC 2018a). Relevant outcomes identified in the Douglas Planning scheme for the community facilities zone include (DSC 2018a):

- Development is designed to provide and promote safe and efficient public use, walking and cycling.
- Facilities are in accessible locations, are supplied with necessary infrastructure and are well integrated into surrounding land uses.
- Community facilities are protected by excluding development that could limit the on-going operation of existing community uses or prejudice appropriate new activities.

Residential

Within Cooya Beach, there are low density residential areas adjacent to the foreshore area. Low density residential areas provide for predominantly dwelling houses supported by community uses and small-scale services and facilities that cater for local residents (DSC 2018a). The purpose of the low density residential zone will be achieved through the following relevant outcomes (DSC 2018a):

- Development maintains a high level of residential amenity having regard to traffic, noise, dust, odour, lighting and other locally specific impacts.
- Development reflects and enhances the existing low density scale and character of the area.
- Development is reflective and responsive to the environmental constraints of the land.
- Development is supported by necessary community facilities, open space and recreational areas and appropriate infrastructure to support the needs of the local community.

Great Barrier Reef Coast Marine Park Zoning

The Great Barrier Reef (GBR) Coast Marine Park Zoning classifies the land and waters below the low tide mark as a Habitat Protection Zone (Figure 2). This zoning protects and manages sensitive habitats and ensures that they are generally free from damaging activities (GBRMPA 2021). Additionally, the area around the Cooya Beach boat ramp is classified as an Estuarine Conservation Zone. This zoning provides for the protection of the areas in a natural state while also allowing the public to appreciate the relatively undisturbed nature in that area. The use of the area also includes providing for traditional hunting and gathering.

Wet Tropics World Heritage Area

Land classified under the Wet Tropics World Heritage Area is located well inland of Cooya Beach. While this is a consideration for the environmental values of the foreshore area, the World Heritage Area is not directly impacted by the management of the Cooya Beach foreshore.

Native Title

Native Title determination recognises the holders to exercise their rights to traditional law and customs. The northern end of Cooya Beach adjacent to Mossman River is held under Native Title by the Eastern-Kuku Yalanji People (Figure 2) (NNTT 2020).

Mangrove regrowth at the southern end of Cooya Beach.

Figure 2. *Cooya Beach foreshore area land use zoning (DSC 2018a, NNTT 2020, GBRMPA 2021).*

2.3 Coastal hazards

The length of Cooya Beach is vulnerable to coastal erosion (DSC 2019b). This erosion may be temporary or permanent. Temporary erosion is generally caused by storms, winds or waves, and the beach rebuilds during calmer periods. Permanent erosion is more likely to occur over the longer-term due to rising sea levels or significant changes to sediment transport dynamics where sand becomes lost to the coastal system. Erosion may impact the foreshore area, including the vegetation, wildlife habitats, infrastructure, recreational uses or values.

Foreshore management precinct

The foreshore zone at Cooya Beach extends from the highest astronomical tide (HAT) line to the road reserve limit of the Conservation zone along the length of Bougainvillea St (Figure 3).

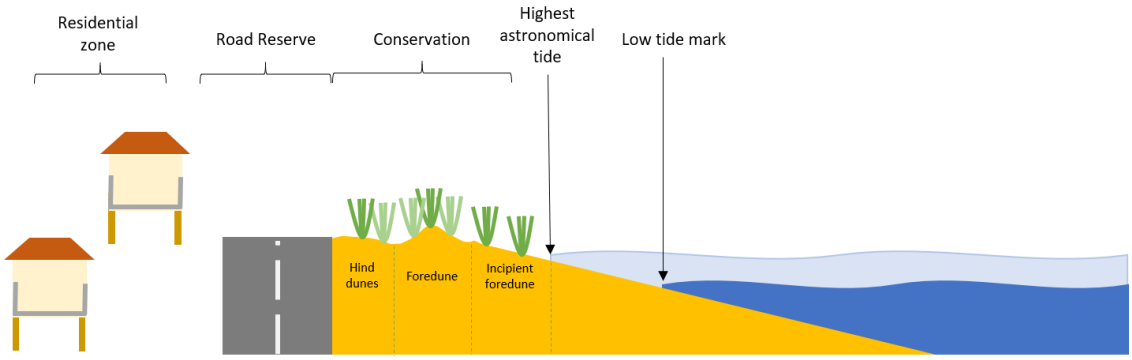


Figure 3. *Graphic representation of the Cooya Beach foreshore management precinct.*

The foreshore area includes the dune system behind the beach, immediately landward of the HAT mark and is made up of the following three key sections (Figure 3):

- **Incipient foredune:** a windblown platform that forms in front of the foredune, however is not present on all beaches. This is where vegetation such as grasses and creepers first establishes and provides a protective buffer to erosion, and storm effects, including winds and waves.
- **Foredune:** the main sandy formation and is of greater height than the incipient dune. Larger vegetation species establish here, including shrubs, which provide greater wind protection.
- **Hind dune:** a smaller dune system behind the foredune. These systems tend to be well established, including larger vegetation species such as trees.

3 Foreshore values

The Cooya Beach foreshore is valued, used and enjoyed in a wide variety of ways. These values support the management of the foreshore area. The following section outlines the social, cultural and environmental values identified for the Cooya Beach foreshore area, as well as describing any threats or challenges to these values.

Healthy incipient foredune at Cooya Beach.

3.1 Knowledge sharing and community engagement

The Cooya Beach community was engaged through the Strategy. However, there was no specific feedback relating to Cooya Beach provided as part of this previous project (DSC 2018b, DSC 2019b). For the current FMP, a survey was distributed to the Cooya Beach community and wider Douglas Shire residents and ratepayers to understand:

- how they use the foreshore zone,
- what they value about the foreshore zone,
- how they would like to see it managed.

The survey was advertised through the Council Foreshore Management Plans website, Facebook, community noticeboards, emails to residents and community groups, and physical copies were made available at Council offices. The survey ran from 31st March to 23rd April 2021 and received a total of 317 responses from residents and community groups throughout the Douglas Shire. A total of 63 responses were received for Cooya Beach, with the vast majority being permanent residents (homeowners).

In addition to the survey, there was also a four-week public comment period following the release of the draft FMP for Cooya Beach. During this period, residents and ratepayers from Cooya Beach and the greater Douglas Shire were given the opportunity to submit feedback on the draft FMP. Several drop-in sessions were held at numerous locations throughout the Shire, including a session at Cooya Beach along the foreshore. The session allowed people to discuss the FMP in greater detail. Feedback from the public consultation has been used to further understand the values and shape the management actions for the final FMP.

Social uses

The majority of respondents at Cooya Beach live adjacent to or within 1 km of the foreshore area. Most respondents also visit the foreshore at least once a week. This information indicates that the foreshore area is significant to residents and ratepayers at Cooya Beach.

Residents predominantly use the Cooya Beach foreshore for exercise and relaxation (Figure 4). The next most common uses of the foreshore are dog walking, meeting friends and family, and fishing. Dog walking seems to be slightly more common at Cooya Beach than other beaches in the Douglas Shire, and Cooya Beach is also one of three beaches where fishing is more common. The least common uses for the foreshore are for recreation

and BBQs. Approximately one in five respondents indicated that they use the foreshore as an extension of their yard.

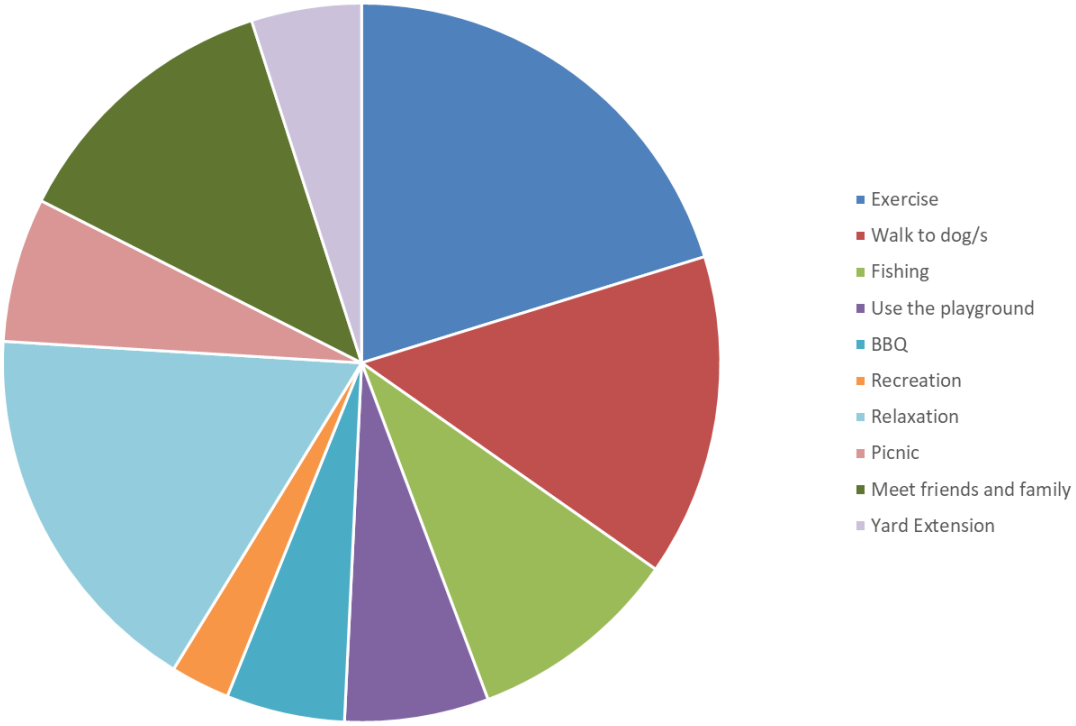


Figure 4. *The most common uses of the foreshore area at Cooya Beach.*

Sense of place

Residents of Cooya Beach value the unspoilt natural beauty and peacefulness of the beach and foreshore. They also value natural vegetation such as the shade trees and mangroves, as well as the abundant wildlife such as birds, butterflies and marine life. Cooya Beach is a place where locals and families can enjoy natural parkland areas, walkways, and local amenities for exercise, playing and socialising.

There are also several culturally significant sites at Cooya Beach. The land at the northern end of Cooya Beach, including the boat ramp on the Mossman River, is held under Native Title by the Eastern Kuku-Yalanji people. This land is the traditional area for camping, hunting, fishing and gathering (TNRM 2010). The Traditional Owners continue to use the area for hunting, gathering, fishing, camping, cultural tourism, cultural education camps for Yalanji people and other traditional purposes (TNRM 2010). North of the boat ramp there are shell middens and areas being regenerated by First Nations people. Land management work has been undertaken in the past by the Traditional Owners as part of the Cooya Beach Revegetation and Rehabilitation project (TNRM 2010). Southern areas of the beach are also home to shell middens, as well as native vegetation used for food and medicine (e.g., salt bush).

Concerns and threats

From the survey, many community concerns were raised about the vegetation and accessibility on the Cooya Beach foreshore. Residents suggested the vegetation buffer be managed by removing debris and weed species (including strangler figs suffocating trees), and that overgrowth towards the southern end be addressed.

There were some conflicting concerns regarding vegetation management, with some desiring more clearing to improve views and safe access to the beach, while others emphasised the importance of trees and native vegetation in protecting dunes from erosion and reducing habitat fragmentation. There were also conflicting views regarding coconut palms. Some believe these are native trees with root systems which help to hold the foredune together, while others noted the number of coconut palms have increased and fallen fronds look messy and exclude native foredune species.

Vegetation clearing for access tracks.

Residents also identified the need for a smooth pathway (rather than the current dirt pathway) adjacent to Bougainvillea Street to provide a safe walking track for people of all abilities. Other concerns include the increase in informal access paths to the beach which contribute to habitat fragmentation and cause damage important dune vegetation.

Further concerns include activities occurring on the foreshore, such as development, vehicle use, and dog on or off-leash areas. Residents of Cooya Beach wish to avoid overdevelopment (such as in Port Douglas) to retain the values of a tight-knit, peaceful coastal community. Some residents were also concerned about those walking dogs off-leash, noting some dogs chase and disturb resident and migratory shorebirds.

3.2 Environmental values

Cooya Beach is well developed as a residential area and much of the narrow foreshore area is considered to be non-remnant with coconut palms featuring heavily in both remnant and non-remnant sections. The foreshore vegetation is heavily impacted by historical residential use and illegal clearing of foreshore vegetation to maintain views and access. In the past there have been revegetation activities undertaken by the community to re-establish this vegetation.

Flora composition

A desktop assessment of the vegetation mapping at Cooya Beach indicates some of the residential foreshore reserve is mapped as remnant closed to open vegetation types (DOR 2020). The northern end is largely non-remnant. Four Regional Ecosystems (REs) are mapped for Cooya Beach. A full list of the REs is provided in Attachment A. There are two REs dominating the foreshore vegetation, these they are summarised in Table 2 and Figure 5.

Table 2. Regional ecosystems (REs) of the Cooya Beach foreshore

RE	Mapped RE description	VM Class	BD Status	Local representation
7.2.1c	Closed forest with *Calophyllum inophyllum*, *Terminalia arenicola*, *Dillenia alata*, *Myristica insipida*, *Planchonella obovata*, *Millettia* pinnata, and *Hibiscus tiliaceus*. Beach ridge deposits adjacent to the foredune, in the very wet rainfall zone.	E	E	Vegetation is semi-intact with individuals of the representative tree strata *Calophyllum inophyllum* and *Terminalia catappa* however coconuts dominate this strata, sometimes in pure stands or groves. *Cordia subcordata, Terminalia muelleri* and *Pongamia pinnata* are also present.

RE	Mapped RE description	VM Class	BD Status	Local representation
7.2.7a	Complex of open shrubland to closed shrubland, grassland, low woodland and open forest. Includes pure stands of *Casuarina equisetifolia*, and *Acacia crassicarpa*, *Syzygium forte* subsp. *forte*, *Calophyllum inophyllum* and *Pandanus* spp. woodland to open forest. Beach strand and foredune.	OC	E	*Thespesia populnea a*nd *Calophyllum inophyllum* is present and the lower strata are frequently removed or the vegetation has been replaced with stands of coconut trees (*Cocos nucifera*). Incipient dunes are largely intact containing a diversity of beach vines, *Ipomoea pes-caprae, Canavalia rosea,* and *Vigna marina.* Shrubs *Scaevola taccada, Wollastonia uniflora* and *vitex rotundifolia* are also present.

Vegetation communities within the Cooya Beach foreshore correlate to only a few foreshore zones; incipient dune, foredune and mangroves. Within the assessed residential areas, only the incipient dune and foredune were present. Vegetation within the incipient dune is prone to removal and impacts of other human activity. The RE descriptions, Vegetation Management (VM) class, Biodiversity (BD) status and local representation of the vegetation communities within the foreshore zone are summarised in Error! Not a valid bookmark self-reference.. There was no hind dune vegetation present within the residential precincts at Cooya Beach.

Table 3. Dune vegetation composition at Cooya Beach

Zone	Vegetation	Comments
Incipient dune	Beach vines – coastal jack bean (*Canavalia rosea)*, coastal morning glory (*Ipomoea pes-caprae)* and dune bean *(Vigna marina)* Grasses, sedges and salt couches – *Sporobolus virginicus* and *Paspalum vaginatum* Shrubs – beach lavender (*Vitex rotundifolia*), sea daisy (*Wollastonia uniflora)* and sea lettuce (*Scaevola taccada)*	• Most exposed area • Prone to atypical erosion – vegetation removed or impacted by anthropogenic activity
Foredune	Trees and shrubs – beach she oak (*Casuarina equestifolia),* beach almonds *(Terminalia catappa, Terminalia arenicola)* and beauty leaf (*Calophyllum inophyllum)* Vines – match box bean (*Entada rheedii)* and *Smilax calophyllum*	• Supports larger trees and shrubs • Coconuts also dominant throughout foredune, including planted groves with maintained lawns beneath

Figure 5. *Remnant regional ecosystems at Cooya Beach (DES 2021).*

Conservation significance

The remnant vegetation of Cooya Beach is mapped as 'Essential Habitat' for several conservation significant species including: the endangered southern cassowary (*Casuarius casuarius johnsonii*); eastern curlew (*Numenius madagascariensis*); great knot (*Calidris tenuirostris*); curlew sandpiper (*Calidris ferruginea*), and lesser sand plover (*Charadrius mongolus*) and the vulnerably listed bar-tailed godwit (*Limosa lapponica baueri*). Essential habitat is regulated under the *Vegetation Management Act 1999* (VM Act). The full list of these species is provided in Attachment B.

Habitat fragmentation

The foreshore vegetation in the less urbanised areas of Cooya Beach is well connected to the north and south, however connectivity within foreshore habitats adjacent to the residential areas is poor. Surrounding vegetation communities maintain continuous connectivity westward to the remnant mountain range vegetation behind Mossman. This connectivity will allow fauna movement within and between these communities and minimise impacts due to population isolation. The altered vegetation in the urbanised areas often lacks the shrub layer that would allow for protected movement of fauna through the coastal vegetation and beachfront areas minimising connectivity through these areas. Canopy dwelling and nesting species may still inhabit these areas and the impacts are more likely to be associated with other human activity such as noise from recreational vehicles and pest species (rats and cats) commonly associated with urban areas.

There have been several disturbances to the foreshore area and vegetation at Cooya Beach. Residential areas adjacent to the foreshore are becoming increasingly exposed to coastal hazards because of diminishing dune vegetation. This loss of vegetation has largely been the result of illegal clearing through the understorey. Table 4 summarises the disturbances and their potential impacts to the foreshore flora and fauna.

Table 4. Disturbances and their potential impacts to flora and fauna at Cooya Beach

Disturbance	Potential impacts to ecology
Dune erosion	• Further loss of vegetation and fauna habitat • Loss of sea turtle nesting habitat through loss of the foredune vegetation • Increase foredune slope and decreasing suitability for nesting sea turtles • Reduced biodiversity
Vegetation loss	• Increases in foreshore dune erosion • Exposure of hind dune systems and vegetation that are less adapted to extreme weather events • Loss of breeding and roosting habitat for nesting shorebirds and sea turtles • Loss of food trees for southern cassowary
Weeds	• Compete with native species for resources – light, nutrients, space • Reduced biodiversity of flora • Loss of habitat and food plants for conservation significant species • Create barriers for connectivity and fauna population dispersal • Increased fuel loads
Pest animals	• Predation of native animals • Sea turtle nest predation • Reduced fauna populations and diversity
Green waste and illegal dumping	• Impacts to marine fauna • Damage to sea turtle nesting areas through suffocation or preventing nesting • Introduction of weed species to natural areas • Increased atypical fire risk

Disturbance	Potential impacts to ecology
Stormwater and agricultural runoff	• Impacts to marine fauna • Increased sediment runoff and resulting increases in nearshore turbidity • Increased nutrient loads and subsequent algal blooms
Coconut debris	• Fallen fronds and fruit to reduce recruitment of native species • Reduced opportunity for sea turtle nesting • Increase habitat for rodents and potential bird egg predation

Fauna

Cooya Beach has potential to provide habitat features for many fauna of conservation significance, including nesting turtles; shorebirds and other notable species such as the endangered southern cassowary (*Casuarius casuarius johnsonii*) (southern population). Anthropogenic disturbance may be the greatest limiting factor here. The full list of these species is provided in Attachment B.

Pest species

During the site inspections, several environmental weeds were identified at Cooya Beach, including the coconut palm. According to the most recent audit, there are approximately 600 coconut palm trees (*Cocos nucifera*) present at Cooya Beach (DSC 2015). Where there is a large concentration of coconut palms (known as "Coconut Grove"), there is very little understorey. Coconut palms will continue to be managed by the Coconut Management Plan (DSC 2015). The following environmental weeds were also identified at Cooya Beach (Table 5). Environment weeds pose a threat to biodiversity by outcompeting native vegetation with respect to available resources such as nutrients and light, establishing monocultures and increasing fuel loads. This additionally results in reduced habitat value for fauna.

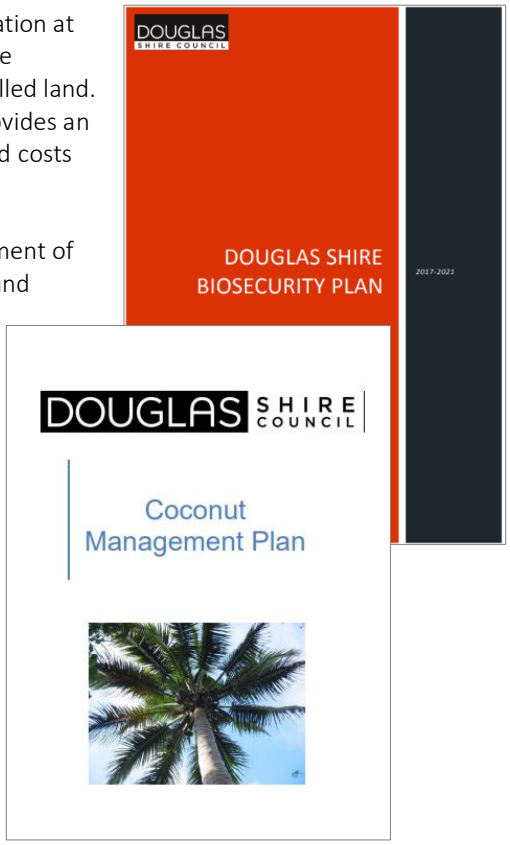
Table 5. Weed species identified at Cooya Beach (BQ 2020, Conn 2021, DSC 2015, Murphy et al. 2016)

Scientific name	Common name	Dispersal Method	Environmental Impacts
Cocos nucifera	Coconut palm	• Large nuts which fall from trees • Nuts germinate if uneaten	• Identified as a transformer weed in littoral (coastal) rainforests • Outcompetes native species for space, light and nutrients • Falling nuts and fronds cause physical damage to species below
Sphagneticola trilobata	Singapore daisy	• Spreads by cuttings from slashing and pruning	• Outcompetes native species for space, light and nutrients • Invades lawns, irrigated areas, and around drains
Sansevieria trifasciata	Mother-in-law's tongue	• Spreads by dumping of garden waste • Seeds spread by birds and other animals	• Forms dense infestations • Outcompetes native species for space, light and nutrients • Tends to form monoculture
Bryophyllum delagoense	Mother of millions	• Spread by floodwaters • Spread by animals, vehicles and garden waste	• Invades coastal dunes, grasslands and woodlands • Outcompetes native species for space, light and nutrients • Very poisonous to humans and livestock

Scientific name	Common name	Dispersal Method	Environmental Impacts
Agave sp.	Agave	• Spread by vegetative reproduction (new plant grows from a fragment) • Planted intentionally as part of a garden	• Does not naturally grow in QLD, though 10 related species have naturalised • Potentially invasive to native species
Megathyrsus maximus var maximus	Guinea grass	• Spreads by seeds attaching to fur of animals	• Invades roadsides and untended areas • Forms large clumps and may cause soil erosion
Leucaena leucocephala	Leucaena	• Spreads seeds by wind, water and animals • Spreads rapidly to adjacent areas	• Forms dense thickets which hinder movement of wildlife • Strongly outcompetes native plants for space, light and nutrients
Tecoma stans	Tecoma, yellow bells	• Spreads seeds by wind, water, garden waste	• Invades native bushland and roadsides

Vegetation management

Douglas Shire Council has several instruments to manage the vegetation at Cooya Beach. The Coconut Management Plan (DSC 2015) defines the objectives for the management of coconut palms on Council-controlled land. The plan identifies the coconut trees within a given location and provides an assessment of the potential risk, distribution, impacts and associated costs of management.



The Douglas Shire Biosecurity Plan (2017-2021) guides the management of invasive biosecurity matter as well as locally declared pests (plants and animals) as outlined in the *Biosecurity Act 201*4. Under this plan, there are programs being undertaken by DSC to eradicate pest species. Prioritisation of pest species is based on several factors, including (DSC 2017):

- Existing plans and priorities on a national, state and local level
- Impacts and threats
  - Conservation and biodiversity
  - Riparian or aquatic environment
  - Agricultural or production
  - Residential and urban areas
- Capacity to manage
  - Achievability
  - Current extent

These programs include (relevant to vegetation) (DSC 2017):

- Siam Weed Eradication Program
- Hiptage eradication Program
- Miconia Species (Four Tropical Weeds Eradication Program)

3.3 Amenity and liveability

There are several facilities and access points for residents and tourists to engage in recreational activities at Cooya Beach. The accessibility and recreational uses of the Cooya Beach foreshore area are summarised in this section and the management implications are discussed.

Boats moored off the Cooya Beach foreshore.

Infrastructure

There is a boat ramp at the northern end of Cooya Beach providing access to the Mossman River. It is located on Native Title land, however, it remains managed by Council. In addition to the boat ramp, there is access for vehicles to the beach at several locations along the foreshore. This also includes the construction of moorings by residents along the beach and vehicles accessing the beach via the Council access road through the Council conservation area. These activities have caused a disruption to the vegetation cover along the foreshore and have the potential to cause erosion and negatively impact essential wildlife habitats.

Passive recreation

Cooya Beach offers the opportunity for residents and tourists to engage in passive recreational activities. Examples of such activities include:

- walking along the beach and foreshore
- bird watching
- fishing at the Mossman River mouth
- traditional owner guided beach walks.

These activities are relatively low impact but can still affect the foreshore condition. If foreshore users create informal access tracks through the vegetation to access the foreshore and beach, this can lead to a loss of vegetation, destabilisation of the sand or soil which may lead to erosion or dune destabilisation, and it could also contribute to habitat loss, fragmentation and destruction. Activities such as bird watching will have similar impacts on the foreshore in relation to access. The impact of fishing will largely be a result of vehicle access to the Mossman River mouth and moorings along the foreshore, including vegetation clearing for access tracks and driving on the sand where there may be important and sensitive wildlife habitats. Dumping of fishing nets or waste may also occur.

A local First Nations family conduct tours at Cooya Beach (Kuku Yalanji Cultural Habitat Tours) and show tourists traditional hunting practices.

Kuku Yalanji Cultural Habitat Tours at Cooya Beach (Source: kycht.com.au).

Pedestrian access

A recent audit of the beach access points within Douglas Shire shows that there are 18 access points along Cooya Beach. Three are formalised access tracks and the remainder are informal. The creation of informal access tracks presents challenges to foreshore management, particularly with regards to illegal vegetation clearing and dune destabilisation.

Dog off-leash areas

An off-leash dog area is located at the northern end of Cooya Beach. Dogs pose a risk to fauna as they may attack or scare vulnerable species, particularly when off-leash.

4 Management precincts

The Cooya Beach foreshore zone has been divided into four management precincts. Management actions have been tailored to specific concerns and threats within each precinct. The four precincts are:

- Precinct 1 – Native Title area
- Precinct 2 – Northern Cooya Beach
- Precinct 3 – Central Cooya Beach
- Precinct 4 – Southern Cooya Beach

Figure 6. *Cooya Beach foreshore management precincts.*

The threats and challenges within each management precinct are summarised in Table 6. These threats and challenges have been identified through the background review, site inspections and community engagement feedback.

Table 6. Cooya Beach foreshore precinct threats and challenges

Precinct	Key foreshore threats and challenges
1 – Native Title area Unpopulated precinct and falls under Native Title.	• Cultural sites vulnerable to coastal processes and foreshore degradation that may impact cultural practices. • Pedestrian and other access along foreshore within potential sensitive and vulnerable habitats, including turtle and shorebird nesting areas – access during nesting and hatching season may pose a threat to vulnerable species. • Environmental weeds present – may impact the conservation value within the precinct.
2 – Northern Cooya Beach Includes land for conservation.	• Cultural sites vulnerable to coastal processes and foreshore degradation that may impact cultural practices. • Illegal clearing to create informal beach access tracks through the vegetation in the foreshore area – these activities may not meet the outcomes of the Conservation zone code, including biological diversity, ecological integrity and scenic amenity. • Environmental weeds present – may impact the conservation value within the precinct.
3 – Central Cooya Beach Populated precinct with land for conservation and significant number of environmental weeds present.	• Cultural sites vulnerable to coastal processes and foreshore degradation that may impact cultural practices. • Illegal clearing to create informal beach access tracks through the vegetation in the foreshore area – these activities may not meet the outcomes of the Conservation zone code, including biological diversity, ecological integrity and scenic amenity. • Environmental weeds present – may impact the conservation value within the precinct.
4 – Southern Cooya Beach Populated precinct with land conservation and environmental weeds present.	• Cultural sites vulnerable to coastal processes and foreshore degradation that may impact cultural practices. • Illegal clearing to create informal beach access tracks through the vegetation in the foreshore area – these activities may not meet the outcomes of the Conservation zone code, including biological diversity, ecological integrity and scenic amenity. • Environmental weeds present – may impact the conservation value within the precinct.

5 Management plan

The following section outlines the adaptive management approach to address the threats and challenges identified for the Cooya Beach foreshore area. The objectives for management have been identified to inform measures for management success. Priorities have also been set to appropriately guide management of the foreshore threats and challenges of the immediate, medium-term and longer-term timeframes. The objectives and priorities shape the management actions for each precinct. In addition, any monitoring and evaluation activities that are to take place following the implementation of the actions will also be summarised to measure the progress of the foreshore management.

5.1 Management objectives

Objectives are useful for measuring the success of the management actions undertaken. They have been informed by the community values identified through the engagement process. The objectives will guide the metrics for monitoring and evaluation of the management actions. They can be applied at the whole of foreshore (community) and precinct scale.

Management objectives for Cooya Beach foreshore

- Maintain the overall natural form and function of the beach.
- Maintain and preserve the cultural value of the beach.
- Enhance and maintain vegetation condition – littoral rainforests, dune vegetation for vulnerable species and to prevent dune erosion.
- Build positive behaviour change outcomes to minimise adverse impacts of foreshore use.
- Proactively undertake weed management to restore native vegetation habitats.
- Monitor the presence and health of potential turtle and shorebird nesting sites in foreshore areas.
- Enforce Local Laws for illegal clearing to prevent further the formation of unauthorised and informal beach access tracks.

5.2 Management prioritisation

Prioritisation of the management actions has been assigned as immediate, medium-term or future.

1 **Immediate** (recommend implementation within next 12 months)

Actions for immediate prioritisation include sites where weeds are present and it is necessary to eradicate the weeds and revegetate the site with native vegetation cover. Environmental weeds pose a significant threat to the values of the Cooya Beach residents, including the natural habitats and wildlife. Actions also revolve around access and use of the foreshore area, such as for fishing or pedestrians. The uses may pose a threat the sensitive habitats and management actions are focussed on minimising the impact.

2 **Medium-term** (recommend implementation within next 2-3 years)

Medium term priority actions are recommended to be implemented within the next two to three years. These actions are important for the management of the foreshore precinct, however, they require community engagement and education to understand their benefits. There is an element of community involvement with the medium-term actions.

3 **Future** (recommend implementation within 5 years)

Future management actions are those that first require an evaluation of the outcomes from immediate to medium-term actions that have been undertaken before being implemented. It is recommended future actions are implemented within five years of the plan's adoption. This timeframe allows sufficient time for immediate actions to be implemented and their progress and success to be evaluated.

5.3 Management actions

Management actions and their priorities for the Cooya Beach foreshore are summarised in Table 7. Maps of the management actions for each precinct are provided in Attachment C. It should be noted that public consultation will occur before any management actions are implemented.

Table 7. Cooya Beach foreshore precinct management actions

	All precincts	*Precinct 1*	*Precinct 2*	*Precinct 3*	*Precinct 4*
Outcome 1: **Preserve the cultural, social and environmental values of the foreshore area, including cultural land practices, dune vegetation, and turtle and shorebird nesting sites.**					
A1.1: Undertake beach monitoring of turtle and shorebird nesting sites during nesting and hatching seasons to understand the impact foreshore access may have on these habitats. Survey vegetation cover to assess revegetation requirements and progress to support nesting habitats.	3				
A1.2: Establish a platform on the DSC Environmental Hub giving residents and visitors the ability to upload information and photos about flora and fauna species they have noticed in the foreshore.	1				
A1.3: Establish an additional, clearly defined and formalised shared use access track in consultation with the Cooya Beach community behind the dune adjacent to Bougainvillea Street for safe thoroughfare within the foreshore.	2				
A1.4: Collaborate with Traditional Owners to maintain and preserve cultural heritage sites within the foreshore area.	1				
A1.5: Continue the boat ramp as a shared maintenance area in collaboration with all stakeholders to maintain safe access for all vessels.		1			
A1.6: Undertake a preliminary costing assessment for an additional toilet block along the foreshore for consideration in the 2022-23 Operational Plan.	1				

	All precincts	*Precinct 1*	*Precinct 2*	*Precinct 3*	*Precinct 4*
Outcome 2: **Restore the conservation value of the foreshore area by reducing the presence and impact of environmental weeds.**					
A2.1: Undertake dune revegetation with native species (see Attachment D) within a 10 m buffer landward of the HAT mark and regenerate cleared land to stabilise the dune protecting against erosion. Install fencing around the revegetated area to reduce damage or clearing and encourage regrowth.	1				
A2.2: Clear and revegetate the foreshore area with appropriate native species in consultation with residents and community.					1
A2.3: Formalise and maintain defined access tracks and install appropriate signage at the beach and land entrances. This is to minimise the impact on the frontal dune. Issue fines for people found to be illegally clearing under Local Law No. 4 (Local Government Controlled Areas, Facilities and Roads).		2	1	1	1
A2.4: Establish a weed eradication and maintenance program in conjunction with the Biosecurity Plan to remove environmental weeds present in the foreshore area and undertake revegetation with native species (see Attachment D).	1				
Outcome 3: Build positive behaviour change outcomes to minimise adverse impacts of foreshore use.					
A3.1: Undertake a community education program to communicate knowledge around environmental concerns such as weeds, including transfer and establishment, awareness and management.	2				
A3.2: Undertake a community education program in collaboration with local Traditional Owners to communicate knowledge around the cultural significance and uses of the foreshore. For example, invite community members to participate in a cultural tour of Cooya Beach.	2				
A3.3: Include crocodile awareness information when undertaking new programs (e.g., booklets for walks).	1				

5.4 Monitoring and evaluation

The success of the management actions is measured through monitoring and evaluation mechanisms. The monitoring focusses on the sensitive and vulnerable environments, including turtle and shorebird nesting habitats, and key coastal vegetation habitats.

Nesting habitats

The habitat monitoring should be undertaken to observe where turtle and shorebird nesting habitats are present in the foreshore area and to understand the vegetation composition of these habitats. Turtle monitoring should be undertaken based on the Queensland Marine Turtle Field Guide (Attachment E) between October and May to assess the seasonal use of these habitats by turtles (QPWS, DES 2016). Guidelines for shorebird monitoring will need to be developed based on local knowledge.

It is recommended monitoring be undertaken in partnership with the Indigenous Rangers and local community groups. In addition, a platform on the DSC Environmental Hub website should be created for residents and visitors to submit photos and information regarding any turtles or shorebirds they notice when using the foreshore. The purpose of the habitat monitoring is to understand which species are accessing the foreshore area for nesting and hatching, as well as the vegetation composition of these habitats.

Vegetation

The vegetation monitoring is a simple measure for the percentage of cover and survival success in relation to the revegetation of the foreshore. This monitoring should be undertaken on a yearly basis to record the survival rate, particularly when undertaking revegetation activities. It is recommended that vegetation is monitored on a yearly basis at the end of the wet season.

The purpose of collecting information about the success of revegetation and other site management issues such as exotic plants (environmental weeds), other threats, habitat quality and connectivity, and significant species values is to be able to refine and direct resources accordingly. Flexibility in program delivery is required to maintain the condition of assets such as plantings, respond to threats as they change through time and account for new values if they emerge during the delivery of the project.

Monitoring and evaluation metrics

Table 8 outlines the monitoring and evaluation metrics for the corresponding management action to evaluate the progress and success of implementation. A detailed method for rapid vegetation assessment is supplied in Attachment E.

Table 8. Foreshore management action monitoring and evaluation metrics

Management action	Monitoring	Evaluation	Timing
Fauna monitoring	• Nesting species • Vegetation composition of nesting habitats	• Turtle tracks, bird nests, animal health • Population dynamics	Nesting season
Vegetation monitoring	• Species specific observations to identify which species may be doing poorly • Weed cover within each of the canopy layers (top 5 transforming weed species)	• Measure of the percentage survival of revegetation • Percentage survival of key species • Percentage cover over canopy layers of weeds • Percentage of bare/disturbed ground • Natural recruitment • Habitat connectivity • Significant species	Annual

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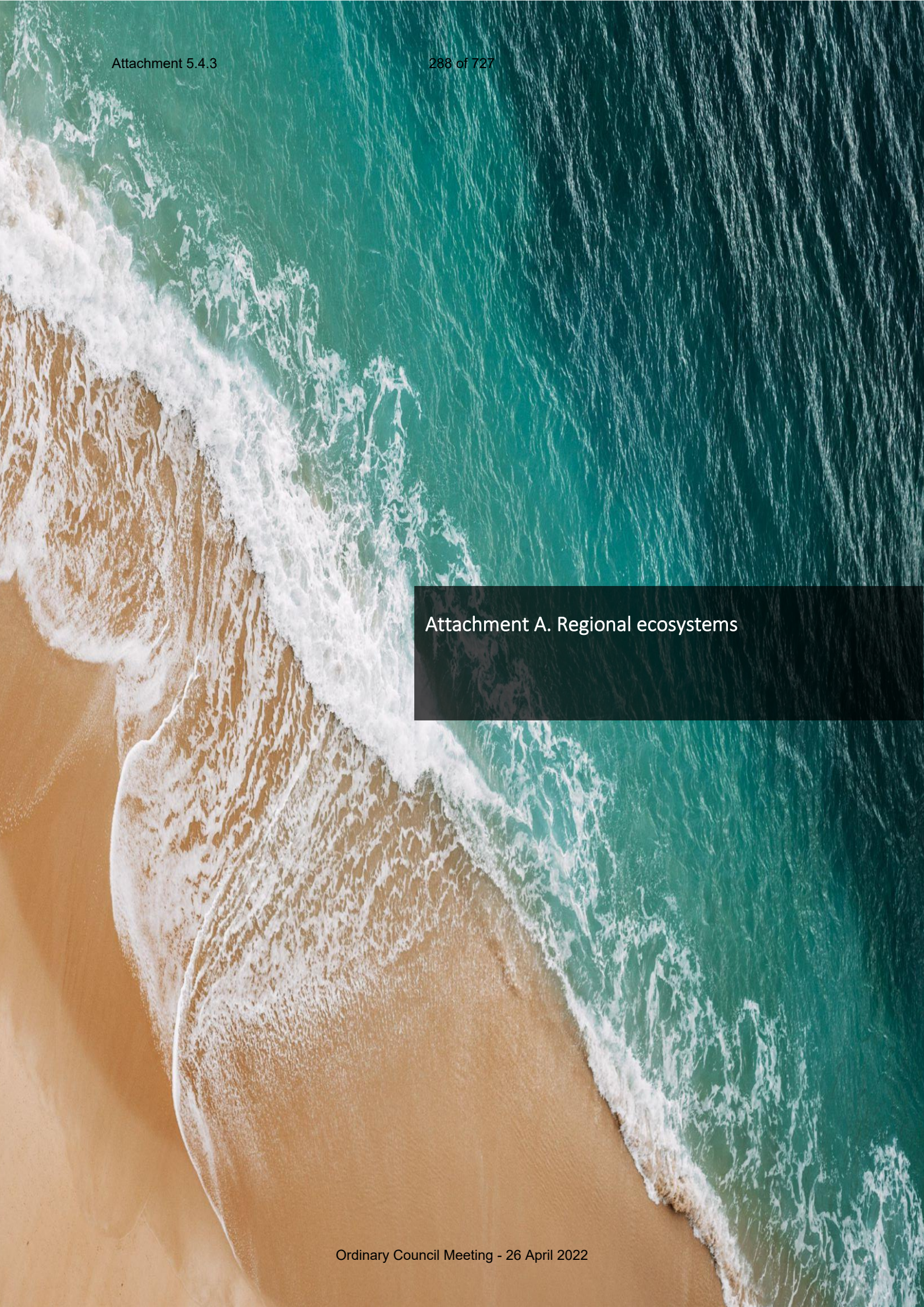
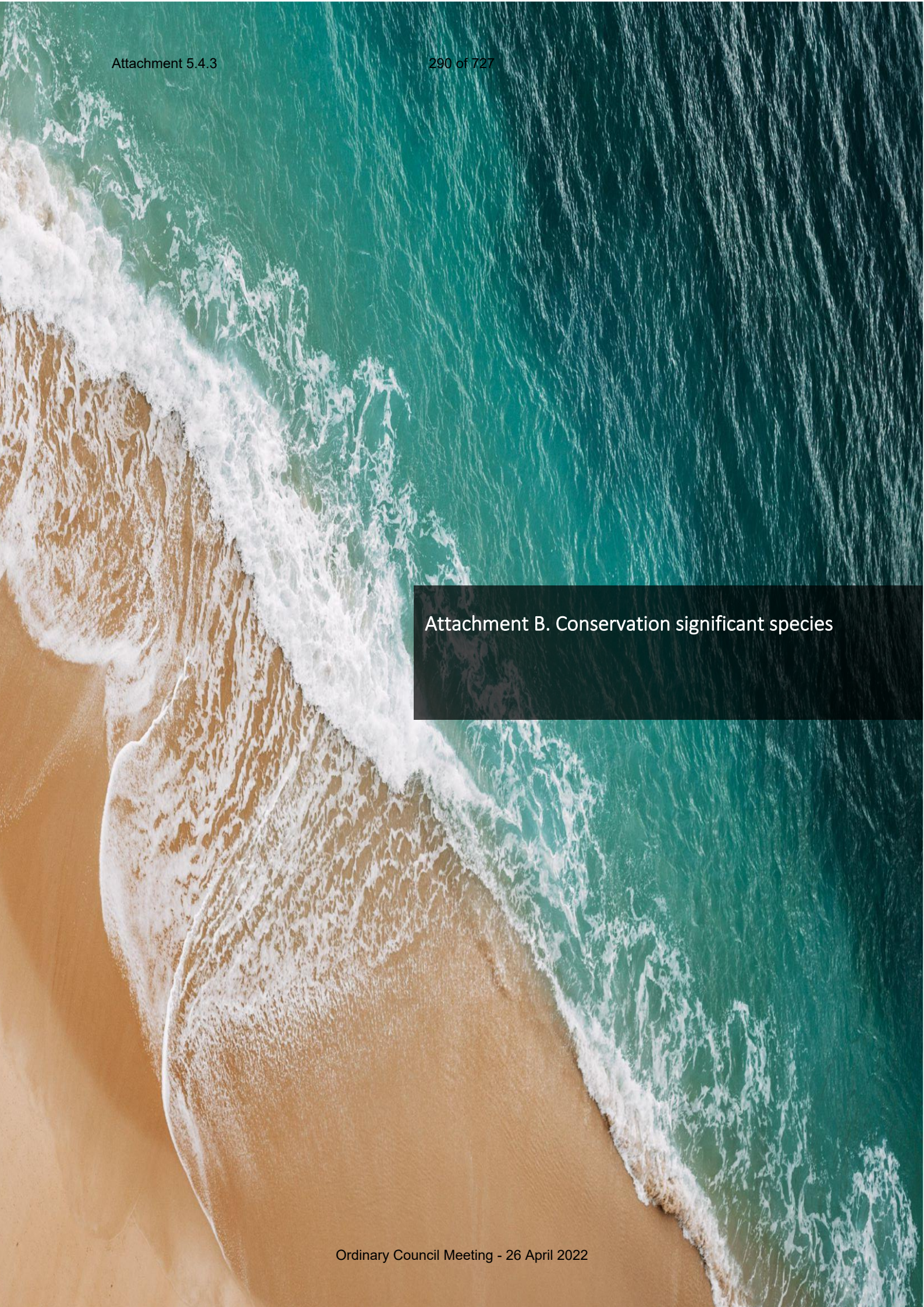


Attachment A. Regional ecosystems

Table 9. Cooya Beach regional ecosystems (REs)

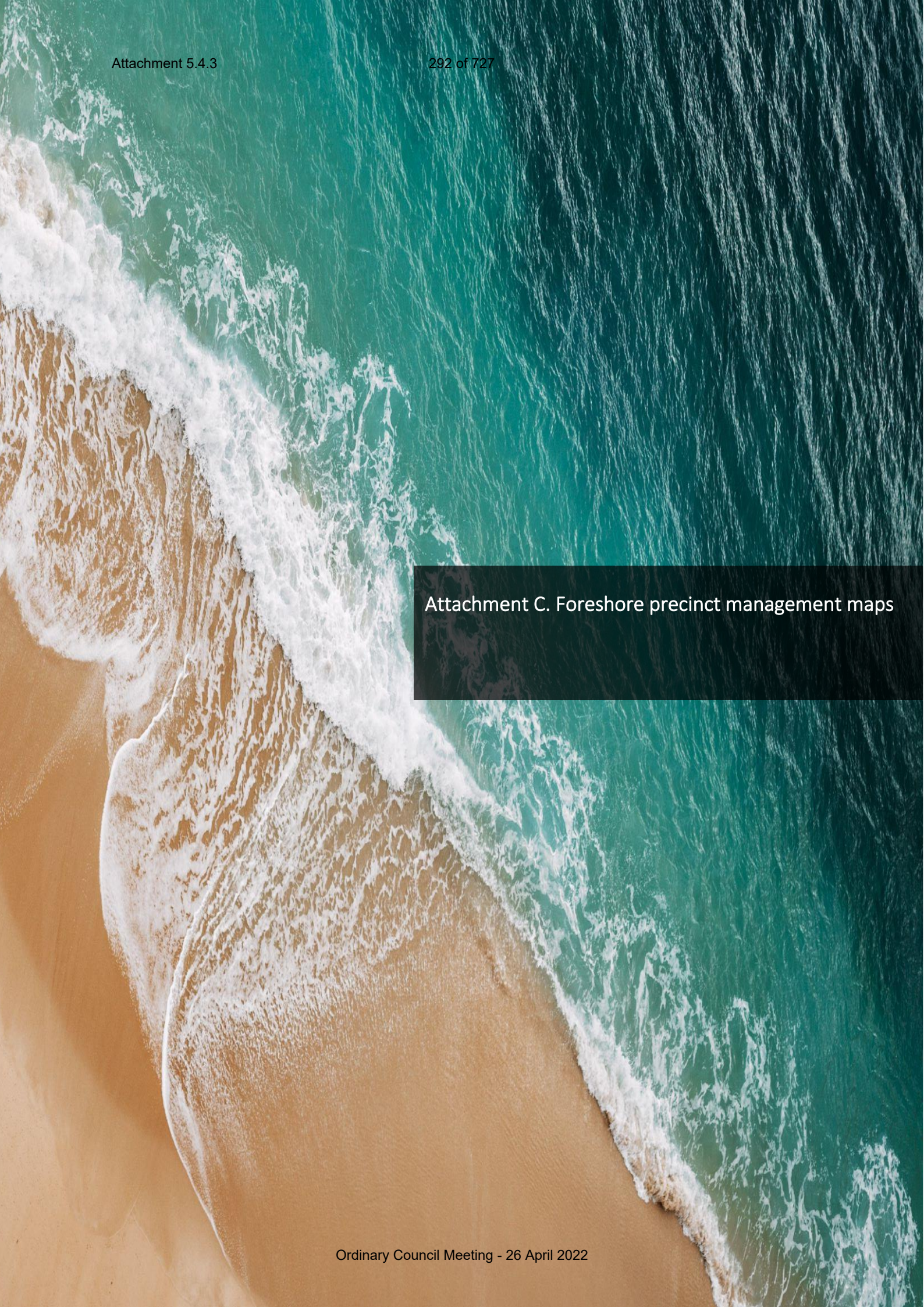
RE	Mapped RE description	VM Class	BD Status
7.1.1	Mangrove closed scrub to open forest. Sheltered coastlines, estuaries, and deep swales between dunes, on fine anaerobic silts, inundated with saline water at high tide.	LC	NC
7.2.1c	Closed forest with *Calophyllum inophyllum*, *Terminalia arenicola*, *Dillenia alata*, *Myristica insipida*, *Planchonella obovata*, *Millettia pinnata*, and *Hibiscus tiliaceus*. Beach ridge deposits adjacent to the foredune, in the very wet rainfall zone.	E	E
7.2.2a	Notophyll vine forests, often with *Acacia* emergents. Species commonly include *Cupaniopsis anacardioides*, *Diospyros geminata*, *Canarium australianum*, *Alphitonia excelsa*, *Acacia crassicarpa*, *Pleiogynium timorense*, *Chionanthus ramiflorus*, *Mimusops elengi*, *Polyalthia nitidissima*, *Millettia pinnata*, *Geijera salicifolia*, *Ficus opposita*, *Sersalisia sericea*, *Terminalia muelleri*, *T. arenicola*, *Drypetes deplanchei*, and *Exocarpos latifolius*. Lowlands on dune sands, of the moist and dry rainfall zones.	OC	E
7.2.7a	Complex of open shrubland to closed shrubland, grassland, low woodland and open forest. Includes pure stands of *Casuarina equisetifolia*, and *Acacia crassicarpa*, *Syzygium forte* subsp. *forte*, *Calophyllum inophyllum* and *Pandanus* spp. woodland to open forest. Beach strand and foredune.	OC	E



Attachment B. Conservation significant species

Table 10. Conservation significant fauna and the likelihood for occurrence at Cooya Beach

Scientific name	Common name	EPBC Act	NC Act	Likelihood of occurrence
		Shorebirds		
Esacus magnirostris	Beach-stone curlew	—	V	Likely
Casuarius casuarius johnsonii	Southern cassowary	E	E	Possible
Calidris ferruginea	Curlew sandpiper	CE	CE	Likely
Numenius madagascariensis	Eastern curlew	CE	E	Likely
Charadrius mongolus	Lesser sand plover	E	E	Likely
Charadrius leschenaultii	Greater sand plover	V	V	Likely
Calidris canutus	Red knot	E	E	Likely
		Sea turtles		
Natator depressus	Flatback turtle	V	V	Likely
Chelonia mydas	Green turtle	V	V	Likely
Eretmochelys imbricata	Hawksbill turtle	V	E	Likely
Dermochelys coriacea	Leatherback turtle	E	E	Possible
Caretta caretta	Loggerhead turtle	E	E	Likely
Lepidochelys olivacea	Olive ridley turtle	E	E	Likely
		Other		
Hirundapus caudacutus	White-throated needletail	V	V	Likely
Cyclopsitta diophthalma macleayana	Macleay's fig-parrot	—	V	Likely
Crocodylus porosus	Estuarine crocodile	—	V	Likely



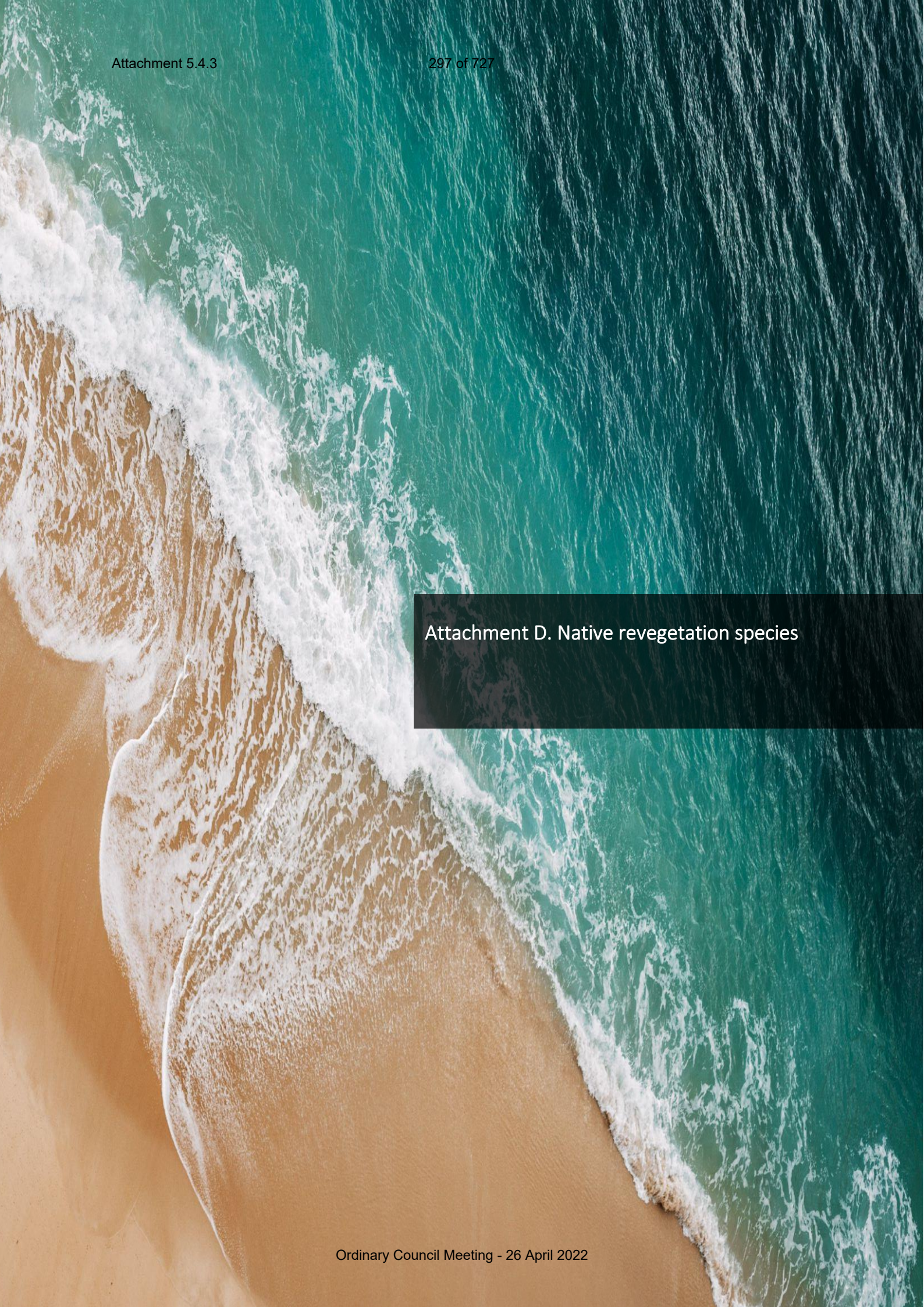
Attachment C. Foreshore precinct management maps

Figure 7. *Cooya Beach foreshore precinct 1 management actions.*

Figure 8. *Cooya Beach foreshore precinct 2 management actions.*

Figure 9. *Cooya Beach foreshore precinct 3 management actions.*

Figure 10. *Cooya Beach foreshore precinct 4 management actions.*



Attachment D. Native revegetation species

Table 11. Native revegetation species (highlighted species are key components of remnant ecosystems) (Florentine, Pohlman and Westbrooke 2015)

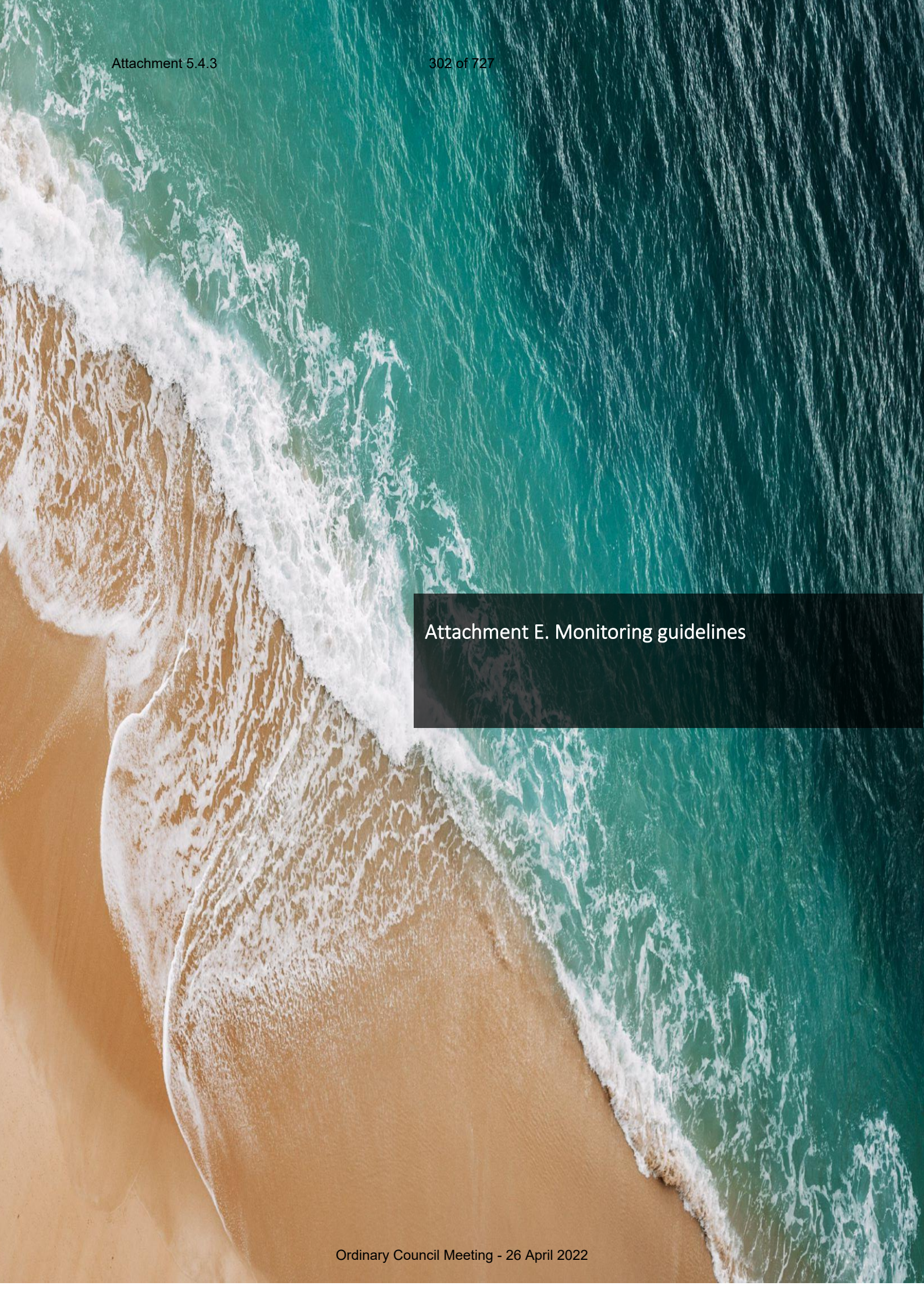
Botanical name[1]	Common name	Precinct 1	Precinct 2	Precinct 3	Precinct 4
*Acacia crassicarpa**	Northern golden wattle				✔
*Acacia mangium**	Broadleaf salwood				✔
*Acacia oraria**	Coastal wattle				✔
Aglaia elaeagnoidea	Coastal boodyarra				✔
*Alphitonia petriei**	Sarsaparilla				✔
Alyxia spicata	Chain fruit	✔	✔	✔	✔
Atractocarpus fitzalanii	Brown gardenia				✔
Barringtonia asiatica	Mango bark, Mango pine				✔
Barringtonia calyptrata	Mango pine				✔
Beilschmiedia obtusifolia	Blush walnut				✔
Blepharocarya involucrigera	Rose butternut				✔
Brachychiton acerifolius	Illawarra flame tree				✔
Breynia cernua	Fart bush				✔
Calophyllum inophyllum	Beach calophyllum				✔
Calophyllum sil	Blush touriga				✔
Canarium vitiense	Canarium				✔
Canavalia rosea	Beach bean	✔	✔	✔	✔
Carallia brachiata	Corky bark, Fresh water mangrove				✔
*Casuarina equisetifolia**	Beach casuarina				✔
Cerbera manghas	Dog bane				✔
Chionanthus ramiflora	Native olive				✔
*Clerodendrum floribundum**	Lolly bush				✔

[1] * denotes pioneer species that will grow and establish quickly, allowing for natural recruitment or planting of secondary species.

Botanical name[1]	Common name	Precinct 1	Precinct 2	Precinct 3	Precinct 4
Clerodendrum inerme	Scrambling clerodendrum	✔	✔	✔	✔
*Clerodendrum longiflorum**	Long flowered clerodendrum				✔
*Colubrina asiatica**	Beach berry bush	✔	✔	✔	✔
*Cordia subcordata**	Sea trumpet				✔
Crinum pedunculatum	Beach lily, Swamp lily	✔	✔	✔	✔
Cupaniopsis anacardioides	Beach Tamarind				✔
Cyperus pedunculatus		✔	✔	✔	✔
Deplanchea tetraphylla	Golden bouquet tree				✔
Dillenia alata	Red beech				✔
Diospyros compacta	Australian ebony				✔
*Dodonea viscosa**	Hop bush	✔	✔	✔	✔
Elaeodendron melanocarpum	False olive				✔
Eucalyptus plattyphylla	Ghost gum				✔
*Euroschinus falcata**	Pink poplar				✔
Ficus benjamina	Weeping fig				✔
Ficus drupacea	Drupe fig				✔
Ficus microcarpa	Small fruited fig				✔
Ficus opposita	Sandpaper fig				✔
Ficus racemosa	Cluster fig				✔
*Ganophyllum falcatum**	Daintree hickory				✔
Glochidion harveyanum	Harvey's buttonwood				✔
Glochidion philippicum	Daintree cheese tree				✔
Gmelina dalrympleana	White beech				✔
Gomphandra australiana	Buff beech				✔
*Guioa acutifolia**	Glossy tamarind				✔
Haemodorum coccineum	Blood root	✔	✔	✔	✔

Botanical name[1]	Common name	Precinct 1	Precinct 2	Precinct 3	Precinct 4
*Hibiscus tiliaceus**	Coast cottonwood				✔
Intsia bijuga	Kwila				✔
*Ipomoea pes-caprae**	Coastal morning glory	✔	✔	✔	✔
Jagera pseudorhus	Foambark				✔
Livistona muelleri	Northern Cabbage Tree Palm				✔
Lophostemon suaveolens	Swamp mahogany, swamp box				✔
*Macaranga tanarius**	Kamala, Blush macaranga				✔
Mallotus philippensis	Red Kamala				✔
Maytenus fasciculiflora	Orangebark				✔
Melaleuca leucadendra	Weeping paperbark				✔
Melaeuca viridiflora	Broad leaved paperbark				✔
Melia azederach	White cedar				✔
Micromelum minutum	Lime berry				✔
Miliusa brahei	Rasberry jelly plant				✔
*Millettia pinnata**	Pongamia tree				✔
Mimusops elengi	Red coondoo				✔
Mischocarpus exangulatus	Red bell mischocarp				✔
Morinda citrifolia	Rotten cheesefruit				✔
Pandanus tectorius	Beach pandan				✔
*Pittosporum ferrugineum**	Rusty pittosporum				✔
Planchonia careya	Cocky apple				✔
Pleiogynium timorense	Burdekin plum				✔
*Polyscias elegans**	Celerywood				✔
Pouteria chartacea	Thin leaved coondoo				✔
Pouteria obovata	Yellow boxwood				✔
*Premna serratifolia**	Coastal premna				✔

Botanical name[1]	Common name	Precinct 1	Precinct 2	Precinct 3	Precinct 4
Ptychosperma elegans	Solitaire palm				✔
Rhus taitensis	Sumac				✔
*Scaevola taccada**	Beach lettuce	✔	✔	✔	✔
Schefflera actinophylla	Umbrella tree				✔
Scolopia braunii	Brown birch				✔
Sporobolus virginicus	Sand couch	✔	✔	✔	✔
Sterculia quadrifida	Peanut tree				✔
Syzygium angophoroides	Yarrabah satinash				✔
Syzygium hemilamprum (Syn. Acmena hemilampra)	Blush satinash				✔
Tarenna dallachiana	Tree ixora				✔
Terminalia arenicola	Brown damson				✔
*Terminalia catappa**	Indian almond				✔
Terminalia microcarpa	Damson plum				✔
Terminalia muelleri	Mueller's damson				✔
*Thespesia populneoides**	Tulip tree				✔
Thuraea involuta	Tropical beachgrass	✔	✔	✔	✔
Timonius timon	False fig				✔
Vitex rotundifolia	Beach vitex	✔	✔	✔	✔
*Vigna marina**	Beach pea	✔	✔	✔	✔



Attachment E. Monitoring guidelines

Rapid Vegetation Assessment Method Data collection

General survey information	Survey ID	Description of survey					
	Assessor Name/s	Descriptive text					
	Date of record	Date					
	Assessment number	Assessment	1	2	3	4	5
Specific location	General Location	Descriptive text					
	Easting	GPS spatial data					
	Northing	GPS spatial data					
	Spatial uncertainty	GPS spatial data					
Desired cover by year 5							
	Present	1 (1-5)	2 (6-25)	3 (26-50)	4 (51-75)	5 (76-100)	Absent
Under							
Mid							
Over							
Current overall cover							
	Present	1 (1-5)	2 (6-25)	3 (26-50)	4 (51-75)	5 (76-100)	Absent
Under							
Mid							
Over							
Percentage survival of each layer							
	Present	1 (1-5)	2 (6-25)	3 (26-50)	4 (51-75)	5 (76-100)	Absent
Under							
Mid							
Over							
Species specific observations							
	% Understorey		% Mid-storey		% Overstorey		%
Sp. 1							
Sp. 2							
Sp. 3							
Sp. 4							

Sp. 5							
Environmental weeds cover							
	Present	1 (1-5)	2 (6-25)	3 (26-50)	4 (51-75)	5 (76-100)	Absent
Under							
Mid							
Over							
High threat environmental weeds							
	% Understorey		% Mid-storey		% Overstorey		%
Sp. 1							
Sp. 2							
Sp. 3							
Sp. 4							
Sp. 5							
Bare ground created by disturbance							
	Present	1 (1-5)	2 (6-25)	3 (26-50)	4 (51-75)	5 (76-100)	Absent
Vehicles							
People							
Erosion							
Other							
Natural recruitment							
	Absent		Present		%		
Under							
Mid							
Over							
Connectivity							
	Patch size (ha)		Distance (km)		Connection		
Patch 1					H	M	L
Patch 2					H	M	L
Patch 3					H	M	L
Significant species identified							
	Location	Population size	Threat		Proposed response		

Sp. 1				
Sp. 2				
Sp. 3				

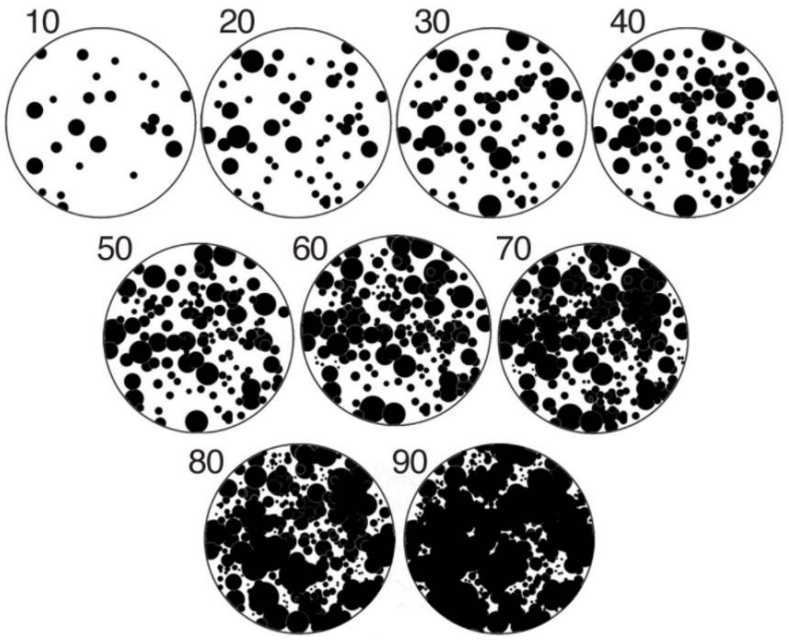
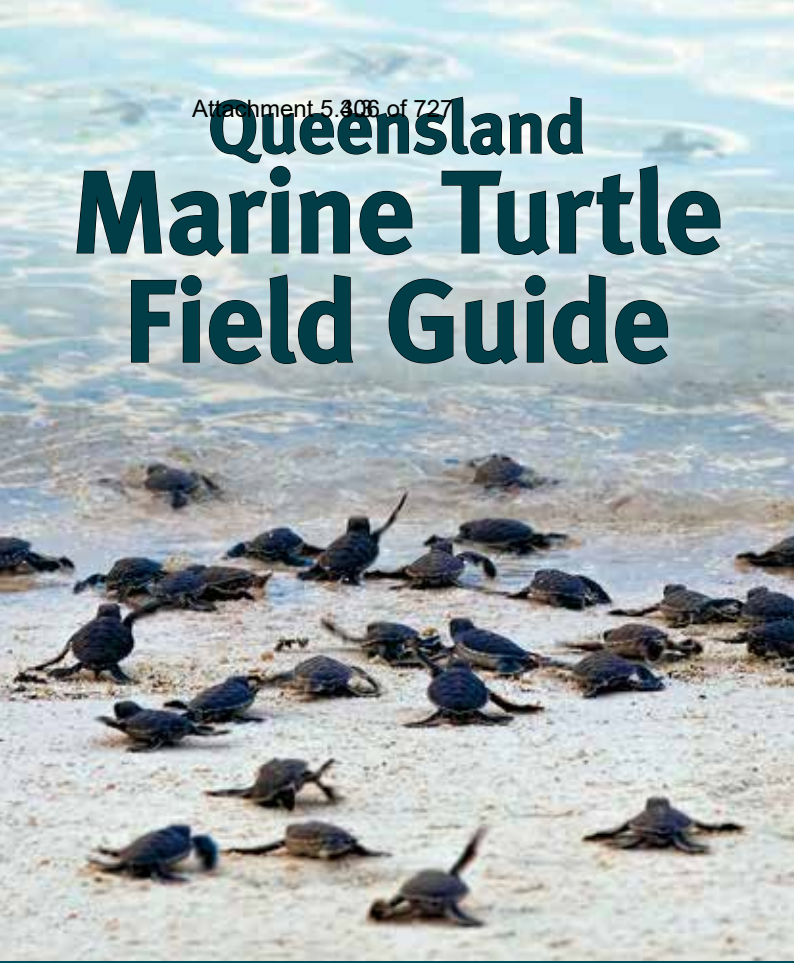


Figure 11. *Schematic representation of percentage cover categories.*

Queensland Marine Turtle Field Guide



Nest to Ocean Turtle Protection Program

Australian Government

Queensland Government


APN

Queensland's coast has some of the most important marine turtle nesting sites in the world. Six species of threatened marine turtles nest along our idyllic beaches. These rookeries support significant nesting populations of green, loggerhead, hawksbill, flatback and olive ridley turtles.

One of the most serious threats to nesting turtle populations is the destruction of their eggs and hatchlings by predators. Feral pigs have been found to be responsible for destroying over 70 per cent of turtle nests at nesting beaches on Cape York, continued loss at this rate is not sustainable. Other predators include foxes, dogs, dingoes and goannas.

To reduce predation on marine turtle nests and help the recovery of threatened marine turtle populations, the Australian and Queensland Governments have together invested nearly $7million in the Nest to Ocean Turtle Protection Program. The program supports predator control and turtle monitoring at priority nesting beaches. It also assists Traditional Owner and community groups to increase their participation in these important activities.

This field guide has been developed as part of the Nest to Ocean Turtle Protection Program. Correctly identifying marine turtles, and the animals that prey on their nests, provides valuable information about turtle populations and shows where predator control activities are most needed.

Nest to Ocean
Turtle Protection Program

Front Cover: Turtle Hatchlings © Kyburgh
Inside Cover: Steven Marpoondin (APN Cape York) © *Brian Ross*

Contents

Marine Turtle Species Identification Key

Indo-Pacific Marine Turtles

Carapace with:
- 5 distinct continuous ridges
- No large scales
- No claws on flippers

Leatherback Turtle
Dermochelys coriacea

Carapace with:
- No continuous ridges
- Large scales
- Claws on flippers

4 pair costal scales

5 pair (rarely 6) costal scales

Carapace longer than wider
Red-brown to brown
No pores in scale of bridge

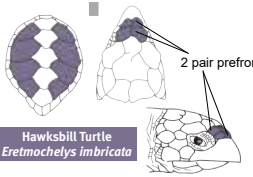
Loggerhead Turtle
Caretta caretta

6 pair or more costal scales

Carapace more circular
Grey-green
Pores in scale of bridge

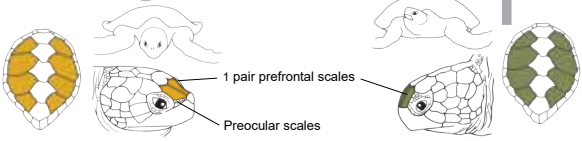
Olive Ridley Turtle
Lepidochelys olivacea

2 pair prefrontal scales
Thick overlapping carapace scales



Hawksbill Turtle
Eretmochelys imbricata

1 pair prefrontal scales
No thick overlapping carapace scales



Low domed carapace with upturned edges
Preocular scales
Olive grey

Flatback Turtle
Natator depressus

High domed carapace
No preocular scales
Light to dark green with dark mottling

Green Turtle
Chelonia mydas

Photographs of Adults and Hatchlings

Green Turtle *Chelonia mydas* Page 10

Olive Ridley Turtle *Lepidochelys olivacea* Page 14

Hawksbill Turtle *Eretmochelys imbricata* Page 18

Marine Turtle Track Identification Key

Alternating Stroke

Flipper marks alternate

Track Features

Early morning monitoring is best as tracks will deteriorate over time. The clarity of tracks can be affected by flipper damage, terrain, sand moisture, tides, wind and weather. Look for several key identifying features, along different sections of track.

The key track identification features are:

- Stroke Style
- Track Width
- Hind Flipper Marks
- Front Flipper Marks
- Plastron Drag
- Tail Drag

Loggerhead

Track Width
Less than 1 meter

Hind Flipper

Front Flipper

Plastron Drag

Tail Drag
Not present

Hawksbill

Track Width
Approx. 70-80 cm

Hind Flipper

Front Flipper

Plastron Drag

Tail Drag

Olive Ridley

Track Width
Approx. 70-80 cm

Hind Flipper

Front Flipper

Plastron Drag

Tail Drag

Breast Stroke

Flipper marks side by side

Green

Track Width
Approx. 94-144 cm

Hind Flipper

Front Flipper

Plastron Drag

Tail Drag

Flatback

Track Width
Approx. 90-100 cm

Hind Flipper

Front Flipper

Plastron Drag

Tail Drag

Leatherback

Track Width
Greater than 2 meters

Hind Flipper

Front Flipper

Plastron Drag
Not Visible

Tail Drag

Track Direction

Clues to determine track direction:

Turtles push sand backwards, the higher sand mound is at the back.

If track overlaps, the top track is the returning track.

Sand is always thrown back over the emerging track when digging.

Measuring Width

Measure from outer edge of track. This may be the front or rear flipper, depending on species.

Basic Beach Monitoring

Guidelines on how to **Record** data and implement **Action** during a basic beach survey (see page 9). These may be tailored to suit individual monitoring programs and implemented in accordance with training.

Record

Species Identification: Use track or sighting to identify species.

GPS Nest Location: Note GPS coordinates & waypoint number.

False Crawl: Track with no nest.

Extent of Damage: Partial or complete destruction of nest.

Evidence of Predation: Diggings, tracks, sighting.

Predator Identification: Use track or sighting to identify species.

Hatchlings Emerged: Yes, hatchling tracks or sighting.

Tag Information: Note tag ID number and its location on turtle.

Curved carapace length (CCL): From front (where skin and carapace meet), down midline to back edge of carapace (over tail).

Action

Photograph: To verify species and/or nest damage/predation.

Mark Nest: Install marker to indicate nest location (if required).

Bury Eggshells and Mark Track: To avoid record duplication; mark track line above the high tide mark.

Submit Data: Project manager to submit data to the relevant Queensland Department.

Basic Beach Survey

Traverse beach to locate fresh turtle tracks.
Walk along the high tide line or drive on the wet sand just below the high tide mark

Equipment Checklist

- GPS (Use datum WGS 84 and decimal degrees)
- Data sheets or charged data recording device
- Pencil
- Tape measure
- Camera
- Personal safety gear
- Torch (night monitoring)
- Spare batteries
- Monitoring field guide

Record fresh tracks only

Adult Track
No nesting turtle

Identify Species

refer to **Track Identification** (Pages 6-7)

Is there a nest or is it a false crawl?

Nest

Record / Action
- Species ID
- GPS Nest Location
- Mark Nest

Is nest damaged?

- No
- Yes

Record / Action
- Extent of Damage
- Evidence of Predation
- Predator ID (refer to pages 22-25)
- Photograph
- Bury Eggshells

False Crawl

Record / Action
- Species ID
- False Crawl

Unsure

Record / Action
- Species ID
- GPS Nest Location
- Mark Nest
- Photograph

Adult Track
Nesting turtle

Identify Species

refer to **Species Identification** (Pages 3-5, 10-21)

Once female has settled into laying or has completed nesting

Record / Action
- Species ID
- Tag Information
- Curved carapace length
- GPS Nest Location
- Mark Nest

Refer to Page 8 for Record / Action monitoring protocols

Hatchling Tracks
Hatchlings

Identify Species

if hatchling present refer to **Species Identification** (Pages 3-5, 10-21)

Record / Action
- Species ID
- Hatchlings Emerged
- Marked Nest ID or GPS Nest Location
- Evidence of Predation
- Predator ID (refer to pages 22-25)

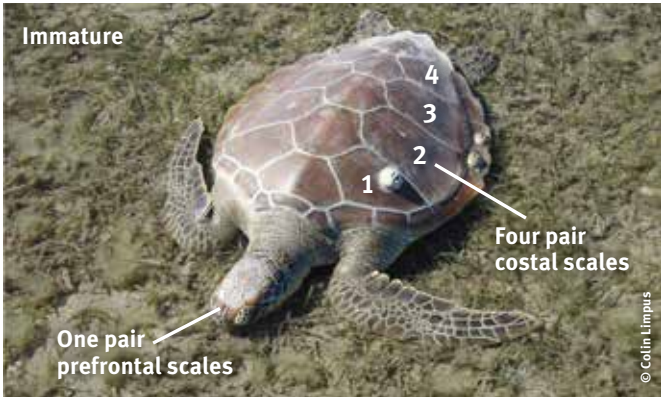
Mark monitored track with a line, above high tide mark, so it's not recorded twice

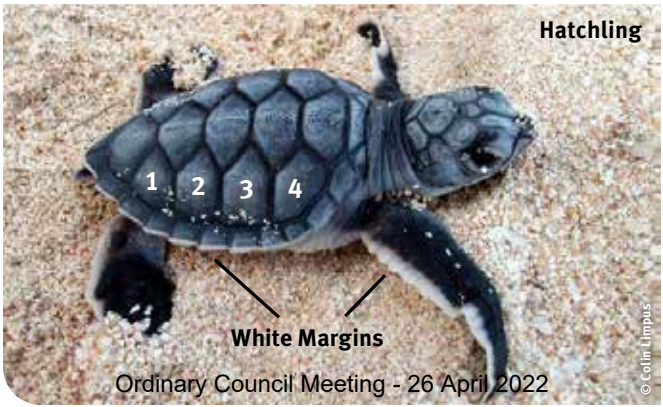
Continue and complete survey

Submit data forms and photographs for verification to project manager

Green Turtle, *Chelonia mydas*

Status: Nationally Vulnerable, Queensland Vulnerable





Key Identification Features

Breast Stroke Track

Carapace Scales

4 Pair Costal Scales

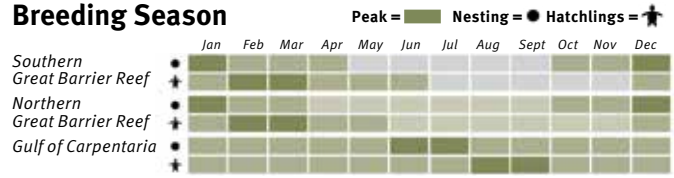
1 Pair Prefrontal Scales

Qld Nesting Sites

Adult: *Carapace is a high dome. Colour is light to dark green with dark mottling. Plastron colour is cream-white.*

Hatchling: *Black-dark brown with white margins, white plastron.*

Breeding Season



Loggerhead Turtle, *Caretta caretta*

Status: Nationally Endangered, Queensland Endangered

Key Identification Features

Alternating Track

Carapace Scales

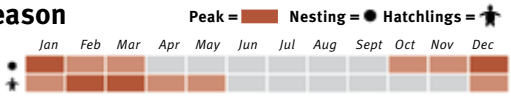
5 Pair Costal Scales

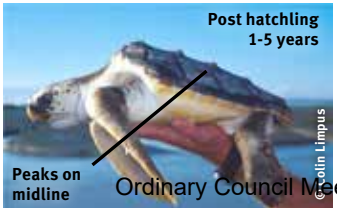
Qld Nesting Sites

Adult: *Carapace is longer than wider. Colour is red-brown to brown. Plastron colour is yellow.*

Hatchling: *Dark brown with 5 costal scales and dark plastron with 3-4 inframarginal scales.*

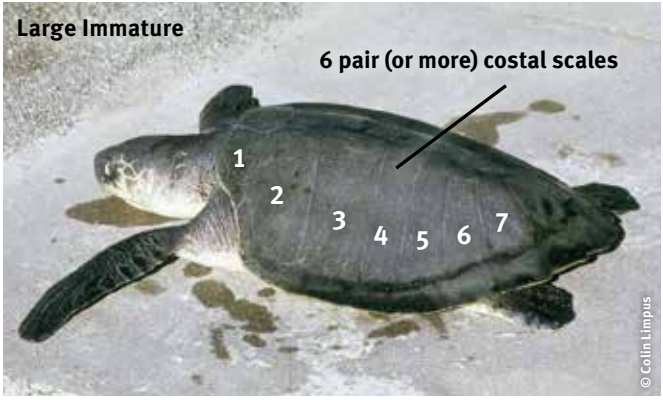
Breeding Season





Olive Ridley Turtle, *Lepidochelys olivacea*

Status: Nationally Endangered, Queensland Endangered

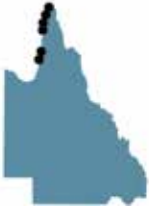


Key Identification Features

Alternating Track

Carapace Scales

6 Pair (or more) Costal Scales

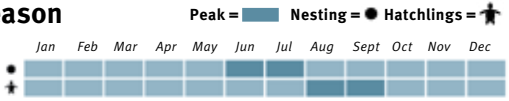


Qld Nesting Sites

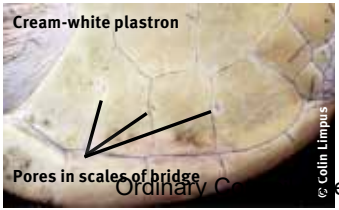
Adult: *Carapace is circular. Colour is grey-green with no conspicuous markings. Plastron colour is cream-white.*

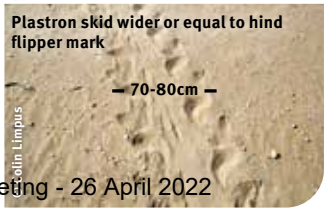
Hatchling*: Charcoal-grey/black-brown on both sides.*

Breeding Season



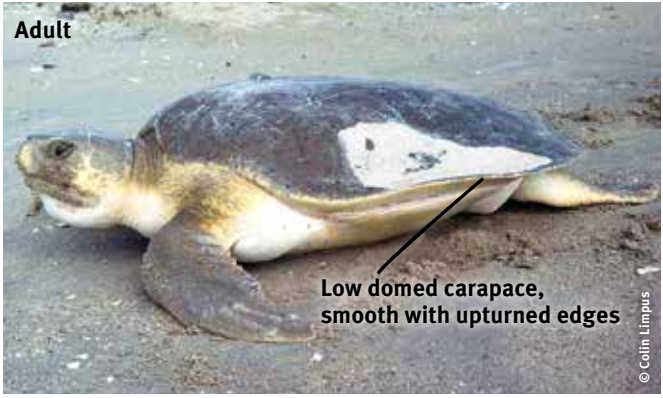
All year, peaks during dry season.

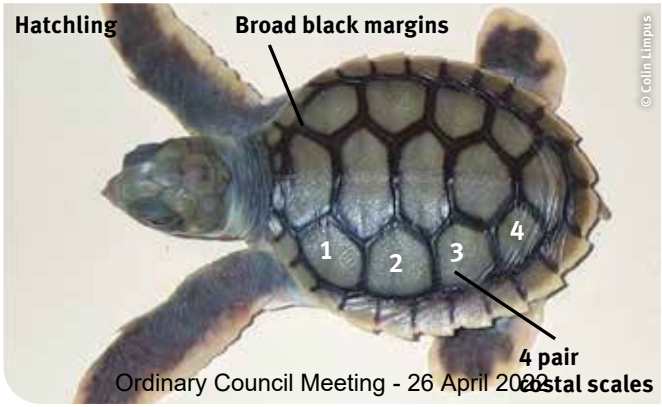




Flatback Turtle, *Natator depressus*

Status: Nationally Vulnerable, Queensland Vulnerable





Key Identification Features

Breast Stroke Track

Carapace Scales

4 Pair Costal Scales

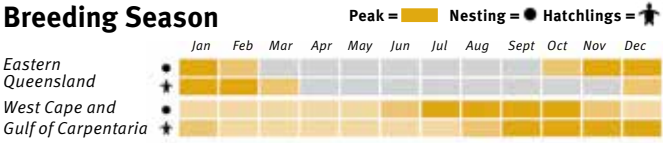
1 Pair Prefrontal Scales

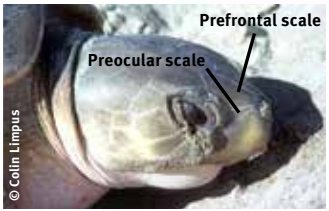
Qld Nesting Sites

Adult: *Carapace is a low dome, smooth with upturned edges. Colour is grey to pale-grey or olive. Preocular scales. Plastron is creamy-yellow.*

Hatchling: *Olive-green, scales with broad black margin. Plastron is a solid white.*

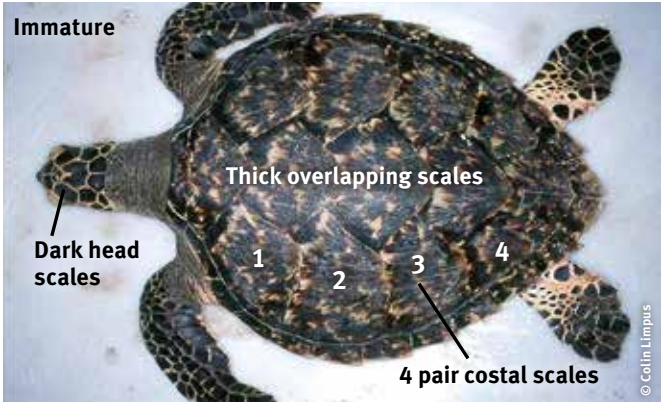
Breeding Season





Hawksbill Turtle, *Eretmochelys imbricata*

Status: Nationally Vulnerable, Queensland Vulnerable



Key Identifcation Features

Alternating Track

Scales Thick Overlapping

4 Pair Costal Scales

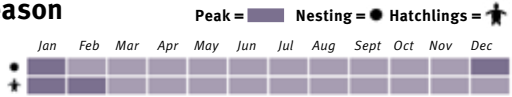
2 Pair Prefrontal Scales

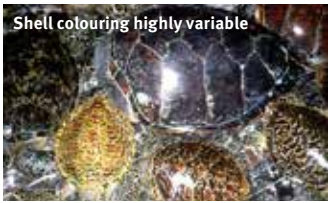
Qld Nesting Sites

Adult: *Carapace has thick overlapping scales. Colour is olive green or brown and is extensively variegated with brown/black markings. Adult plastron is yellow or white with black spots.*

Hatchlings: *Dark brown.*

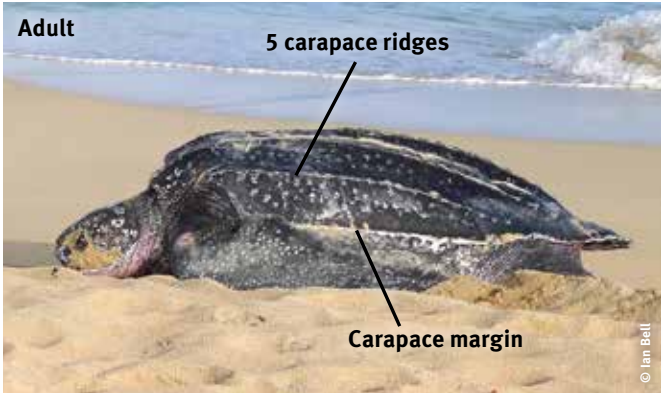
Breeding Season

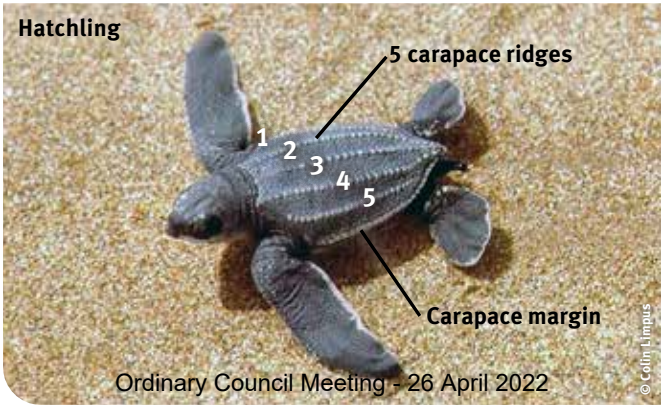




Leatherback Turtle, *Dermochelys coriacea*

Status: Nationally Vulnerable, Queensland Endangered





Key Identification Features

Breast Stroke Track

No Carapace Scales

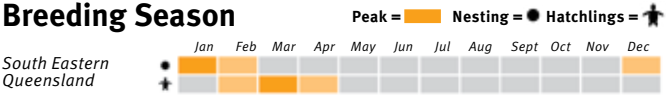
5 Carapace Ridges

Qld Nesting Sites

Adult: *Carapace is long and pointed. Long ridges run down the length of carapace. Colour is a uniform black-brown. Soft leathery skin.*

Hatchlings: *Finely beaded, black with white markings on the carapace ridges and plastron.*

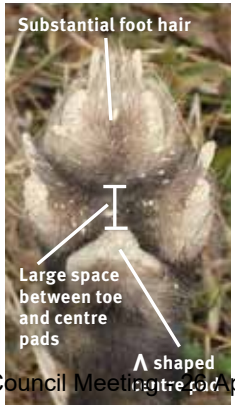
Breeding Season



Fox

Track Identification Features

- Front foot is larger than back foot.
- Elongated oval shaped claws, may not show on track.
- Substantial foot hair, sometimes visible on track impression.
- Large space between centre pad and toe pads.
- Centre pad has a distinct inverted V shape.
- Tracks are straight, hind feet reusing front feet impressions.
- Small track width.



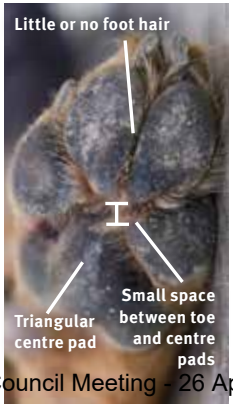
Management Options

- Den detection and fumigation
- Ground shooting
- Trapping
- Baiting
- Exclusion fencing
- Nest protection (cages)

Wild Dog or Dingo

Track Identification Features

- Front foot is larger than back foot.
- Little or no foot hair in between pads.
- Small space between centre pad and toe pads.
- Centre pad almost triangular.
- Foot imprint rounded.
- Tracks are straight but not as neat and aligned as a fox's track.



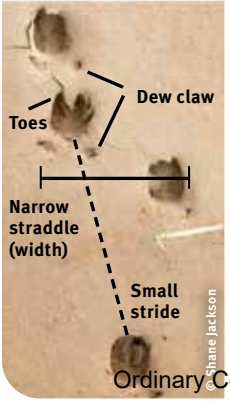
Management Options

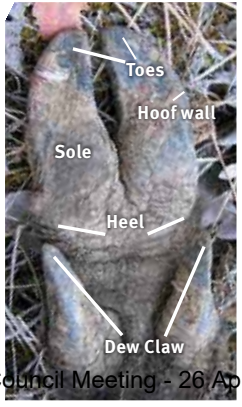
- Ground shooting
- Leg hold trapping
- Baiting (1080 or strychnine)
- Exclusion fencing
- Nest protection (cages)

Feral Pig

Track Identification Features

- Back feet slightly larger than front.
- Foot print consists of a two toe hoof and two dew claws.
- Dew claws distinctive identification feature but may not be present in harder soils.
- Small stride and narrow straddle.





Management Options

- Ground/aerial shooting
- Trapping
- Baiting
- Exclusion fencing
- Nest protection (cages)

Goanna

Track Identification Features

- Both walk and run tracks have alternating foot prints.
- Trail drag usually visable.

Nest Predation Identification

- Goannas burrow into nest at an angle from the side of the nest, not vertical from directly above.
- The burrow is typically domed shape, not circular.

Management Options

- Trapping
- Exclusion fencing
- Nest protection (cages)

Principles of Pest Management

Managing pest animals requires long-term control programs and a variety of approaches. Effective programs are designed around these eight principles:

1. INTEGRATION

Ensuring pest management programs are an integral part of the management of natural areas.

2. PUBLIC AWARENESS

Raising public awareness and knowledge of pests to increase community and individual participation in pest management.

3. COMMITMENT

Gaining a commitment to long term programs by the community, industry groups and government entities.

4. CONSULTATION AND PARTNERSHIP

Establishing partnerships between local communities, industry groups, state government agencies and local governments to achieve a collaborative approach.

5. PLANNING

Consistent planning at local, regional, state and national levels ensures combined resources target the agreed priorities.

6. PREVENTION

Preventing the spread of pests, and using early detection and intervention to control pests.

7. BEST PRACTICE

Using ecologically and socially responsible pest management practices to protect the environment and natural resources.

8. IMPROVEMENT

Research and regular monitoring and evaluating of programs helps improve and refine pest management practices.

Threats to Marine Turtles

Marine turtles are long-lived and slow to mature. Depending on the species they can take anywhere between 8–50 years to reach breeding age. Due to the range of threats, at their different life stages, it is thought that only 1 in 1000 hatchlings will survive to adulthood and then return to the beach to nest. For this reason it is critical to address the range of threats throughout their lifecycle.

Threats include:

- Native and introduced animals predating turtle eggs and hatchlings.
- Vehicles compacting turtle nests or forming tyre ruts that trap hatchlings.
- Humans taking turtle eggs.
- Bycatch of marine turtles in fisheries.
- Marine debris.
- Impact to breeding habitat from coastal development and artificial lighting.
- Deteriorating water quality.
- Unknown and possibly unsustainable levels of turtle harvesting, in and outside Australian waters.

What you can do:

- Support the management of predators such as pigs, dogs and foxes around turtle nesting beaches.
- Report turtle nests and predated turtle nests to your local ranger.
- Keep your dogs on a lead when walking on the beach during nesting/hatchling season.
- Drive slowly on beaches and avoid driving over nests. Drive on the wet sand below the high tide mark to avoid making wheel ruts.
- Pick up marine debris from the beach and waterways.
- Report ghost nets to your local ranger.
- At night, minimise lights on the beach, including campfires.
- Support sustainable, traditional use of turtle and turtle eggs.

Acknowledgements

The Queensland Parks and Wildlife Service Nest to Ocean Turtle Protection Program Team would like to acknowledge the contribution of staff from the following organisations in the development of the field guide: Western Cape Turtle Threat Abatement Alliance supported by Cape York Natural Resource Management, Balkanu Cape York Development Corporation, Aak Puul Ngantam, Feralfix, World Wildlife Fund for Nature, and University of Queensland. Also acknowledged is the input and advice of staff from our partnering Australian and Queensland Government departments.

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Prepared by:
Queensland Parks and Wildlife Service,
Department of Environment and Science.

Four Mile Beach

FORESHORE MANAGEMENT PLAN

April 2022

DOUGLAS SHIRE COUNCIL

The Eastern Kuku Yalanji and Yirrganydji Peoples are the Traditional Custodians and Owners of the land and sea country that encompass the Douglas Shire region.

Douglas Shire Council acknowledges the 'Bama', the traditional rainforest Aboriginal coastal people of our region who hold the unique position of being the First Peoples of this country. We recognise and respect Bama cultural heritage, values, beliefs and continuing relationships and responsibility to their land and sea country. We honour and respect your Elders past, present and future.

We commit to maintaining and strengthening our partnerships and respectful relationships with Bama in the spirit of reconciliation so that together we can increase the opportunities for successful and positive outcomes to the advantage of everyone in our communities.

Council respectfully acknowledges other Aboriginal and Torres Strait Islander people who call our region 'home'.

This report has been prepared by Alluvium Consulting Australia Pty Ltd and Wild Environmental for Douglas Shire Council under the contract titled 'WO5429 Foreshore Management Plan'.

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Cover image:	Four Mile Beach foreshore.

Contents

Figures

Tables

1 Introduction

The coastline is an important place for many Australians, providing significant social and cultural value. This is especially so for many residents of the Douglas Shire who have identified these unique coastal landscapes and natural ecosystems among some of the most important factors attracting people to this coastline (DSC 2019a). The Douglas Shire coastline also has high tourism value, attracting many visitors to the area.

The Eastern Kuku-Yalanji and Yirriganydji Peoples are the Traditional Custodians of the Land and Sea Country within the Douglas Shire. They have lived in and cared for this region for thousands of years, represented in important cultural sites throughout the Shire, and the memories and experiences of its people; past, present and future.

Douglas Shire Council (DSC) has an extensive 111 km long coastline that extends from Degarra in the north to south of Wangetti. The Shire is well known for its diverse coastline and its proximity to the Great Barrier Reef. Much of the Shire is within the Wet Tropics World Heritage Area and its dynamic coast consists of a variety of sandy beaches, rocky headlands and coastal rainforests.

The region's beaches and foreshore areas are important both to people and to the ecosystems around them. Coastal landscapes provide essential habitat for life on the foreshore and provide visual and recreational amenity to the people. Healthy coastal ecosystems are necessary to promote the resilience of plant and animal communities to coastal hazard impacts. Denser vegetation types are also effective in reducing the destructive forces of a storm tide for communities and infrastructure landward of the foreshore.

However, these ecosystems are experiencing ongoing disturbance as a result of erosion, vehicle and pedestrian access, weeds and pest species, illegal dumping, and runoff from stormwater and agricultural land. These factors threatening dune stability and reducing the erosion buffer often result in vegetation loss, impacts to native fauna species, and changes in ecosystem structure.

To help manage and protect these important coastal zones, DSC has developed five Foreshore Management Plans (FMPs) for the Wonga, Newell, Cooya, Four Mile and Oak Beaches.

1.1 Purpose

In 2019, DSC developed the Resilient Coast Strategic Plan 2019-2029 (referred to henceforth as the Strategy) and have committed to undertake actions to reduce the impacts of coastal hazards, such as erosion and coastal flooding, and activities in the coastal zone. A priority outcome of the Strategy is to undertake dune protection, maintenance and monitoring. This encompasses the foreshore area and is the focus of the FMP.

The FMPs will help to guide Council in the protection, maintenance and management of the coastline and foreshore, while maintaining the natural character of the area and respecting ecological, cultural and social values of these coastal reserves. Funding has been secured through the Queensland Government Reef Assist Program which will be used to support the implementation of the management actions outlined in the FMP.

The plans will:

- Ensure there is a **shared understanding** of the social, cultural, environmental and economic values and uses of the foreshore zone
- Identify options for the **proactive management** of vulnerable areas of the foreshore zone over the next 5 years
- Help **improve and maintain** the vegetation cover and condition in the foreshore zone.

1.2 Foreshore Management Plan area

Four Mile Beach is approximately 5.5 km long and represents approximately 5 % of the Shire's coastal length. The beach forms part of a sandy beach ridge system which extends south from Flagstaff Hill to the mouth of the Mowbray River (DSC 2019b) (Figure 1). There are a number of smaller creek outlets that drain onto the beach and cause minor erosion, however, the beach has relatively healthy and stable dunes. The upper beach is flat and gently slopes down.

Four Mile Beach is located within the Port Douglas suburb area, which is the largest settlement in the Douglas Shire. According to the most recent census, there are approximately 3,500 residents in the Port Douglas area and more than 1,200 dwellings (ABS 2017; DSC 2019b). However, the population can almost double during peak tourist season and is also likely to have increased since 2016. There is a surf lifesaving club located at the northern end of Four Mile Beach, including a guard tower and swimming nets.

1.3 Implementation

This FMP has been developed following a series of site inspections, including vegetation mapping, species identification and coastal morphology assessments, as well as public engagement with residents and ratepayers from Four Mile Beach and the greater Douglas Shire. The site inspections and public engagement have informed the management actions and planning decisions for the Four Mile Beach foreshore area. The management actions have been tailored to incorporate what the community values about their foreshore and how the foreshore is used.

Figure 1. *Four Mile Beach foreshore management area.*

The Four Mile Beach FMP outlines actions for dune protection, including weed species for removal, native vegetation species for regeneration, and pedestrian access management. It also provides a schedule for implementation to allow Council to prioritise actions for the area. This FMP remains non-statutory but once approved by Council provides an informed and proactive guide for the future management of Four Mile Beach.

2 Study area and planning context

Four Mile Beach is a coastal community located on a sandy beach ridge system from Flagstaff Hill to the mouth of the Mowbray River. It is bordered by the Great Barrier Reef Marine Park seaward and the Wet Tropics World Heritage Area to the west. There are a variety of land zoning uses and ecological communities at Four Mile Beach. The following section outlines the DSC land zoning and vegetation and faunal communities that have been identified in literature review and supported by findings from the site visits and surveys.

2.1 Legislative, policy and strategy setting

Coastal management is guided by Commonwealth, State and local legislation. The legislation results in a complex structure of rights and responsibilities. Key legislation, plans, policies and strategies relevant to foreshore management are summarised in Table 1.

Table 1. Summary of the legislation, policy, plans and strategies relevant to foreshore management

Legislation	Relevance

Biosecurity Act 2014	• This Act provides a comprehensive biosecurity framework to manage the impacts of animal and plant diseases and pests.
	• The purpose of this Act is to:
	  ○ Provide a framework for an effective biosecurity system for Queensland.
	  ○ Ensure the safety and quality of animal feed, fertilisers and other agricultural inputs.
	  ○ Help align responses to biosecurity risks in the State with national and international obligations and requirements.
	• The purpose of the Act is also to manage risks associated with emerging, endemic and exotic pests and diseases.

Coastal Protection and Management Act 1995	• This Act aims to provide for the protection, conservation, rehabilitation and management of the coastal zone, including its resources and biological diversity. • This Act considers the goal, core objectives and guiding principles of the National Strategy for Ecologically Sustainable Development in the use of the coastal zone. • This Act ensures that decisions about land use and development safeguard life and property from the threat of coastal hazards. • This Act encourages the enhancement of knowledge of coastal resources and the effect of human activities on the coastal zone.

Planning Act 2016	• This Act provides for an efficient, effective, transparent, integrated, coordinated and accountable systems of land use planning and development assessment to facilitate the achievement of ecological sustainability by:
	  ○ Coordinating and integrating planning at the local (i.e., planning schemes), regional and State scales
	  ○ Managing the process and effects of development on the environment (including managing the use of premises).

Native Title Act 1993	• The purpose of this Act is for the recognition and protection of native title.
	• It covers:
	  ○ Acts affecting native title.
	  ○ Determining whether native title exists and compensation for acts affecting native title.

Legislation	Relevance
Aboriginal Cultural Heritage Act 2003	• The main purpose of this Act is to provide effective recognition, protection and conservation of Aboriginal cultural heritage.
Vegetation Management Act 1999	• This Act aims to regulate the clearing of vegetation by: o Managing the environmental effects of clearing. o Regulating clearing in a way that conserves remnant vegetation that is an endangered regional ecosystem, an of concern ecosystem, or a least concern regional ecosystem. o Ensuring clearing does not cause land degradation and allows for sustainable land use. o Preventing the loss of biodiversity, maintain ecological processes, and reduce greenhouse gas emissions.
Environmental Protection Act 1994	• This Act aims to protect Queensland's environment while allowing for development that improves the total quality of life, both now and in the future, and that maintains the ecological processes on which life depends. • The Act defines environmental value, environmental harm and best practice environmental management.
Nature Conservation Act 1992	• This Act aims to conserve nature while allowing for the involvement of indigenous people in the management of protected areas. • This is to be achieved by a conservation strategy for Queensland that declares and manages protected areas, protects native wildlife and habitats, ensures use of protected wildlife and areas to be ecologically sustainable, and allows cooperative involvement of Aboriginal and Torres Strait Islander people.
Environment Protection and Biodiversity Conservation Act 1999	• This Act aims to provide protection of the environment, promote ecologically sustainable development and the conservation of biodiversity. • The Act aims to promote the use of indigenous knowledge of biodiversity through a cooperative approach to the protection and management of environments.
Queensland Local Government Act 2009	• This Act provides a system of local government in Queensland, including: o The way in which a local government is constituted and the nature and extent of its responsibilities and powers o A system of local government in Queensland that is accountable, effective, efficient and sustainable.
Marine Parks Act 2004	• The main purpose of this Act is to provide for conservation of the marine environment. • This purpose as it relates to this plan can be achieved through: o Cooperative involvement of public authorities and other interested groups and persons, including members of Aboriginal and Torres Strait Islander communities. o Recognition of the cultural, economic, environmental and social relationships between marine parks and other areas, whether of water or land.

Legislation	Relevance
Local Laws	• Local laws sit within the *Local Government Act 2009* and under the Act a local government may make and enforce any local law that is necessary or convenient for the good rule and local government of its local government area. • This legislation sets out the laws for the DSC area, including animal management, community and environmental management, local government areas, and facilities.

2.2 Zoning

Land use

The DSC Planning Scheme (2018) has been used to understand the boundaries between different land uses (Figure 2) (DSC 2018a). At Four Mile Beach, the primary land uses within or immediately adjacent to the foreshore area are recreation and open space, and low-medium density and medium density residential. These land uses have implications for the management of the foreshore area. Changes within these zones can have flow-on impacts to the foreshore area, including:

- habitat fragmentation (loss of habitat into smaller, isolated areas)
- runoff
- illegal clearing and planting, including weed dispersal and growth
- impacts on fauna (light and noise pollution, road/beach kills).

Recreation and open space

Much of the length of the Four Mile Beach foreshore area is dedicated to recreation and open space. The purpose of the recreation and open space zone is to provide for informal recreation where the built form is not essential to the enjoyment of the space, parks that serve the recreational needs of residents and visitors, and a range of organised activities that require a level of built infrastructure (DSC 2018a). Relevant outcomes to the recreation and open space zone include (DSC 2018a):

- Areas are provided for active sport and recreation to meet community needs.
- Open space is accessible to the general public for a range of outdoor sport and recreation activities.
- A range of functional and accessible open spaces, including local and regional parks and linkages, are available for the use and enjoyment of residents and visitors.
- Ancillary structures and buildings such as shelters, amenity facilities, picnic tables and playgrounds are provided where necessary.
- Sport and recreation areas are planned and designed to enhance community liveability, scenic amenity and provide a retreat from developed areas.
- The use of sport and recreation areas does not unduly affect the amenity of adjacent areas particularly residential areas.

Residential

Within Four Mile Beach, there are low-medium density and medium density residential areas with and adjacent to the foreshore area. Low-medium density residential areas provide for a range and mix of dwelling types including dwelling houses and multiple dwellings supported by community uses and small-scale services and facilities that cater for local residents. The purpose of the low-medium density residential zone will be achieved through the following relevant outcomes relevant to foreshore management (DSC 2018a):

- Development is designed to provide safe and walkable neighbourhoods.
- Development maintains a high level of residential amenity having regard to traffic, noise, dust, odour, lighting and other specific impacts.
- Development is reflective and responsive to the environmental constraints of the land.

- Development provides a high level of amenity and is reflective of the surrounding character of the area.
- Development is supported by necessary community facilities, open space and recreational areas and appropriate infrastructure to support the needs of the local community.

Medium density residential areas provide the same the same amenity as low-medium density residential zones. The purpose of the zone relevant to foreshore management can be achieved through the following outcomes (DSC 2018a):

- Development is of an appropriate scale and achieves an attractive built form which incorporates the character and natural attributes of the site and the surrounding area as integral features of the theme and design of the development.
- Landscaping enhances the visual appearance of development and the streetscape, provides attractive outdoor spaces and privacy between adjoining development.
- Community facilities, open space and recreational areas and appropriate infrastructure to support the needs of the local community are provided.

Great Barrier Reef Coast Marine Park Zoning

The Great Barrier Reef (GBR) Coast Marine Park Zoning classifies the land and waters below the low tide mark near the Four Mile Beach FMP area as a Conservation Park Zone (Figure 2). This zoning allows for increased protection and conservation of areas while also providing opportunities for reasonable use and enjoyment (GBRMPA 2021). This zoning also permits limited extractive use, including some fishing activities. While this zoning lies outside of the FMP precinct area, activities onshore can have impacts on the GBR Coast Marine Park zones.

Wet Tropics World Heritage Area

The area inland of Four Mile Beach falls under the Wet Tropics World Heritage Area (WTMA n.d.). While this is a consideration for the environmental values of the foreshore area, the World Heritage Area is not directly impacted by the management of the Four Mile Beach foreshore.

Four Mile Beach.

Figure 2. *Four Mile Beach foreshore area land use zoning (DSC 2018, GBRMPA 2021).*

2.3 Coastal hazards

The upper section of Four Mile Beach is vulnerable to coastal erosion (DSC 2019b). This erosion may be temporary or permanent. Temporary erosion is generally caused by storms, winds or waves, and the beach rebuilds during calmer periods. Permanent erosion is more likely to occur over the longer-term due to rising sea levels or significant changes to sediment transport dynamics where sand becomes lost to the coastal system. Erosion may impact the foreshore area, including the vegetation, wildlife habitats, infrastructure, recreational uses or values.

Foreshore management precinct

The foreshore area at Four Mile Beach extends from the highest astronomical tide (HAT) line to the road reserve limit of the recreation and open space zone, with the exception of a small section of low-medium density residential towards the southern end of the beach (Figure 3). This also includes a segment of the foreshore on the seaward side of the Sheraton Grand Mirage Resort. Under the Integrated Resorts Development Act (1988), The Mirage Port Douglas Scheme of Integrated Resort Development is approved and administered by the State. Management of the foreshore and dune area will be in accordance with the Easement agreement.

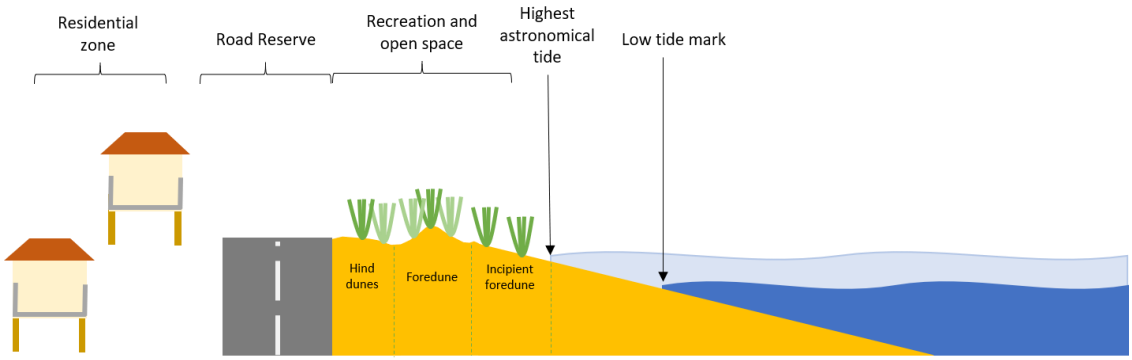


Figure 3. *Graphic representation of the Four Mile Beach foreshore management precinct.*

The foreshore area includes the dune system behind the beach, immediately landward of the HAT mark and is made up of the following three key sections (Figure 3):

- **Incipient foredune:** a windblown platform that forms in front of the foredune, however is not present on all beaches. This is where vegetation such as grasses and creepers first establish and provides a protective buffer to erosion, and storm effects, including winds and waves.
- **Foredune:** the main sandy formation and is of greater height than the incipient dune. Larger vegetation species establish here, including shrubs, which provide greater wind protection.
- **Hind dune:** a smaller dune system behind the foredune. These systems tend to be well established, including larger vegetation species such as trees.

3 Foreshore values

The Four Mile Beach foreshore is valued by residents and visitors for a number of reasons and the management of the foreshore should aim to protect and enhance these values. The following section outlines the social, cultural and environmental values that have been identified for the Four Mile Beach foreshore area, as well as describing any threats or challenges to these values.

Foredune at Four Mile Beach.

3.1 Knowledge sharing and community engagement

The community at Four Mile Beach were engaged through the Resilient Coast Strategic Plan (DSC 2018b). Feedback from this engagement process specific to Four Mile Beach included:

- Residents appreciate the natural beauty of the beach
- There is a preference to retain the coconut palms.

For this FMP, a survey was distributed to the Four Mile Beach community and the wider Douglas Shire residents and ratepayers to understand how they use and what they value about the foreshore zone, and how they would like to see it managed in the future. The survey was advertised through the Council Foreshore Management Plans website, Facebook, community noticeboards, emails to residents and community groups, and physical copies available at Council offices. The survey ran from 31st March to 23rd April 2021 and received a total of 317 responses from residents and community groups throughout the Douglas Shire. A total of 85 responses were received from Four Mile Beach Residents, with most being homeowners.

In addition to the survey, there was a four-week period of public comment following the release of the draft FMP for Four Mile Beach. This public comment period provided residents and ratepayers with an opportunity to submit feedback on the draft FMP. Several drop-in sessions were also held at numerous locations throughout the Shire, including at Port Douglas Community Hall, to allow people to discuss the FMP in greater detail. Feedback from the public consultation has been used to further understand the community values and shape the management actions for the final FMP.

Social values

The majority of respondents at Four Mile Beach live adjacent or within 1 km of the foreshore area. Most respondents also visit the foreshore at least once a week. This information indicates that the foreshore area is significant to residents, ratepayers and visitors at Four Mile Beach.

Residents predominantly use the Four Mile Beach foreshore for exercise and relaxation (Figure 4). The next most common uses for the foreshore area are meeting family and friends or for recreation and picnics. Four Mile Beach is one of two beaches in Douglas Shire where use of the foreshore for recreation activities (e.g., swimming, surfing, kayaking) is more common. The foreshore is used less often for BBQs, fishing and using the

playground. Almost one in five respondents indicated that they are using the foreshore area as an extension of their yard.

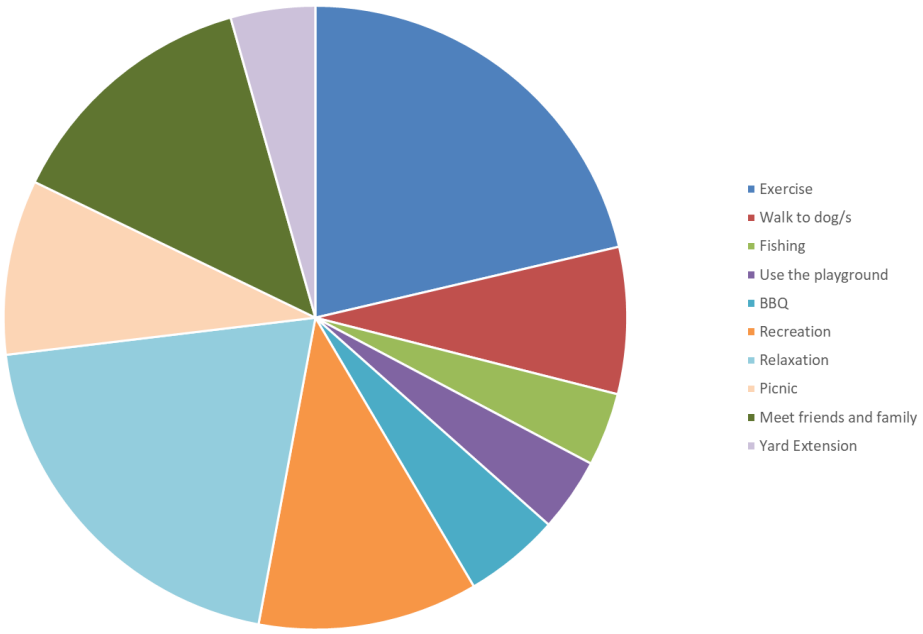


Figure 4. *The most common uses of the foreshore area at Four Mile Beach.*

Sense of place

Residents and visitors of Four Mile Beach value the tropical atmosphere and beauty of the beach, particularly the secluded nature of the beach from the busy town and residential areas. Essential to this seclusion is the well-established natural vegetation buffer that provides protection from storms and cyclones. Four Mile Beach is also appreciated for its abundant plant and birdlife and views of the ocean and surrounding hills.

Four Mile Beach is a place where people can enjoy shaded areas to sit, there are safe paddling areas for children, open parkland spaces, and it is a place to walk and relax. Four Mile Beach is appreciated as a unique tourist area that is safe and accessible.

Concerns and threats

From the survey, several concerns were raised around foreshore vegetation. Some people feel that more maintenance is required to remove weeds and coconut palm fronds, and that clearing of some coconut trees is necessary to allow native vegetation to flourish. There have also been reports of vegetation being cleared to create pathways and ocean views for private properties. This, combined with dumping of garden waste in this zone, fragments natural habitat, encourages weed growth, and impacts upon the secluded feel of the beach that users highly value.

Respondents also commented on issues of misuse and pollution of foreshore areas through illegal camping, fires, and littering of rubbish and dog waste. More signage and prominent rubbish bins may improve this situation. On a similar note, some users wished to remove excess natural debris (e.g., wood, seaweed, palm fronds) that wash up on the beach, however others commented that this “beach grooming” can disturb wildlife and nesting/feeding grounds and remove important habitat and refuge for invertebrates such as crabs.

Along with addressing these issues, some wished for upgrades to and the addition of more foreshore amenities such as BBQs, covered seating areas and picnic facilities. Despite this, survey respondents strongly oppose development close to the foreshore that can be visible from the beach.

Erosion scrap and exposed tree roots on the southern end of Four Mile Beach.

3.2 Environmental values

The vegetation cover along Four Mile Beach has been heavily impacted by illegal clearing to maintain views and access. The remnant vegetation is present only as a narrow strip of semi-intact, impacted foreshore vegetation between 35 and 80 m wide. Towards the southern end of Four Mile Beach however, the vegetation is well connected to the mangrove estuaries of the Mowbray River.

Flora composition

A desktop assessment of the vegetation mapping for the northern section of Four Mile Beach indicates that the largely intact vegetation within this area supports a complex system of communities transitioning from the tidal zone through melaleuca dominated swales, mangroves, and littoral rainforest and contains in a mosaic of six different Regional Ecosystem (RE) types. Ground-truthing of the vegetation mapping has confirmed the local representation of the RE types present. The descriptions, Vegetation Management (VM) Class and Biodiversity (BD) Status of the REs along Four Mile Beach are summarised in Table 2 and Figure 5.

Table 2. Regional Ecosystems of Four Mile Beach

RE	Mapped RE description	VM Class[1]	BD Status[2]	Local representation
7.2.2a	Notophyll vine forests, often with *Acacia* emergents. Species commonly include *Cupaniopsis anacardioides*, *Diospyros geminata*, *Canarium australianum*, *Alphitonia excelsa*, *Acacia crassicarpa*, *Pleiogynium timorense*, *Chionanthus ramiflorus*, *Mimusops elengi*, *Polyalthia nitidissima*, *Millettia pinnata*, *Geijera salicifolia*, *Ficus opposita*, *Sersalisia sericea*, *Terminalia muelleri*, *T. arenicola*, *Drypetes deplanchei*, and *Exocarpos latifolius*. Lowlands on dune sands, of the moist and dry rainfall zones.	OC	E	Heavily impacted/ cleared to occasionally intact areas of dense closed vine forest containing *Syzygium* spp., *Pongamia pinatta*, *Mimusops elengi*, *Cupaniopsis anacardioides*. Clearings were dominated by *Macaranga* sp. and vines and scramblers such as *Flagellaria indica*. Coconuts present in reasonable numbers
7.2.3	*Corymbia tessellaris* (Moreton Bay ash) and/or *Acacia crassicarpa* (beach wattle) and/or *C. intermedia* (pink bloodwood) and/or *C. clarksoniana* (Clarkson's bloodwood) woodland to closed forest. Beach ridges, predominantly of Holocene age.	OC	OC	Not assessed

[1] VM Class: LC – Least Concern, OC – Of Concern, E – Endangered.
[2] BD Status: NC – No Concern, OC – Of Concern, E – Endangered.

RE	Mapped RE description	VM Class[1]	BD Status[2]	Local representation
7.2.4g	*Melaleuca dealbata* +/- *M. leucadendra* woodland to open forest. Weathered relict beach ridges. Palustrine wetland (e.g. vegetated swamp).	OC	OC	Not assessed
7.2.7	*Casuarina equisetifolia* (coast sheoak) +/- *Corymbia tessellaris* (Moreton Bay ash) open forest +/- groved vine forest shrublands. Beach strand and foredune.	OC	E	*Casuarina equesitifolia, Thespesia populnea* and *Terminalia* spp. form the dominant tree layer with occasional *Pandanus cookii.* The coastal facing edge is dominated by shrubs, *Scaevola taccada*, *Wollastonia uniflora* and *Vitex rotundafolia*, vines *Vigna marina* and *Ipomoea pes-caprae*, and grasses and sedges *Ischaemum muticum*, *Thuarea involuta* and *Cyperus pedunculatus.*
7.2.7a	Complex of open shrubland to closed shrubland, grassland, low woodland and open forest. Includes pure stands of *Casuarina equisetifolia*, and Acacia *crassicarpa*, *Syzygium forte* subsp. *forte*, *Calophyllum inophyllum* and Pandanus spp. woodland to open forest. Beach strand and foredune.	OC	E	*Casuarina equesitifolia, Thespesia populnea* and *Terminalia* spp. form the dominant tree layer with occasional *Pandanus cookii.* The coastal facing edge is dominated by shrubs, *Scaevola taccada*, *Wollastonia uniflora* and *Vitex rotundafolia*, vines *Vigna marina* and *Ipomoea pes-caprae*, and grasses and sedges *Ischaemum muticum*, *Thuarea involuta* and *Cyperus pedunculatus.*
7.2.8	*Melaleuca leucadendra* (weeping tea tree) open forest to woodland. Sands of beach origin.	OC	E	Not assessed

Local flora representation at Four Mile Beach - Syzygium sp., Mimusops elengi, Cupaniopsis anacardioides, Casuarina equesitifolia

Figure 5. *Remnant regional ecosystems within Four Mile Beach foreshore area.*

Conservation significance

The remnant vegetation of Four Mile Beach is mapped as 'Essential Habitat' for several conservation significant species including: the endangered southern cassowary (*Casuarius casuarius johnsonii*), eastern curlew (*Numenius madagascariensis*), red knot (*Calidris canatus*), and the lesser sand plover (*Charadrius mongolus*) and the vulnerably listed bar-tailed godwit (*Limosa lapponica baueri*) and greater sand plover (*Charadrius leschenaultii*). Essential habitat is regulated under the *Vegetation Management Act 1999* (VM Act).

Habitat fragmentation

The foreshore vegetation of Four Mile Beach is fairly-well connected in the southern-most section; however, there is little connectivity through the northern areas due to development and the limitations associated with the isolated Island Point end of the beach. The altered vegetation in the urbanised areas often lacks the shrub layer that would allow for protected movement of fauna through the coastal vegetation and beach front areas minimising connectivity through these areas. Canopy dwelling and nesting species may still inhabit these areas and the impacts are more likely to be associated with other anthropogenic activity such as noise and disturbance from tourist related activities. There are a number of disturbances which may impact on the flora and fauna at Four Mile Beach (Table 3).

Table 3. Disturbances and their potential impacts to flora and fauna at Four Mile Beach

Disturbance	Potential impacts to ecology
Dune erosion	• Further loss of vegetation and fauna habitat • Loss of sea turtle nesting habitat through loss of the foredune vegetation • Increase foredune slope and decreasing suitability for nesting sea turtles • Reduced biodiversity
Vegetation loss	• Increases in foreshore dune erosion • Exposure of hind dune systems and vegetation that are less adapted to extreme weather events • Loss of breeding and roosting habitat for nesting shorebirds and sea turtles • Loss of food trees for southern cassowary
Weeds	• Compete with native species for resources – light, nutrients, space • Reduced biodiversity of flora • Loss of habitat and food plants for conservation significant species • Create barriers for connectivity and fauna population dispersal
Pest animals	• Predation of native animals • Sea turtle nest predation • Reduced fauna populations and diversity
Green waste and illegal dumping	• Impacts to marine fauna • Damage to sea turtle nesting areas through suffocation or preventing nesting • Introduction of weed species to natural areas • Increased atypical fire risk
Stormwater and agricultural runoff	• Impacts to marine fauna • Increased sediment runoff and resulting increases in nearshore turbidity • Increased nutrient loads and subsequent algal blooms
Coconut debris	• Fallen fronds and fruit to reduce recruitment of native species • Reduced opportunity for sea turtle nesting • Increase habitat for rodents and potential bird egg predation

Fauna

Four Mile Beach has potential to provide habitat features for a number of fauna of conservation significance, including nesting turtles, shorebirds and other notable species such as the endangered southern cassowary (*Casuarius casuarius johnsonii*) (southern population). While these fauna may not currently be present, there are habitat features to support their survival. Anthropogenic disturbance may be the greatest limiting factor here. The full list of species is provided in Attachment A.

Pest species

Four Mile Beach is not mapped as habitat for conservation significant flora species. Towards the southern end of Four Mile there has been historic coconut palm clearing, which included the removal of 49 mature coconut palms and invasive pest species in 2012 (DSC 2015a). Coconut palms will continue to be managed by the Coconut Management Plan (DSC 2015a). The site of the historic coconut palm clearing is now a revegetation site that undergoes periodic illegal clearing and Council has previously attempted to address this site through the Revegetation Plan for Four Mile Beach Esplanade (DSC 2015b). The following environmental weeds were identified at Four Mile Beach during the site inspections (Table 4). Environment weeds pose a threat to biodiversity by outcompeting native vegetation with respect to available resources such as nutrients and light, establishing monocultures and increasing fuel loads. This additionally results in reduced habitat value for fauna.

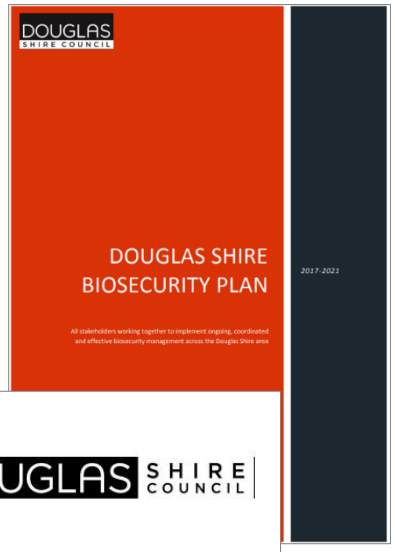
Table 4. Weed species identified at Four Mile Beach (BQ 2020, Conn 2021, DSC 2015b, Murphy et al. 2016)

Scientific name	Common name	Dispersal Method	Environmental Impacts
Cocos nucifera	Coconut palm	• Large nuts which fall from trees • Nuts germinate if uneaten	• Identified as a transformer weed in littoral (coastal) rainforests • Outcompetes native species for space, light and nutrients • Falling nuts and fronds cause physical damage to species below
Sphagneticola trilobata	Singapore daisy	• Spreads by cuttings from slashing and pruning	• Outcompetes native species for space, light and nutrients • Invades lawns, irrigated areas, and around drains
Sansevieria trifasciata	Mother-in-law's tongue	• Spreads by dumping of garden waste • Seeds spread by birds and other animals	• Forms dense infestations • Outcompetes native species for space, light and nutrients • Tends to form monoculture
Bryophyllum delagoense	Mother of millions	• Spread by floodwaters • Spread by animals, vehicles and garden waste	• Invades coastal dunes, grasslands and woodlands • Outcompetes native species for space, light and nutrients • Very poisonous to humans and livestock
Opuntia sp.	Prickly pear	• Spread by birds and animals eating the fruit • Spread by animals and floods moving broken stems	• Outcompetes native species for space and nutrients, esp. in hot, dry conditions • Can harm animals and prevent them from eating
Leucaena leucocephala	Leucaena	• Spreads seeds by wind, water and animals • Spreads rapidly to adjacent areas	• Forms dense thickets which hinder movement of wildlife • Strongly outcompetes native plants for space, light and nutrients

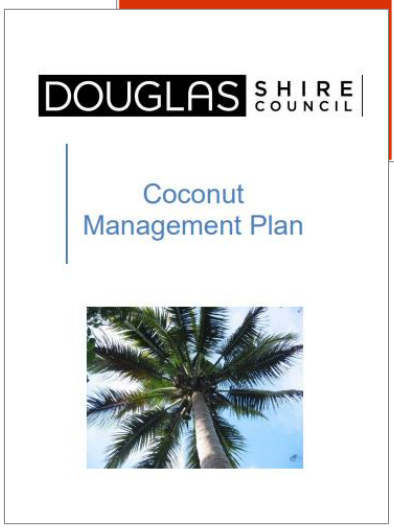
Vegetation management

Douglas Shire Council has a number of instruments to manage the vegetation at Four Mile Beach. The Coconut Management Plan (DSC 2015a) defines the objectives for the management of coconut palms on Council-controlled land. The plan identifies the coconut trees within a given location and provides an assessment of the potential risk, distribution, impacts and associated costs of management.

A revegetation plan has previously been written for two parcels of land at Four Mile Beach, north of Four Mile Park (DSC 2015b). This plan was developed to address the illegal clearing of native vegetation that had been occurring along the esplanade and adjacent coastal lands where DSC is responsible for the management of these areas. These land parcels were assessed during the site inspections and further information regarding their management will be provided in the following sections.



The Douglas Shire Biosecurity Plan (2017-2021) guides the management of invasive biosecurity matter as well as locally declared pests (plants and animals) as outlined in the *Biosecurity Act 2014*. Under this plan, there are programs being undertaken by DSC to eradicate pest species. Prioritisation of pest species is based on several factors, including (DSC 2017):



- Existing plans and priorities on a national, state and local level
- Impacts and threats
  - Conservation and biodiversity
  - Riparian or aquatic environment
  - Agricultural or production
  - Residential and urban areas
- Capacity to manage
  - Achievability
  - Current extent

These programs include (relevant to vegetation) (DSC 2017):

- Siam Weed Eradication Program
- Hiptage eradication Program
- Miconia Species (Four Tropical Weeds Eradication Program)

3.3 Amenity and liveability

There are a number of facilities and access points for residents and tourists to engage in recreational activities at Four Mile Beach. The accessibility and recreational uses of the Four Mile Beach foreshore area are summarised in this section and the management implications are discussed.

Infrastructure

Along the length of Four Mile Beach there are numerous access tracks to provide residents and tourists access to the foreshore and beach. Along the Esplanade from Flagstaff Hill to the Surf Club, there is a paved path for pedestrian use. At this northern end of the beach, there is car parking and a surf lifesaving tower, including a swimming enclosure with netting.

There are openings for drainage onto the foreshore and beach behind the surf club and at Helmet St near Four Mile Beach Park. Runoff from these drains may be causing erosion along the foreshore and contributing to vegetation loss, particularly of larger trees. Additionally, the drain behind the surf club periodically becomes blocked with palm fronds and other debris, impacting the flushing of the drain and creating an odour which affects the amenity of the recreation and open space zone.

Disability access ramp to the swimming enclosure.

There are no boat ramps or boat access points along Four Mile Beach as access is limited to Dickson's Inlet. However, near Four Mile Beach Park, there is an access track for watercraft. This is by foot only and is expected to have minimal impact on the vegetation and erosion.

Passive recreation

Four Mile Beach offers the opportunity for residents and tourists to engage in passive recreational activities. These activities include:

- walking along the foreshore and beach
- bird watching
- watercraft sports
- horse riding

At the southern end of Four Mile Beach near Four Mile Beach Park, there is an area for watercraft sports. This includes an outrigger club and several businesses offering craft hire. There are several formalised access tracks at this location to provide recreational access. Access for boats is limited to Dickson's Inlet, away from Four Mile Beach so it is only smaller craft accessing the beach at this point and no vehicle access is required to launch craft.

These activities are relatively low impact but can still affect the foreshore condition. If foreshore users create informal access tracks through the vegetation to access the foreshore and beach, this can lead to a loss of vegetation, destabilisation of the sand or soil which may lead to erosion or dune destabilisation, and it could also contribute to habitat loss and destruction. Activities such as bird watching and horse riding will have similar impacts on the foreshore in relation to access.

Swimming enclosure at Four Mile Beach.

Pedestrian access

An audit of beach access points in the Douglas Shire found that there are 53 access tracks along Four Mile Beach. There are 21 formal access paths, 20 private accessways to houses and 12 informal access paths. The site inspection indicated that there were several illegally cleared access tracks and landscaping by residents occurring within the Recreation and Open Space buffer zone between the beach and residential area, which falls within the foreshore area of this FMP. The creation of informal access tracks presents challenges to foreshore management, particularly with regards to illegal vegetation clearing and dune destabilisation.

Dog off-leash areas

An off-leash dog area is located at the southern end of Four Mile Beach. Dogs pose a risk to fauna as they may attack or scare vulnerable species, particularly when off-leash.

4 Management precincts

Four Mile Beach has been designated seven management precincts to tailor management actions specific to threats and challenges within each precinct. The seven precincts are (Figure 6):

- Precinct 1 – Four Mile Beach swimming enclosure
- Precinct 2 – Sand St foreshore
- Precinct 3 – Sheraton Mirage foreshore
- Precinct 4 – Solander Blvd foreshore
- Precinct 5 – Reef St foreshore
- Precinct 6 – Four Mile Beach Park
- Precinct 7 – Southern Four Mile Beach

Figure 6. *Four Mile Beach foreshore management precincts.*

The threats and challenges within each management precinct are summarised in Table 5. These threats and challenges have been identified through the background review, site inspections and community engagement feedback.

Table 5. Four Mile Beach foreshore precinct threats and challenges

Precinct	Key foreshore threats and challenges
1 – Four Mile Beach swimming enclosure Significant tourist area with a netted swimming enclosure.	• Illegal clearing to create informal beach access tracks and viewing windows through the vegetation in the foreshore area – these activities may not meet the outcomes of the Conservation zone code, including biological diversity, ecological integrity and scenic amenity. • Line of sight from Surf Lifesaving guard tower obstructed by vegetation. • Natural debris washed up on foreshore (e.g., seaweed, mangrove seed pods). • Coconut palm debris blocking drainage of an outlet that extends behind Surf Club.
2 – Sand St foreshore Residential area set back from foreshore.	• Environmental weeds present – may impact the conservation value within the precinct. • Illegal clearing to create informal beach access tracks through the vegetation in the foreshore area – these activities may not meet the outcomes of the Conservation zone code, including biological diversity, ecological integrity and scenic amenity. • Natural debris washed up on foreshore (e.g., seaweed, mangrove seed pods).
3 – Sheraton Mirage foreshore Tourist accommodation directly on the foreshore.	• Natural debris washed up on foreshore (e.g., seaweed, mangrove seed pods). • Management of the precinct overseen by the Sheraton Grand Mirage in accordance with the existing Easement agreement.
4 – Solander Blvd foreshore Residential area set back from the foreshore.	• Significant illegal clearing to create beach access tracks and viewing windows through the vegetation in the foreshore zone – multiple well-established access tracks through vegetation from the houses to the beach, including encroachment on Council land designated to Recreation and Open Space. • Natural debris washed up on foreshore (e.g., seaweed, mangrove seed pods).
5 – Reef Street foreshore Residential area set back from the foreshore.	• Natural debris washed up on foreshore (e.g., seaweed, mangrove seed pods).
6 – Four Mile Beach Park Mixed residential and recreation area.	• Significant illegal clearing to create access tracks through the vegetation in the foreshore zone, including encroachment onto the land between Low-medium density Residential and the beach. • Natural debris washed up on foreshore (e.g., seaweed, mangrove seed pods).
7 – Southern Four Mile Beach Residential and aged care facilities set back from the foreshore.	• Natural debris washed up on foreshore (e.g., seaweed, mangrove seed pods).

5 Management plan

The following section outlines the adaptive management approach to address the threats and challenges that have been identified for the Four Mile Beach foreshore area. The objectives for management have been identified in order to inform measures for management success. Priorities have also been set to appropriately guide management of the foreshore threats and challenges over the immediate, medium and longer-term timeframes. The objectives and priorities shape the management actions for each precinct. In addition, any monitoring and evaluation activities that are to take place following the implementation of the actions will also be summarised to measure the progress of the foreshore management.

5.1 Management objectives

Objectives are useful for measuring the success of the management actions undertaken. They are based on the community values identified through the engagement process. The objectives will guide the metrics for monitoring and evaluation of the management actions. They can be applied at the whole of foreshore (community) and precinct scale.

Management objectives for Four Mile Beach foreshore

- Maintain the overall natural form and function of the beach.
- Enhance and maintain vegetation condition – littoral rainforests, dune vegetation for vulnerable species and to prevent dune erosion.
- Build positive behaviour change outcomes to minimise adverse impacts of foreshore use.
- Proactively undertake weed management to restore native vegetation habitats.
- Enforce illegal clearing local laws to prevent further establishment of unauthorised and informal beach access tracks.

5.2 Management prioritisation

Prioritisation of the management actions has been assigned as:

1 **Immediate** (recommend implementation within next 12 months)

Actions for immediate prioritisation include sites where weeds are present and it is necessary to eradicate the weeds and revegetate the site with native vegetation cover. Environmental weeds pose a significant threat to the values of the Four Mile Beach residents, including the natural habitats and wildlife. Actions also revolve around access and use of the foreshore area, such as for ATVs, fishing or pedestrians. The uses may pose a threat the sensitive habitats and management actions are focussed on minimising the impact.

2 **Medium-term** (recommend implementation within next 2-3 years)

Medium term priority actions are recommended to be implemented within the next two to three years. These actions are important for the management of the foreshore precinct, however, they require community engagement and education to understand their benefits. There is an element of community involvement with the medium-term actions.

3 **Future** (recommend implementation within 5 years)

Future management actions are those that first require an evaluation of the outcomes from immediate to medium-term actions that have been undertaken before being implemented. It is recommended that future actions are implemented within five years. This timeframe allows sufficient time for immediate actions to be implemented and their progress and success to be evaluated.

Four Mile Beach.

5.3 Management actions

Management actions and their priorities for the Four Mile Beach foreshore are summarised in Table 6. Maps of the management actions for each precinct are provided in Attachment B. Public consultation will occur before any management actions are implemented.

Table 6. Four Mile Beach foreshore precinct management actions

	All precincts	*Precinct 1*	*Precinct 2*	*Precinct 3*	*Precinct 4*	*Precinct 5*	*Precinct 6*	*Precinct 7*
Outcome 1: **Protect and maintain the natural form and function of the beach.**								
A1.1: Formalise and maintain defined access tracks and install appropriate signage at the beach and land entrances. This is to minimise the impact on the frontal dune. Issue fines for people found to be illegally clearing under Local Law No. 4 (Local Government Controlled Areas, Facilities and Roads).	1							
A1.2: Commence a dune protection and maintenance program in consultation with adjacent landholders using the northern end of Four Mile Beach as a pilot site. Undertake dune revegetation with native species (see Attachment C) within a 5 m buffer landward of the HAT mark with low-growing species to maintain views and to stabilise the dune to protect against erosion. Only authorised Council staff to prune vegetation to maintain views. Install fencing around the revegetated area to reduce damage or clearing and encourage regrowth.		1						
Outcome 2: **Restore the biological diversity, ecological integrity, cultural value, scenic amenity and dune stability of the foreshore area.**								
A2.1: Undertake dune revegetation using native species (see Attachment C) within a 10 m buffer landward of the HAT mark with low-growing species to maintain views, and regenerate land that has been cleared and to stabilise the dune to protect against erosion. Install fencing around the revegetated area to reduce damage or clearing and encourage regrowth.			2		1		2	3

	All precincts	*Precinct 1*	*Precinct 2*	*Precinct 3*	*Precinct 4*	*Precinct 5*	*Precinct 6*	*Precinct 7*
A2.2: Undertake beach monitoring of turtle and shorebird nesting sites during nesting and hatching seasons to understand the impact foreshore access may have on these habitats. Survey vegetation cover to assess revegetation requirements and progress to support nesting habitats.	3							
A2.3: Establish a platform on the DSC Environmental Hub giving residents and visitors the ability to upload information and photos about flora and fauna species they have noticed in the foreshore.	1							
A2.4: Establish several zones of management along the foreshore at Solander Blvd: 1) Establish a 10 m buffer zone landward of HAT mark to stabilise the dune and prevent erosion by revegetating with native species. 2) Zone reserved for recreation and open space that is maintained by DSC and establishes a native vegetation buffer between the dune and the residential area. 3) Shared zone between DSC and landowners that provides a pathway to formalised beach access tracks and shared maintenance opportunity by landscaping with native plants and ensuring a suitable buffer to minimise the risk of damage to private infrastructure from trees. Develop a Memorandum of Understanding (MoU) and undertake community consultation to discuss how the shared management responsibilities will work. Ensure that the area is cleared and maintained free of invasive species and green waste dumping. The MoU will also outline clear guidelines on the infrastructure that will be accepted within the shared zone (3).					1			

	All precincts	*Precinct 1*	*Precinct 2*	*Precinct 3*	*Precinct 4*	*Precinct 5*	*Precinct 6*	*Precinct 7*
A2.5: Maintain marine debris along the foreshore within the netted swimming enclosure in accordance with the DSC Marine Plant Management Strategy. Remove coconut debris to prevent accumulation. Coconut removal to be in accordance with the Coconut Management Plan and following community consultation and discussion with adjacent landowners.		1						
A2.6: Council to ensure existing vegetation is kept trimmed to maintain a line of sight of the netted swimming area from the lifeguard tower.		1						
A2.7: Collaborate with Traditional Owners to maintain and preserve cultural heritage sites within the foreshore area.	1							
A2.8: Maintain the foreshore area between Helmet and Cowrie Street to a high-profile standard. Council acknowledges the Coconut Grove site has historical significance for the Shire, including our World War 2 diggers and as a wedding location. Only Council or Council approved Contractors are to undertake works within this area and all works must be authorised by Council.							1	
Outcome 3: Restore the conservation value of the foreshore area by reducing the presence and impact of environmental weeds.								
A3.1: Establish a weed eradication and maintenance program in conjunction with the Biosecurity Plan to remove environmental weeds present in the foreshore area and undertake revegetation with native species (See Attachment C).			1		2		2	
Outcome 4: Build positive behaviour change to minimise adverse impacts on the foreshore.								
A4.1: Provide community education material regarding the limitations placed on Council to remove debris along the foreshore and beach which sits within the Great Barrier Reef Marine Park Zone.	2							

	All precincts	*Precinct 1*	*Precinct 2*	*Precinct 3*	*Precinct 4*	*Precinct 5*	*Precinct 6*	*Precinct 7*
A4.2: Undertake a community education program to communicate knowledge around foreshore clearing and weeds, including transfer and establishment, awareness and management, and the benefits of dune vegetation. Extend this education to include contractors engaged by private landholders.	1							
A4.3: Include crocodile awareness information when undertaking new programs (e.g., booklets for walks).	1							

Four Mile Beach.

5.4 Monitoring and evaluation

The success of the management actions is measured through monitoring and evaluation mechanisms. The monitoring focusses on the sensitive and vulnerable environments, including turtle and shorebird nesting habitats, and key coastal vegetation habitats.

Nesting habitats

The habitat monitoring should be undertaken to observe where turtle and shorebird nesting habitats are present in the foreshore area and to understand the vegetation composition of these habitats. Turtle monitoring should be undertaken based on the Queensland Marine Turtle Field Guide (Attachment F) between October and May to understand the seasonal use of these habitats by turtles (QPWS, DES 2016). Guidelines for shorebird monitoring will need to be developed based on local knowledge.

It is recommended that the monitoring be undertaken in partnership with the Indigenous Rangers and local community groups. In addition, a platform on the DSC Environmental Hub website should be created for residents and visitors to submit photos and information regarding any turtle or shorebirds they notice when using the foreshore. The purpose of the habitat monitoring is to understand which species are accessing the foreshore area for nesting and hatching, as well as the vegetation composition of these habitats.

Vegetation

The vegetation monitoring is a simple measure for the percentage of cover and survival success. This monitoring should be undertaken on a yearly basis to record the survival rate. It is recommended that vegetation is monitored on a yearly basis at the end of the wet season.

The purpose of collecting information about the success of revegetation and other site management issues such as exotic plants (environmental weeds), other threats, habitat quality and connectivity, and significant species values is to be able to refine and direct resources accordingly. Flexibility in program delivery is required to maintain the condition of assets such as plantings, respond to threats as they change through time and account for new values if they emerge during the delivery of the project.

Monitoring and evaluation metrics

Table 7 outlines the monitoring and evaluation metrics for the corresponding management action to evaluate the progress and success of implementation. A detailed method for rapid vegetation assessment is supplied in Attachment D.

Table 7. Foreshore management action monitoring and evaluation metrics

Management action	Monitoring	Evaluation	Timing
Vegetation monitoring	• Species specific observations to identify which species may be doing poorly • Weed cover within each of the canopy layers (top 5 transforming weed species)	• Measure of the percentage survival of revegetation • Percentage survival of key species • Percentage cover over canopy layers of weeds • Percentage of bare/disturbed ground • Natural recruitment • Habitat connectivity • Significant species	Annual
Fauna monitoring	• Nesting species • Vegetation composition of nesting habitats	• Turtle tracks, bird nests • Population dynamics • Animal health	Nesting season

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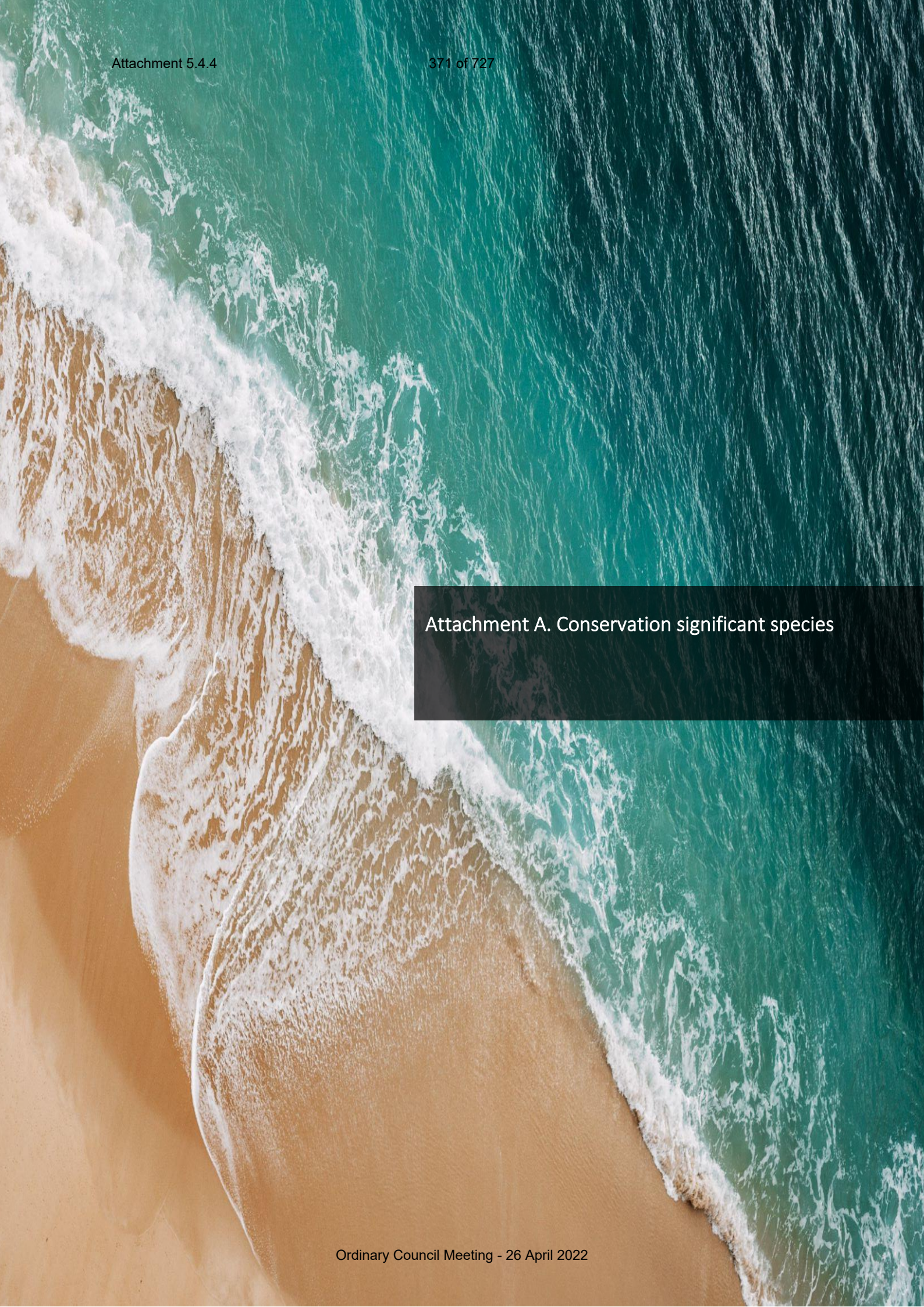
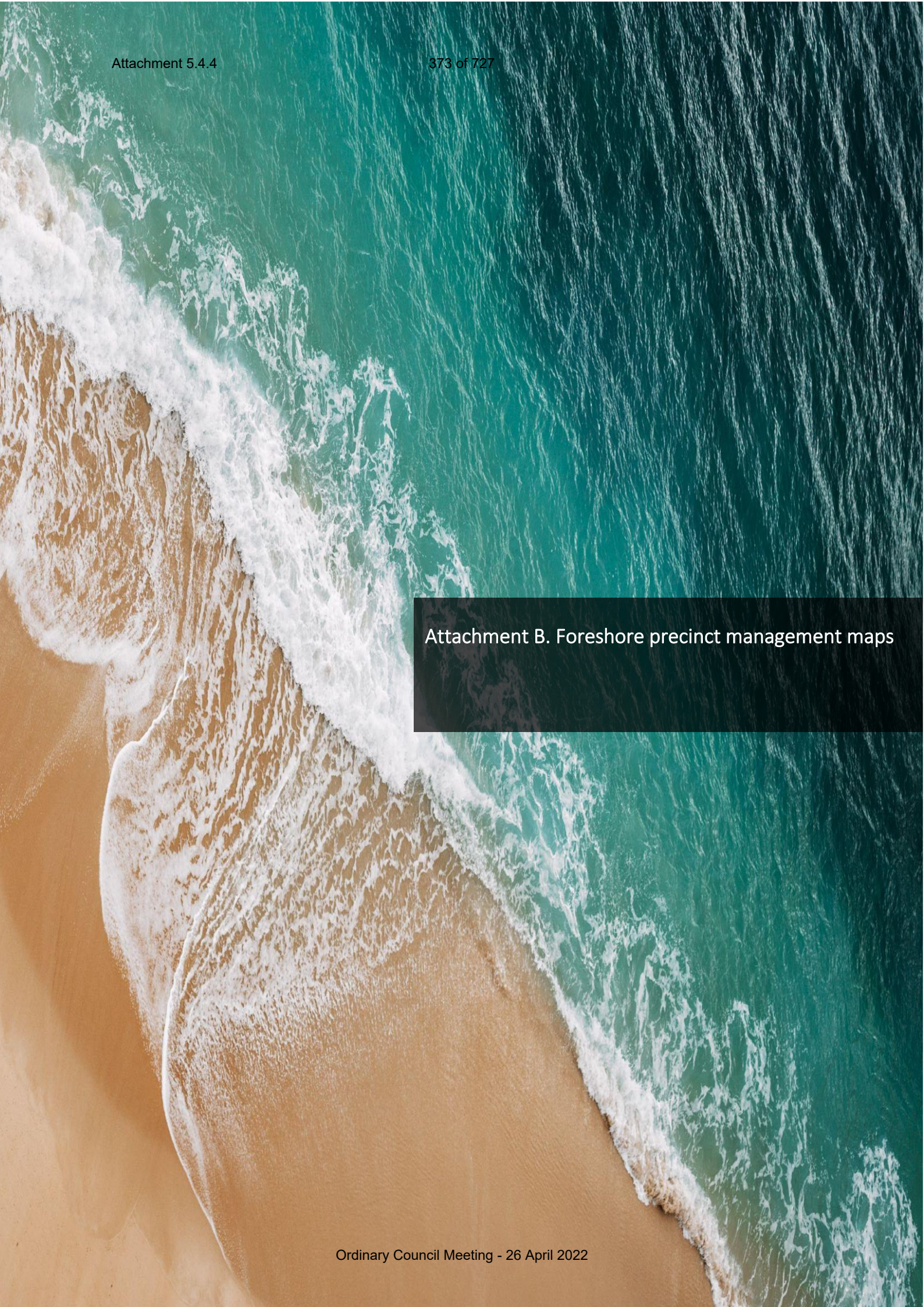


Attachment A. Conservation significant species

Table 8. Conservation significant fauna and their likelihood of occurrence at Four Mile Beach

Scientific name	Common name	EPBC Act	NC Act	Likelihood of occurrence
		Shorebirds		
Esacus magnirostris	Beach-stone curlew	—	V	Likely
Casuarius casuarius johnsonii	Southern cassowary	E	E	Possible
Calidris ferruginea	Curlew sandpiper	CE	CE	Likely
Numenius madagascariensis	Eastern curlew	CE	E	Likely
Charadrius mongolus	Lesser sand plover	E	E	Likely
Charadrius leschenaultii	Greater sand plover	V	V	Likely
Calidris canutus	Red knot	E	E	Likely
		Sea turtles		
Natator depressus	Flatback turtle	V	V	Likely
Chelonia mydas	Green turtle	V	V	Likely
Eretmochelys imbricata	Hawksbill turtle	V	E	Likely
Dermochelys coriacea	Leatherback turtle	E	E	Possible
Caretta caretta	Loggerhead turtle	E	E	Likely
Lepidochelys olivacea	Olive ridley turtle	E	E	Likely
		Other		
Hirundapus caudacutus	White-throated needletail	V	V	Likely
Cyclopsitta diophthalma macleayana	Macleay's fig-parrot	—	V	Likely
Crocodylus porosus	Estuarine crocodile	—	V	Likely



Attachment B. Foreshore precinct management maps

Figure 7. *Four Mile Beach foreshore precinct 1 management actions.*

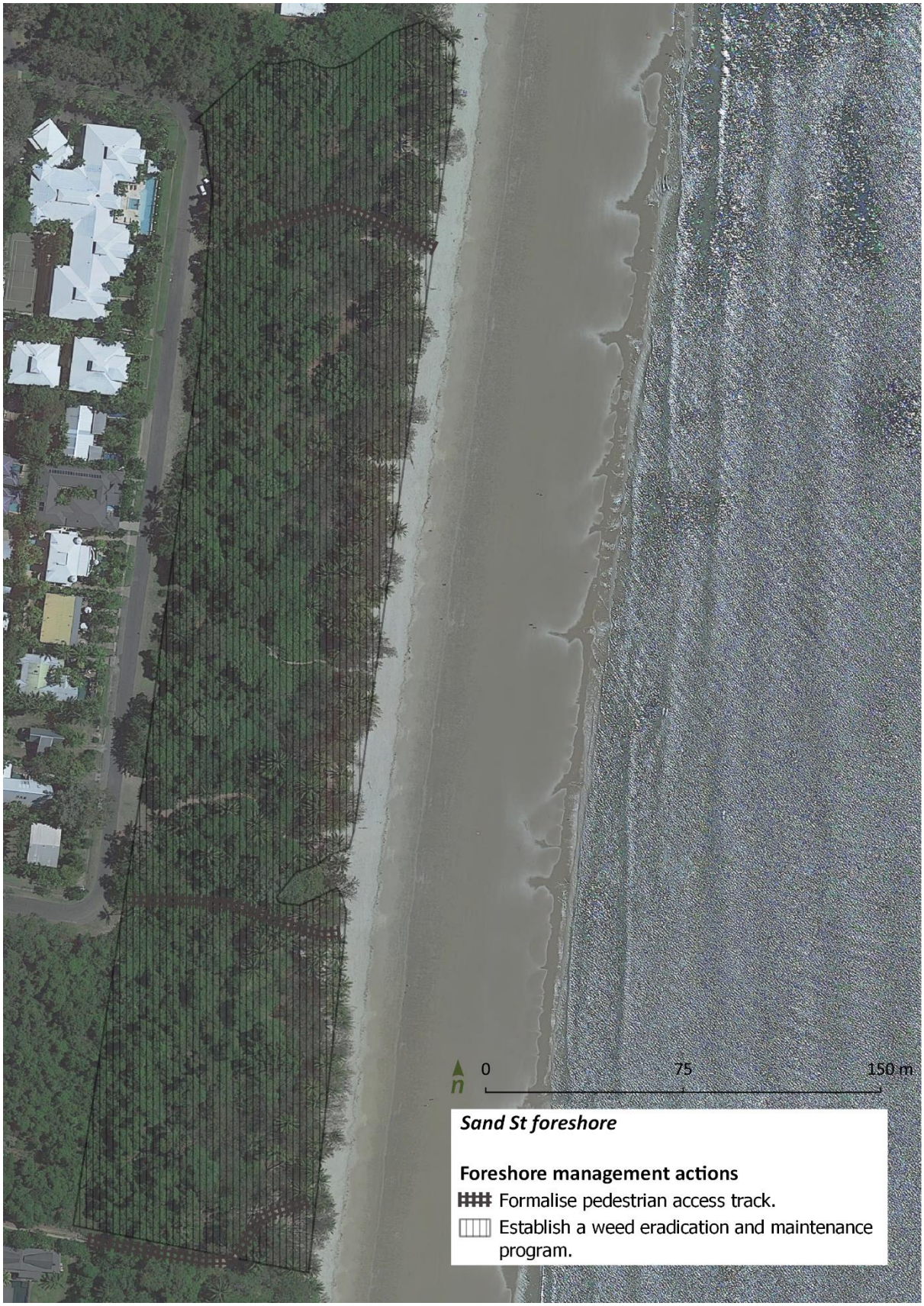


Figure 8. *Four Mile Beach foreshore precinct 2 management actions.*

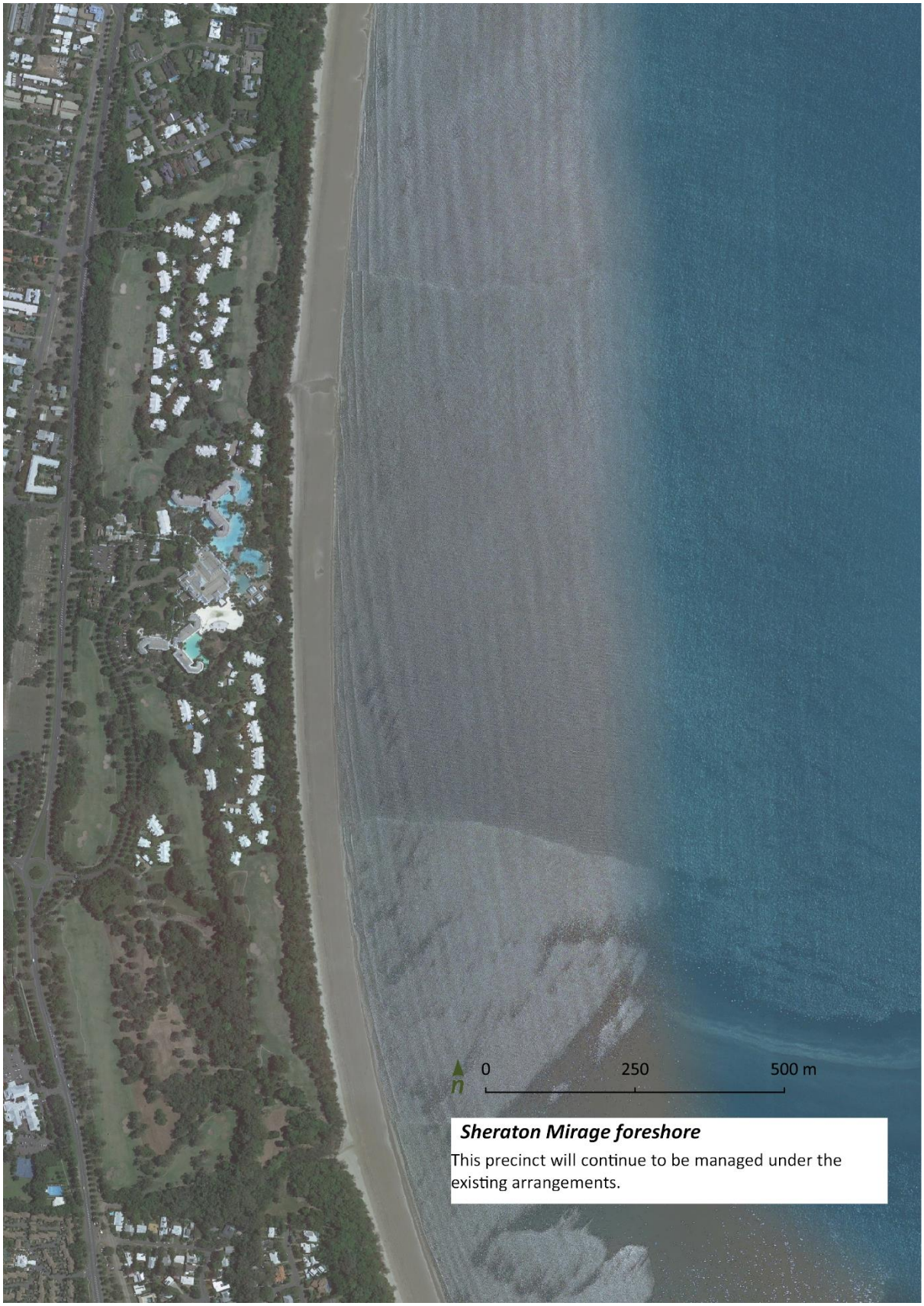


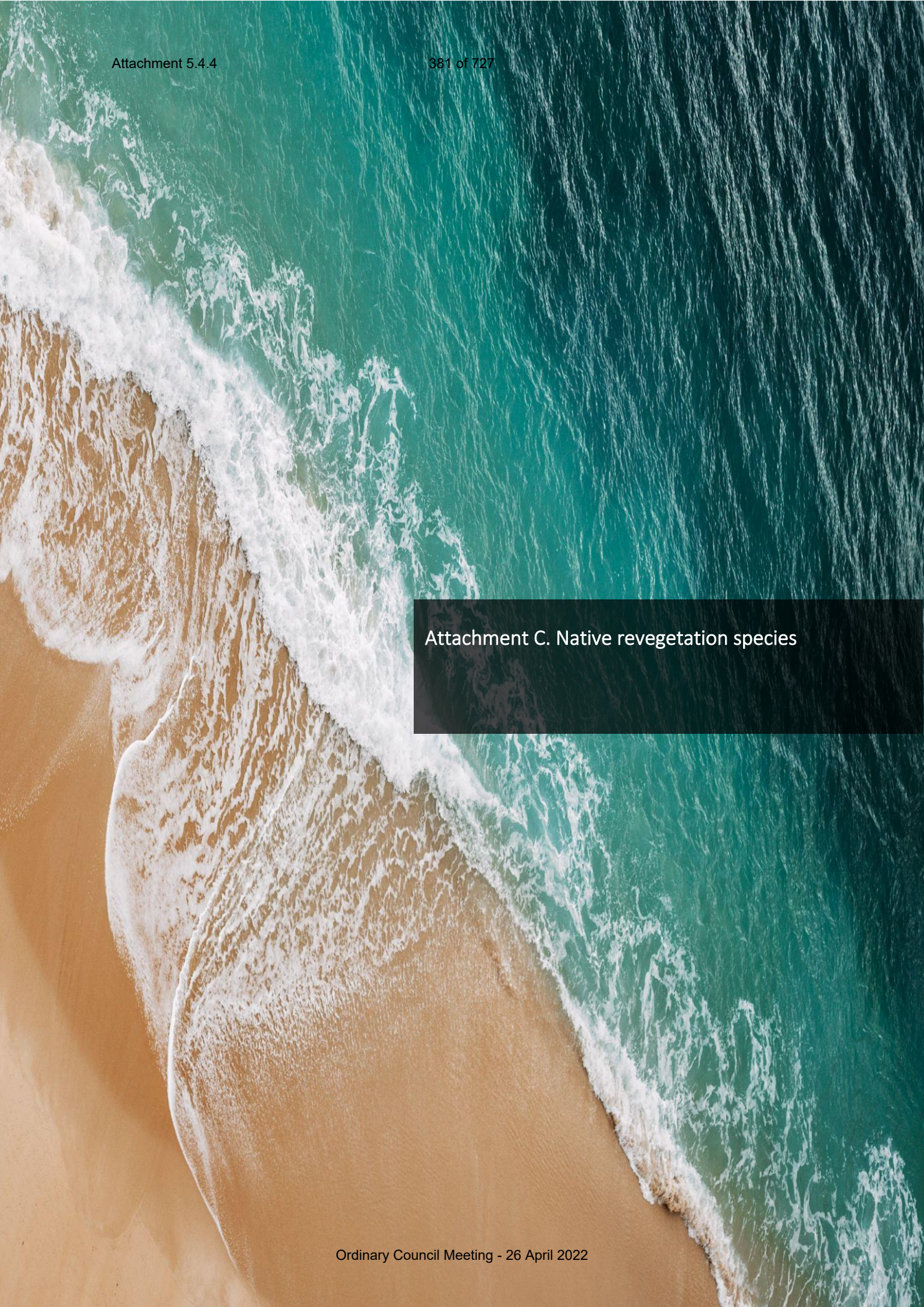
Figure 9. *Four Mile Beach foreshore precinct 3 management actions.*

Figure 10. *Four Mile Beach foreshore precinct 4 management actions.*

Figure 11. *Four Mile Beach foreshore precinct 5 management actions.*

Figure 12. *Four Mile Beach foreshore precinct 6 management actions.*

Figure 13. *Four Mile Beach foreshore precinct 7 management actions.*



Attachment C. Native revegetation species

Table 9. Native revegetation species for foreshore precincts where revegetation has been recommended (highlighted species are key components of remnant ecosystems) (Florentine, Pohlman and Westbrooke 2015)

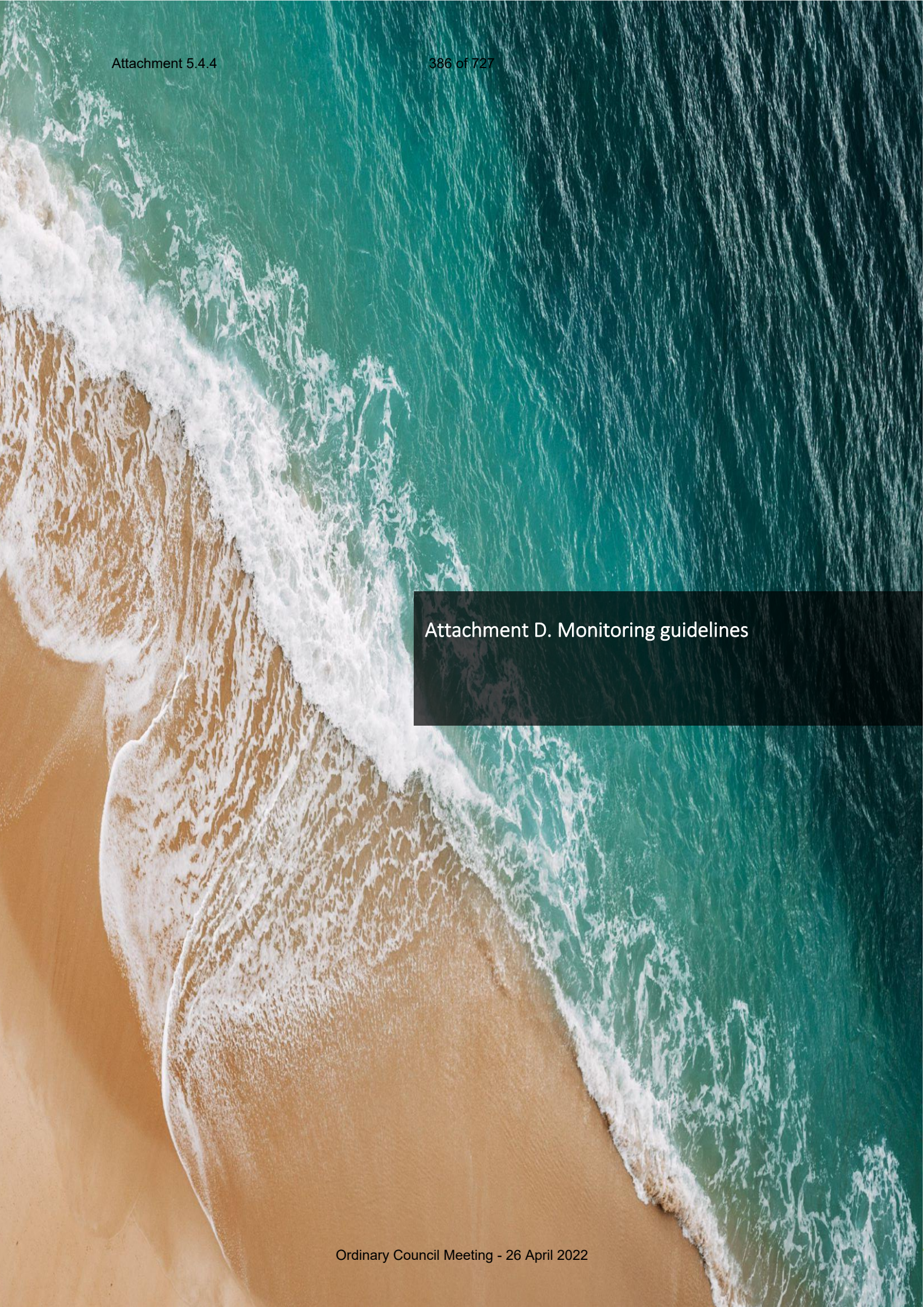
Botanical name[3]	Common name	Precinct 1	Precinct 2	Precinct 4	Precinct 6	Precinct 7
*Acacia crassicarpa**	Northern golden wattle		✔	✔		✔
*Acacia mangiu**	Broadleaf salwood		✔	✔		✔
*Acacia oraria**	Coastal wattle		✔	✔		✔
Aglaia elaeagnoidea	Coastal boodyarra		✔	✔		✔
*Alphitonia petriei**	Sarsaparilla		✔	✔		✔
Alyxia spicata	Chain fruit		✔	✔		✔
Atractocarpus fitzalanii	Brown gardenia		✔	✔		✔
Barringtonia asiatica	Mango bark, Mango pine		✔	✔		✔
Barringtonia calyptrata	Mango pine		✔	✔		✔
Beilschmiedia obtusifolia	Blush walnut		✔	✔		✔
Blepharocarya involucrigera	Rose butternut		✔	✔		✔
Brachychiton acerifolius	Illawarra flame tree		✔	✔		✔
Breynia cernua	Fart bush		✔	✔		✔
Calophyllum inophyllum	Beach calophyllum		✔	✔		✔
Calophyllum sil	Blush touriga		✔	✔		✔
Canarium vitiense	Canarium		✔	✔		✔
Carallia brachiata	Corky bark, Fresh water mangrove		✔	✔		✔
*Casuarina equisetifolia**	Beach casuarina		✔	✔		✔
Cerbera manghas	Dog bane		✔	✔		✔
Chionanthus ramiflora	Native olive		✔	✔		✔
*Clerodendrum floribundum**	Lolly bush		✔	✔		✔
Clerodendrum inerme	Scrambling clerodendrum		✔	✔		✔

[3] * denotes pioneer species that will grow and establish quickly, allowing for natural recruitment or planting of secondary species.

Botanical name[3]	Common name	Precinct 1	Precinct 2	Precinct 4	Precinct 6	Precinct 7
*Clerodendrum longiflorum**	Long flowered clerodendrum		✔	✔		✔
*Colubrina asiatica**	Beach berry bush		✔	✔		✔
*Cordia subcordata**	Sea trumpet		✔	✔		✔
Crinum pedunculatum	Beach lily, Swamp lily		✔	✔		✔
Cupaniopsis anacardioides	Beach Tamarind		✔	✔		✔
Cyperus pedunculatus		✔	✔	✔	✔	✔
Deplanchea tetraphylla	Golden bouquet tree		✔	✔		✔
Dillenia alata	Red beech		✔	✔		✔
Diospyros compacta	Australian ebony		✔	✔		✔
*Dodonea viscosa**	Hop bush		✔	✔		✔
Elaeodendron melanocarpum	False olive		✔	✔		✔
Eucalyptus plattyphylla	Ghost gum		✔	✔		✔
*Euroschinus falcata**	Pink poplar		✔	✔		✔
Ficus benjamina	Weeping fig		✔	✔		✔
Ficus drupacea	Drupe fig		✔	✔		✔
Ficus microcarpa	Small fruited fig		✔	✔		✔
Ficus opposita	Sandpaper fig		✔	✔		✔
Ficus racemosa	Cluster fig		✔	✔		✔
*Ganophyllum falcatum**	Daintree hickory		✔	✔		✔
Glochidion harveyanum	Harvey's buttonwood		✔	✔		✔
Glochidion philippicum	Daintree cheese tree		✔	✔		✔
Gmelina dalrympleana	White beech		✔	✔		✔
Gomphandra australiana	Buff beech		✔	✔		✔
*Guioa acutifolia**	Glossy tamarind		✔	✔		✔
Haemodorum coccineum	Blood root	✔	✔	✔	✔	✔

Botanical name[3]	Common name	Precinct 1	Precinct 2	Precinct 4	Precinct 6	Precinct 7
*Hibiscus tiliaceus**	Coast cottonwood		✔	✔		✔
Intsia bijuga	Kwila		✔	✔		✔
*Ipomoea pes-caprae**	Coastal morning glory	✔	✔	✔	✔	✔
Jagera pseudorhus	Foambark		✔	✔		✔
Livistona muelleri	Northern Cabbage Tree Palm		✔	✔		✔
Lophostemon suaveolens	Swamp mahogany, swamp box		✔	✔		✔
*Macaranga tanarius**	Kamala, Blush macaranga		✔	✔		✔
Mallotus philippensis	Red Kamala		✔	✔		✔
Maytenus fasciculiflora	Orangebark		✔	✔		✔
Melaleuca leucadendra	Weeping paperbark		✔	✔		✔
Melaeuca viridiflora	Broad leaved paperbark		✔	✔		✔
Melia azederach	White cedar		✔	✔		✔
Micromelum minutum	Lime berry		✔	✔		✔
Miliusa brahei	Rasberry jelly plant		✔	✔		✔
*Millettia pinnata**	Pongamia tree		✔	✔		✔
Mimusops elengi	Red coondoo		✔	✔		✔
Mischocarpus exangulatus	Red bell mischocarp		✔	✔		✔
Morinda citrifolia	Rotten cheesefruit		✔	✔		✔
Pandanus tectorius	Beach pandan		✔	✔		✔
*Pittosporum ferrugineum**	Rusty pittosporum		✔	✔		✔
Planchonia careya	Cocky apple		✔	✔		✔
Pleiogynium timorense	Burdekin plum		✔	✔		✔
*Polyscias elegans**	Celerywood		✔	✔		✔
Pouteria chartacea	Thin leaved coondoo		✔	✔		✔

Botanical name[3]	Common name	Precinct 1	Precinct 2	Precinct 4	Precinct 6	Precinct 7
Pouteria obovata	Yellow boxwood		✔	✔		✔
*Premna serratifolia**	Coastal premna		✔	✔		✔
Ptychosperma elegans	Solitaire palm		✔	✔		✔
Rhus taitensis	Sumac		✔	✔		✔
*Scaevola taccada**	Beach lettuce	✔	✔	✔	✔	✔
Schefflera actinophylla	Umbrella tree		✔	✔		✔
Scolopia braunii	Brown birch		✔	✔		✔
Sporobolus virginicus	Sand couch	✔	✔	✔	✔	✔
Sterculia quadrifida	Peanut tree		✔	✔		✔
Syzygium angophoroides	Yarrabah satinash		✔	✔		✔
Syzygium hemilamprum (Syn. Acmena hemilampra)	Blush satinash		✔	✔		✔
Tarenna dallachiana	Tree ixora		✔	✔		✔
Terminalia arenicola	Brown damson		✔	✔		✔
*Terminalia catappa**	Indian almond		✔	✔		✔
Terminalia microcarpa	Damson plum		✔	✔		✔
Terminalia muelleri	Mueller's damson		✔	✔		✔
*Thespesia populneoides**	Tulip tree		✔	✔		✔
Thuraea involuta	Tropical beachgrass	✔	✔	✔	✔	✔
Timonius timon	False fig		✔	✔		✔
Vitex rotundifolia	Beach vitex	✔	✔	✔	✔	✔
Vigna marina	Beach pea	✔	✔	✔	✔	✔



Attachment D. Monitoring guidelines

Rapid Vegetation Assessment Method Data collection

General survey information	Survey ID	Description of survey					
	Assessor Name/s	Descriptive text					
	Date of record	Date					
	Assessment number	Assessment	1	2	3	4	5
Specific location	General Location	Descriptive text					
	Easting	GPS spatial data					
	Northing	GPS spatial data					
	Spatial uncertainty	GPS spatial data					
Desired cover by year 5							
	Present	1 (1-5)	2 (6-25)	3 (26-50)	4 (51-75)	5 (76-100)	Absent
Under							
Mid							
Over							
Current overall cover							
	Present	1 (1-5)	2 (6-25)	3 (26-50)	4 (51-75)	5 (76-100)	Absent
Under							
Mid							
Over							
Percentage survival of each layer							
	Present	1 (1-5)	2 (6-25)	3 (26-50)	4 (51-75)	5 (76-100)	Absent
Under							
Mid							
Over							
Species specific observations							
	% Understorey		% Mid-storey		% Overstorey		%
Sp. 1							
Sp. 2							
Sp. 3							
Sp. 4							

Sp. 5							
Environmental weeds cover							
	Present	1 (1-5)	2 (6-25)	3 (26-50)	4 (51-75)	5 (76-100)	Absent
Under							
Mid							
Over							
High threat environmental weeds							
	% Understorey		% Mid-storey		% Overstorey		%
Sp. 1							
Sp. 2							
Sp. 3							
Sp. 4							
Sp. 5							
Bare ground created by disturbance							
	Present	1 (1-5)	2 (6-25)	3 (26-50)	4 (51-75)	5 (76-100)	Absent
Vehicles							
People							
Erosion							
Other							
Natural recruitment							
	Absent		Present		%		
Under							
Mid							
Over							
Connectivity							
	Patch size (ha)		Distance (km)		Connection		
Patch 1					H	M	L
Patch 2					H	M	L
Patch 3					H	M	L
Significant species identified							
	Location	Population size	Threat		Proposed response		

Sp. 1				
Sp. 2				
Sp. 3				

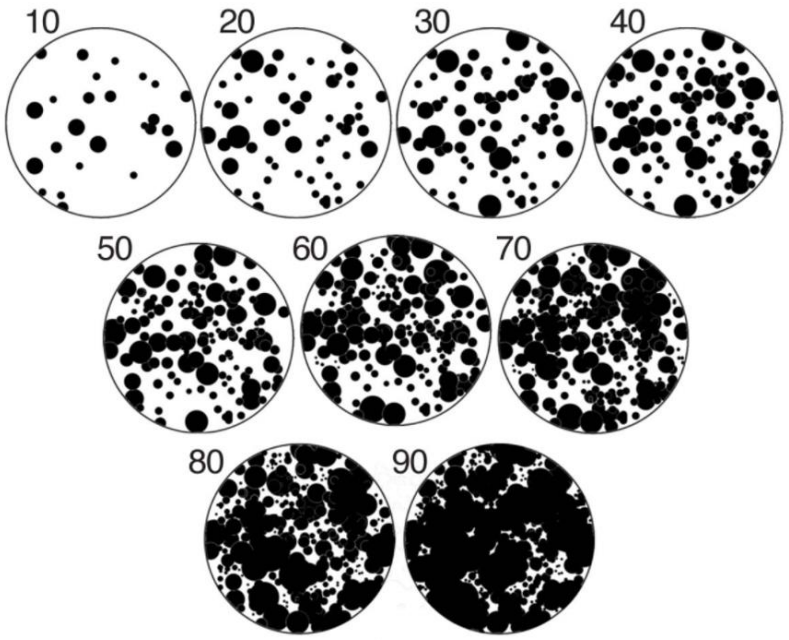
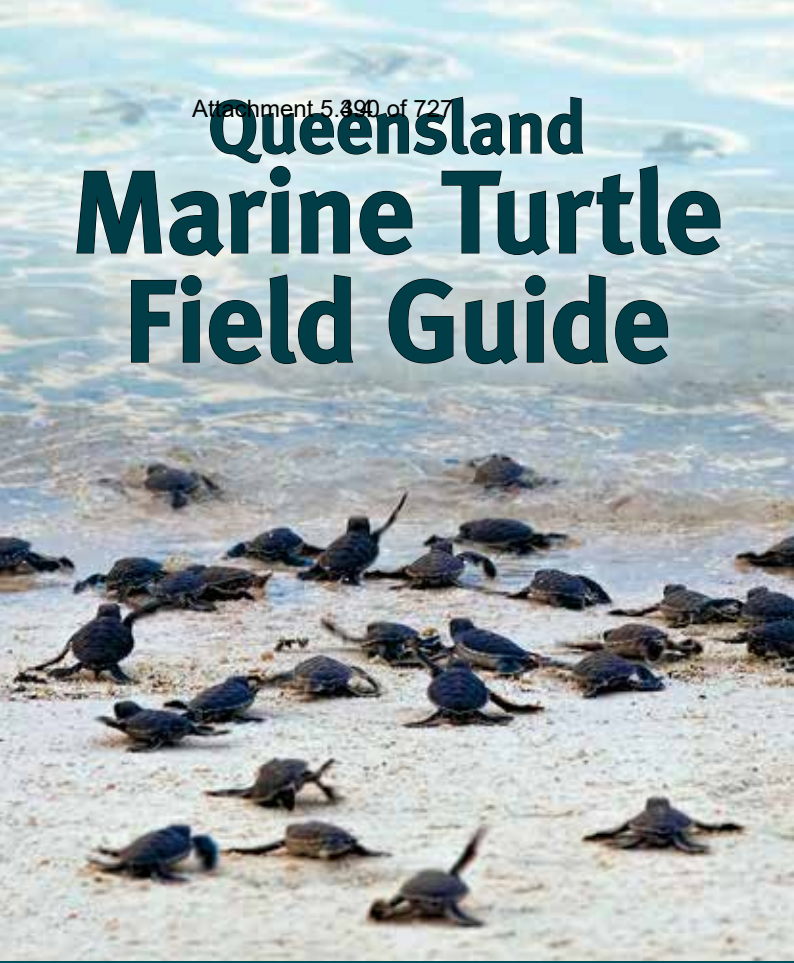


Figure 14. *Schematic representation of percentage cover categories.*

Queensland Marine Turtle Field Guide




APN

Queensland's coast has some of the most important marine turtle nesting sites in the world. Six species of threatened marine turtles nest along our idyllic beaches. These rookeries support significant nesting populations of green, loggerhead, hawksbill, flatback and olive ridley turtles.

One of the most serious threats to nesting turtle populations is the destruction of their eggs and hatchlings by predators. Feral pigs have been found to be responsible for destroying over 70 per cent of turtle nests at nesting beaches on Cape York, continued loss at this rate is not sustainable. Other predators include foxes, dogs, dingoes and goannas.

To reduce predation on marine turtle nests and help the recovery of threatened marine turtle populations, the Australian and Queensland Governments have together invested nearly $7million in the Nest to Ocean Turtle Protection Program. The program supports predator control and turtle monitoring at priority nesting beaches. It also assists Traditional Owner and community groups to increase their participation in these important activities.

This field guide has been developed as part of the Nest to Ocean Turtle Protection Program. Correctly identifying marine turtles, and the animals that prey on their nests, provides valuable information about turtle populations and shows where predator control activities are most needed.

Nest to Ocean
Turtle Protection Program

Front Cover: Turtle Hatchlings © Kyburgh
Inside Cover: Steven Marpoondin (APN Cape York) © *Brian Ross*

Contents

Marine Turtle Species Identification Key

Indo-Pacific Marine Turtles

Carapace with:
- No continuous ridges
- Large scales
- Claws on flippers

Carapace with:
- 5 distinct continuous ridges
- No large scales
- No claws on flippers

Leatherback Turtle
Dermochelys coriacea

4 pair costal scales

5 pair (rarely 6) costal scales

Carapace longer than wider
Red-brown to brown
No pores in scale of bridge

Loggerhead Turtle
Caretta caretta

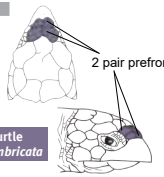
6 pair or more costal scales

Carapace more circular
Grey-green
Pores in scale of bridge

Olive Ridley Turtle
Lepidochelys olivacea

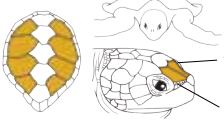
2 pair prefrontal scales
Thick overlapping carapace scales

2 pair prefrontal scales



Hawksbill Turtle
Eretmochelys imbricata

1 pair prefrontal scales
No thick overlapping carapace scales

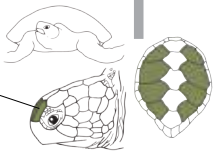


1 pair prefrontal scales

Preocular scales

Low domed carapace with upturned edges
Preocular scales
Olive grey

Flatback Turtle
Natator depressus



High domed carapace
No preocular scales
Light to dark green with dark mottling

Green Turtle
Chelonia mydas

Photographs of Adults and Hatchlings

Green Turtle *Chelonia mydas* Page 10

Olive Ridley Turtle *Lepidochelys olivacea* Page 14

Hawksbill Turtle *Eretmochelys imbricata* Page 18

Marine Turtle Track Identification Key

Alternating Stroke

Flipper marks alternate

Track Features

Early morning monitoring is best as tracks will deteriorate over time. The clarity of tracks can be affected by flipper damage, terrain, sand moisture, tides, wind and weather. Look for several key identifying features, along different sections of track.

The key track identification features are:

- Stroke Style
- Track Width
- Hind Flipper Marks
- Front Flipper Marks
- Plastron Drag
- Tail Drag

Loggerhead

Track Width
Less than 1 meter

Hind Flipper

Front Flipper

Plastron Drag

Tail Drag
Not present

Hawksbill

Track Width
Approx. 70-80 cm

Hind Flipper

Front Flipper

Plastron Drag

Tail Drag

Olive Ridley

Track Width
Approx. 70-80 cm

Hind Flipper

Front Flipper

Plastron Drag

Tail Drag

Breast Stroke

Flipper marks side by side

Green

Track Width
Approx. 94-144 cm

Hind Flipper

Front Flipper

Plastron Drag

Tail Drag

Flatback

Track Width
Approx. 90-100 cm

Hind Flipper

Front Flipper

Plastron Drag

Tail Drag

Leatherback

Track Width
Greater than 2 meters

Hind Flipper

Front Flipper

Plastron Drag
Not Visible

Tail Drag

Track Direction

Clues to determine track direction:

Turtles push sand backwards, the higher sand mound is at the back.

If track overlaps, the top track is the returning track.

Sand is always thrown back over the emerging track when digging.

Measuring Width

Measure from outer edge of track. This may be the front or rear flipper, depending on species.

Basic Beach Monitoring

Guidelines on how to **Record** data and implement **Action** during a basic beach survey (see page 9). These may be tailored to suit individual monitoring programs and implemented in accordance with training.

Record

Species Identification: Use track or sighting to identify species.

GPS Nest Location: Note GPS coordinates & waypoint number.

False Crawl: Track with no nest.

Extent of Damage: Partial or complete destruction of nest.

Evidence of Predation: Diggings, tracks, sighting.

Predator Identification: Use track or sighting to identify species.

Hatchlings Emerged: Yes, hatchling tracks or sighting.

Tag Information: Note tag ID number and its location on turtle.

Curved carapace length (CCL): From front (where skin and carapace meet), down midline to back edge of carapace (over tail).

Action

Photograph: To verify species and/or nest damage/predation.

Mark Nest: Install marker to indicate nest location (if required).

Bury Eggshells and Mark Track: To avoid record duplication; mark track line above the high tide mark.

Submit Data: Project manager to submit data to the relevant Queensland Department.

Basic Beach Survey

Traverse beach to locate fresh turtle tracks.
Walk along the high tide line or drive on the wet sand just below the high tide mark

Equipment Checklist

- GPS (Use datum WGS 84 and decimal degrees)
- Data sheets or charged data recording device
- Pencil
- Tape measure
- Camera
- Personal safety gear
- Torch (night monitoring)
- Spare batteries
- Monitoring field guide

Record fresh tracks only

Adult Track No nesting turtle

Identify Species

refer to **Track Identification** (Pages 6-7)

Is there a nest or is it a false crawl?

Nest

Record / Action
- Species ID
- GPS Nest Location
- Mark Nest

Is nest damaged?

No

Yes

Record / Action
- Extent of Damage
- Evidence of Predation
- Predator ID (refer to pages 22-25)
- Photograph
- Bury Eggshells

False Crawl

Record / Action
- Species ID
- False Crawl

Unsure

Record / Action
- Species ID
- GPS Nest Location
- Mark Nest
- Photograph

Adult Track Nesting turtle

Identify Species

refer to **Species Identification** (Pages 3-5, 10-21)

Once female has settled into laying or has completed nesting

Record / Action
- Species ID
- Tag Information
- Curved carapace length
- GPS Nest Location
- Mark Nest

Hatchling Tracks Hatchlings

Identify Species

if hatchling present refer to **Species Identification** (Pages 3-5, 10-21)

Record / Action
- Species ID
- Hatchlings Emerged
- Marked Nest ID or GPS Nest Location
- Evidence of Predation
- Predator ID (refer to pages 22-25)

Refer to Page 8 for Record / Action monitoring protocols

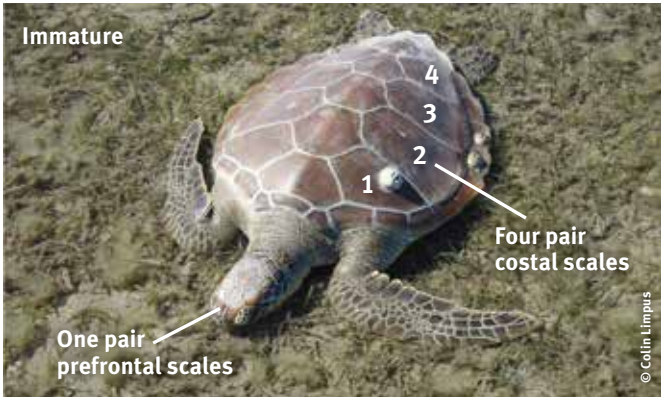
Mark monitored track with a line, above high tide mark, so it's not recorded twice

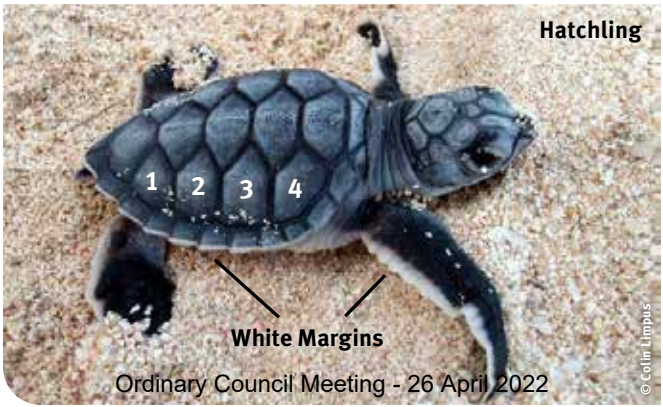
Continue and complete survey

Submit data forms and photographs for verification to project manager

Green Turtle, *Chelonia mydas*

Status: Nationally Vulnerable, Queensland Vulnerable





Key Identification Features

Breast Stroke Track

Carapace Scales

4 Pair Costal Scales

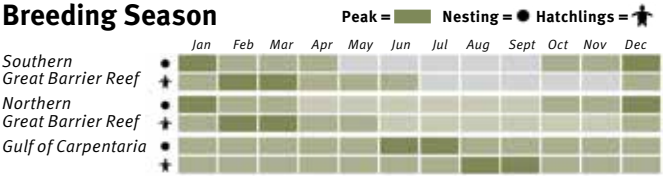
1 Pair Prefrontal Scales

Qld Nesting Sites

Adult: *Carapace is a high dome. Colour is light to dark green with dark mottling. Plastron colour is cream-white.*

Hatchling: *Black-dark brown with white margins, white plastron.*

Breeding Season



Loggerhead Turtle, *Caretta caretta*

Status: Nationally Endangered, Queensland Endangered

Key Identification Features

Alternating Track

Carapace Scales

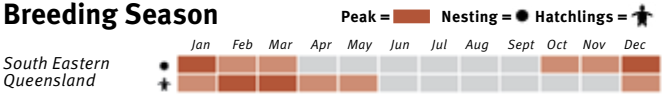
5 Pair Costal Scales

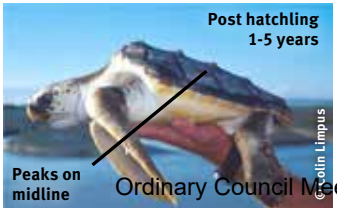
Qld Nesting Sites

Adult: *Carapace is longer than wider. Colour is red-brown to brown. Plastron colour is yellow.*

Hatchling: *Dark brown with 5 costal scales and dark plastron with 3-4 inframarginal scales.*

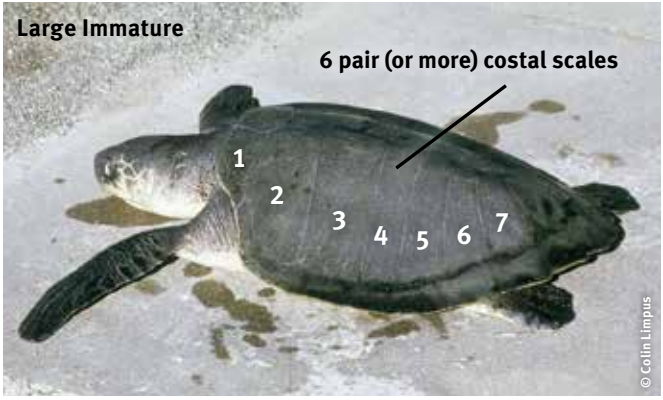
Breeding Season





Olive Ridley Turtle, *Lepidochelys olivacea*

Status: Nationally Endangered, Queensland Endangered

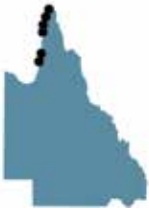


Key Identification Features

Alternating Track

Carapace Scales

6 Pair (or more) Costal Scales

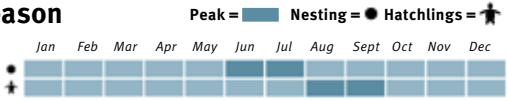


Qld Nesting Sites

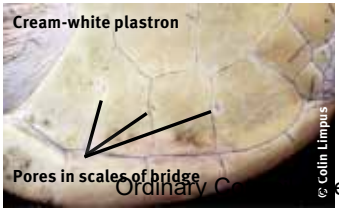
Adult: *Carapace is circular. Colour is grey-green with no conspicuous markings. Plastron colour is cream-white.*

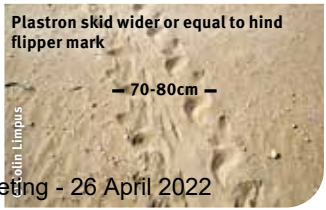
Hatchling*: Charcoal-grey/black-brown on both sides.*

Breeding Season



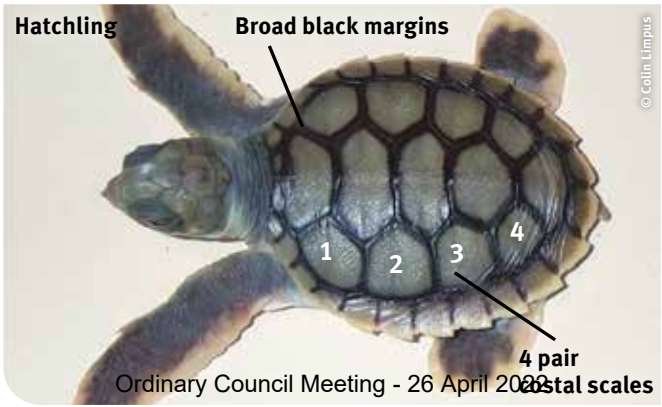
All year, peaks during dry season.





Flatback Turtle, *Natator depressus*

Status: Nationally Vulnerable, Queensland Vulnerable



Key Identification Features

Breast Stroke Track

Carapace Scales

4 Pair Costal Scales

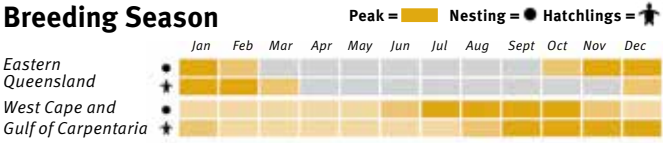
1 Pair Prefrontal Scales

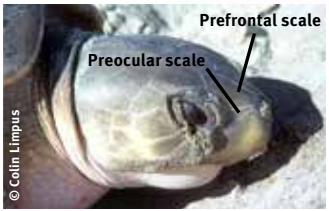
Qld Nesting Sites

Adult: *Carapace is a low dome, smooth with upturned edges. Colour is grey to pale-grey or olive. Preocular scales. Plastron is creamy-yellow.*

Hatchling: *Olive-green, scales with broad black margin. Plastron is a solid white.*

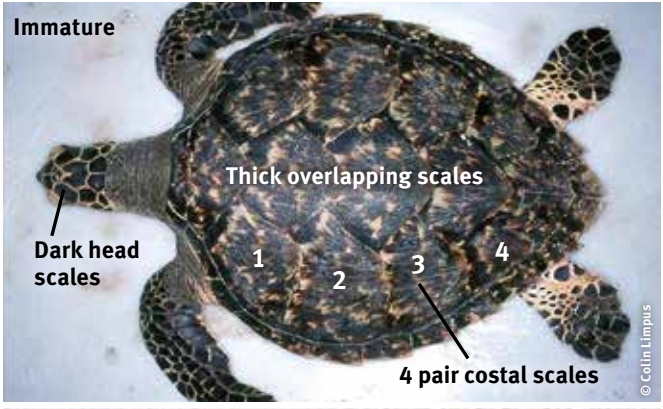
Breeding Season





Hawksbill Turtle, *Eretmochelys imbricata*

Status: Nationally Vulnerable, Queensland Vulnerable



Key Identifcation Features

Alternating Track

Scales Thick Overlapping

4 Pair Costal Scales

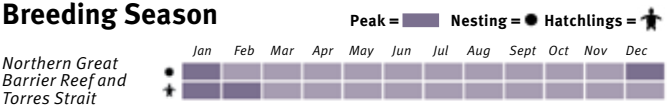
2 Pair Prefrontal Scales

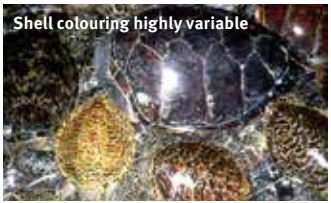
Qld Nesting Sites

Adult: *Carapace has thick overlapping scales. Colour is olive green or brown and is extensively variegated with brown/black markings. Adult plastron is yellow or white with black spots.*

Hatchlings: *Dark brown.*

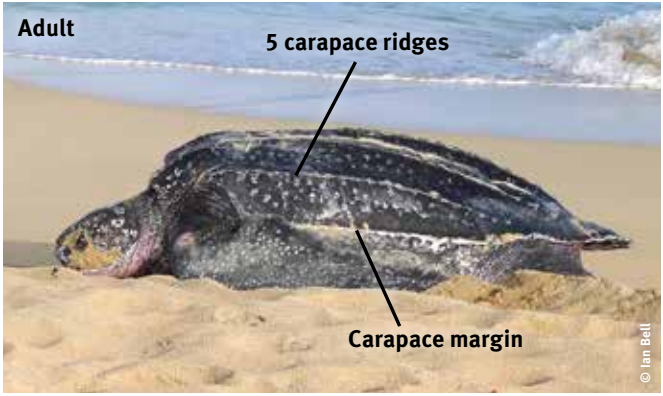
Breeding Season

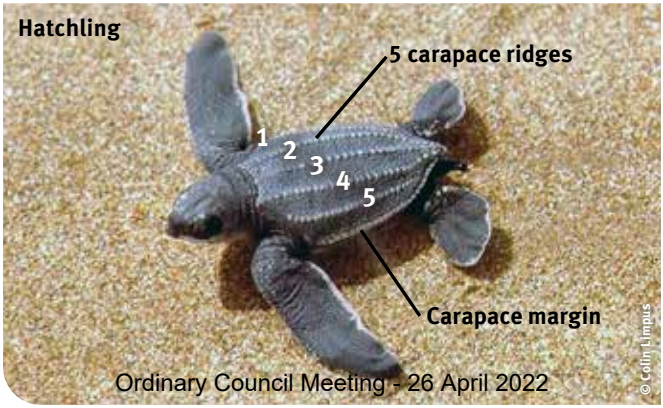




Leatherback Turtle, *Dermochelys coriacea*

Status: Nationally Vulnerable, Queensland Endangered





Key Identification Features

Breast Stroke Track

No Carapace Scales

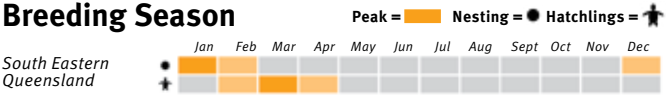
5 Carapace Ridges

Qld Nesting Sites

Adult: *Carapace is long and pointed. Long ridges run down the length of carapace. Colour is a uniform black-brown. Soft leathery skin.*

Hatchlings: *Finely beaded, black with white markings on the carapace ridges and plastron.*

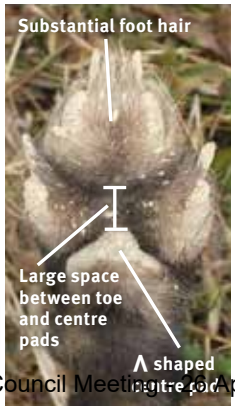
Breeding Season



Fox

Track Identification Features

- Front foot is larger than back foot.
- Elongated oval shaped claws, may not show on track.
- Substantial foot hair, sometimes visible on track impression.
- Large space between centre pad and toe pads.
- Centre pad has a distinct inverted V shape.
- Tracks are straight, hind feet reusing front feet impressions.
- Small track width.



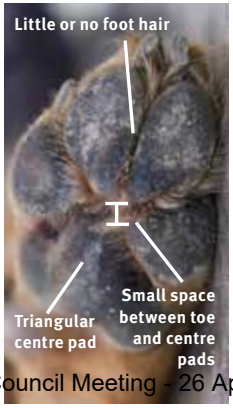
Management Options

- Den detection and fumigation
- Ground shooting
- Trapping
- Baiting
- Exclusion fencing
- Nest protection (cages)

Wild Dog or Dingo

Track Identification Features

- Front foot is larger than back foot.
- Little or no foot hair in between pads.
- Small space between centre pad and toe pads.
- Centre pad almost triangular.
- Foot imprint rounded.
- Tracks are straight but not as neat and aligned as a fox's track.



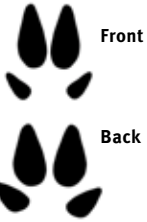
Management Options

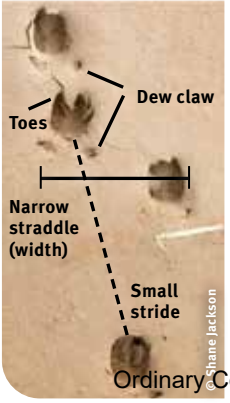
- Ground shooting
- Leg hold trapping
- Baiting (1080 or strychnine)
- Exclusion fencing
- Nest protection (cages)

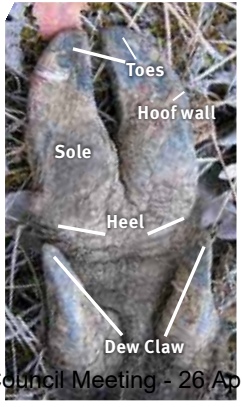
Feral Pig

Track Identification Features

- Back feet slightly larger than front.
- Foot print consists of a two toe hoof and two dew claws.
- Dew claws distinctive identification feature but may not be present in harder soils.
- Small stride and narrow straddle.







Management Options

- Ground/aerial shooting
- Trapping
- Baiting
- Exclusion fencing
- Nest protection (cages)

Goanna

Track Identification Features

- Both walk and run tracks have alternating foot prints.
- Trail drag usually visable.

Nest Predation Identification

- Goannas burrow into nest at an angle from the side of the nest, not vertical from directly above.
- The burrow is typically domed shape, not circular.

Management Options

- Trapping
- Exclusion fencing
- Nest protection (cages)

Principles of Pest Management

Managing pest animals requires long-term control programs and a variety of approaches. Effective programs are designed around these eight principles:

1. INTEGRATION

Ensuring pest management programs are an integral part of the management of natural areas.

2. PUBLIC AWARENESS

Raising public awareness and knowledge of pests to increase community and individual participation in pest management.

3. COMMITMENT

Gaining a commitment to long term programs by the community, industry groups and government entities.

4. CONSULTATION AND PARTNERSHIP

Establishing partnerships between local communities, industry groups, state government agencies and local governments to achieve a collaborative approach.

5. PLANNING

Consistent planning at local, regional, state and national levels ensures combined resources target the agreed priorities.

6. PREVENTION

Preventing the spread of pests, and using early detection and intervention to control pests.

7. BEST PRACTICE

Using ecologically and socially responsible pest management practices to protect the environment and natural resources.

8. IMPROVEMENT

Research and regular monitoring and evaluating of programs helps improve and refine pest management practices.

Threats to Marine Turtles

Marine turtles are long-lived and slow to mature. Depending on the species they can take anywhere between 8–50 years to reach breeding age. Due to the range of threats, at their different life stages, it is thought that only 1 in 1000 hatchlings will survive to adulthood and then return to the beach to nest. For this reason it is critical to address the range of threats throughout their lifecycle.

Threats include:

- Native and introduced animals predating turtle eggs and hatchlings.
- Vehicles compacting turtle nests or forming tyre ruts that trap hatchlings.
- Humans taking turtle eggs.
- Bycatch of marine turtles in fisheries.
- Marine debris.
- Impact to breeding habitat from coastal development and artificial lighting.
- Deteriorating water quality.
- Unknown and possibly unsustainable levels of turtle harvesting, in and outside Australian waters.

What you can do:

- Support the management of predators such as pigs, dogs and foxes around turtle nesting beaches.
- Report turtle nests and predated turtle nests to your local ranger.
- Keep your dogs on a lead when walking on the beach during nesting/hatchling season.
- Drive slowly on beaches and avoid driving over nests. Drive on the wet sand below the high tide mark to avoid making wheel ruts.
- Pick up marine debris from the beach and waterways.
- Report ghost nets to your local ranger.
- At night, minimise lights on the beach, including campfires.
- Support sustainable, traditional use of turtle and turtle eggs.

Acknowledgements

The Queensland Parks and Wildlife Service Nest to Ocean Turtle Protection Program Team would like to acknowledge the contribution of staff from the following organisations in the development of the field guide: Western Cape Turtle Threat Abatement Alliance supported by Cape York Natural Resource Management, Balkanu Cape York Development Corporation, Aak Puul Ngantam, Feralfix, World Wildlife Fund for Nature, and University of Queensland. Also acknowledged is the input and advice of staff from our partnering Australian and Queensland Government departments.

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Prepared by:
Queensland Parks and Wildlife Service,
Department of Environment and Science.

Oak Beach

FORESHORE MANAGEMENT PLAN

July 2021

DOUGLAS SHIRE COUNCIL

The Eastern Kuku Yalanji and Yirrganydji Peoples are the Traditional Custodians and Owners of the land and sea country that encompass the Douglas Shire region.

Douglas Shire Council acknowledges the 'Bama', the traditional rainforest Aboriginal coastal people of our region who hold the unique position of being the First Peoples of this country. We recognise and respect Bama cultural heritage, values, beliefs and continuing relationships and responsibility to their land and sea country. We honour and respect your Elders past, present and future.

We commit to maintaining and strengthening our partnerships and respectful relationships with Bama in the spirit of reconciliation so that together we can increase the opportunities for successful and positive outcomes to the advantage of everyone in our communities.

Council respectfully acknowledges other Aboriginal and Torres Strait Islander people who call our region 'home'.

This report has been prepared by Alluvium Consulting Australia Pty Ltd and Wild Environmental for Douglas Shire Council under the contract titled 'WO5429 Foreshore Management Plan'.

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Approved:	Emily Lazarus
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Cover image:	Oak Beach foreshore.

Contents

Figures

Tables

1 Introduction

The coastline is an important place for many Australians, providing significant social and cultural value. This is especially so for many residents of the Douglas Shire who have identified these unique coastal landscapes and natural ecosystems among some of the most important factors attracting people to this coastline (DSC 2019a). The Douglas Shire coastline also has high tourism value, attracting many visitors to the area.

The Eastern Kuku-Yalanji and Yirriganydji Peoples are the Traditional Custodians of the Land and Sea Country within the Douglas Shire. They have lived in and cared for this region for thousands of years, represented in important cultural sites throughout the Shire, and the memories and experiences of its people; past, present and future.

Douglas Shire Council (DSC) has an extensive 111 km long coastline extending from Degarra in the north to south of Wangetti. The Shire is well known for its diverse coastline and its proximity to the Great Barrier Reef. Much of the Shire is within the Wet Tropics World Heritage Area and its dynamic coast consists of a variety of sandy beaches, rocky headlands and coastal rainforests.

The region's beaches and foreshore areas are important both to people and to the ecosystems around them. Coastal landscapes provide essential habitat for life on the foreshore and provide visual and recreational amenity to the people. Healthy coastal ecosystems are necessary to promote the resilience of plant and animal communities to coastal hazard impacts. Denser vegetation types are also effective in reducing the destructive forces of a storm tide for communities and infrastructure landward of the foreshore.

However, these ecosystems are experiencing ongoing disturbance because of erosion, vehicle and pedestrian access, weeds and pest species, illegal dumping, and runoff from stormwater and agricultural land. These factors threatening dune stability and reducing the erosion buffer often result in vegetation loss, impacts to native fauna species, and changes in ecosystem structure.

To help manage and protect these important coastal zones, DSC has developed five Foreshore Management Plans (FMPs) for the Wonga, Newell, Cooya, Four Mile and Oak Beaches.

1.1 Purpose

In 2019, DSC developed the Resilient Coast Strategic Plan 2019-2029 (referred to henceforth as the Strategy) and has committed to undertake actions to reduce the impacts of coastal hazards, such as erosion and coastal flooding, and activities in the coastal zone. A priority outcome of the Strategy is to undertake dune protection, maintenance and monitoring. This encompasses the foreshore area and is the focus of the FMP.

The FMPs will help to guide Council in the protection, maintenance and management of the foreshore, while maintaining the natural character of the area and respecting ecological, cultural and social values of these coastal reserves. Funding has been secured through the Queensland Government Reef Assist Program which will be used to support the implementation of the management actions outlined in the FMP.

The plans will:

- Ensure there is a **shared understanding** of the social, cultural, environmental and economic values and uses of the foreshore area
- Identify options for the **proactive management** of vulnerable areas of the foreshore area over the next 5 years
- Help **improve and maintain** the vegetation cover and condition in the foreshore area.

1.2 Foreshore Management Plan area

Oak Beach is located south of the Mowbray River and forms a 1.6 km long pocket beach (Figure 1) (DSC 2019b). It is part of a mini barrier spit landform that is anchored by a rocky headland to the south. The intertidal zone is approximately 20 to 40 m wide. There is an erosion scarp evident along the beach that reaches the vegetation line.

Oak Beach is a small coastal settlement with approximately 195 residents as of the 2016 census (ABS 2017). Some of the residents at Oak Beach are absentee owners, only visiting seasonally. There are approximately 25 dwellings along the foreshore, as well as Thala Beach Nature Reserve Resort at the northern end of Oak Beach (DSC 2019b). Some of these houses are around 20 to 30 m from the erosion scarp line along the central section of the beach at the residential end. During the site visits, significant encroachment of the residential property boundary seaward onto Council land was noted. This encroachment includes the construction of permanent structures and planting of non-native vegetation on Council land between the dune and the residential area.

1.3 Implementation

This FMP has been developed following a series of site inspections, including vegetation mapping, species identification and coastal morphology assessments, as well as public engagement with residents and ratepayers from Oak Beach and the wider Douglas Shire. The site inspections and public engagement have informed the management actions and planning decisions for the Oak Beach foreshore area. The management actions have been tailored to incorporate what the community values about their foreshore and how the foreshore is used.

The Oak Beach FMP outlines actions for dune protection, including weed species for removal, native vegetation species for regeneration and pedestrian access management. It also provides a schedule for implementation to allow Council to prioritise actions for the area. This FMP remains non-statutory but once approved by Council provides an informed and proactive guide for the future management of Oak Beach.

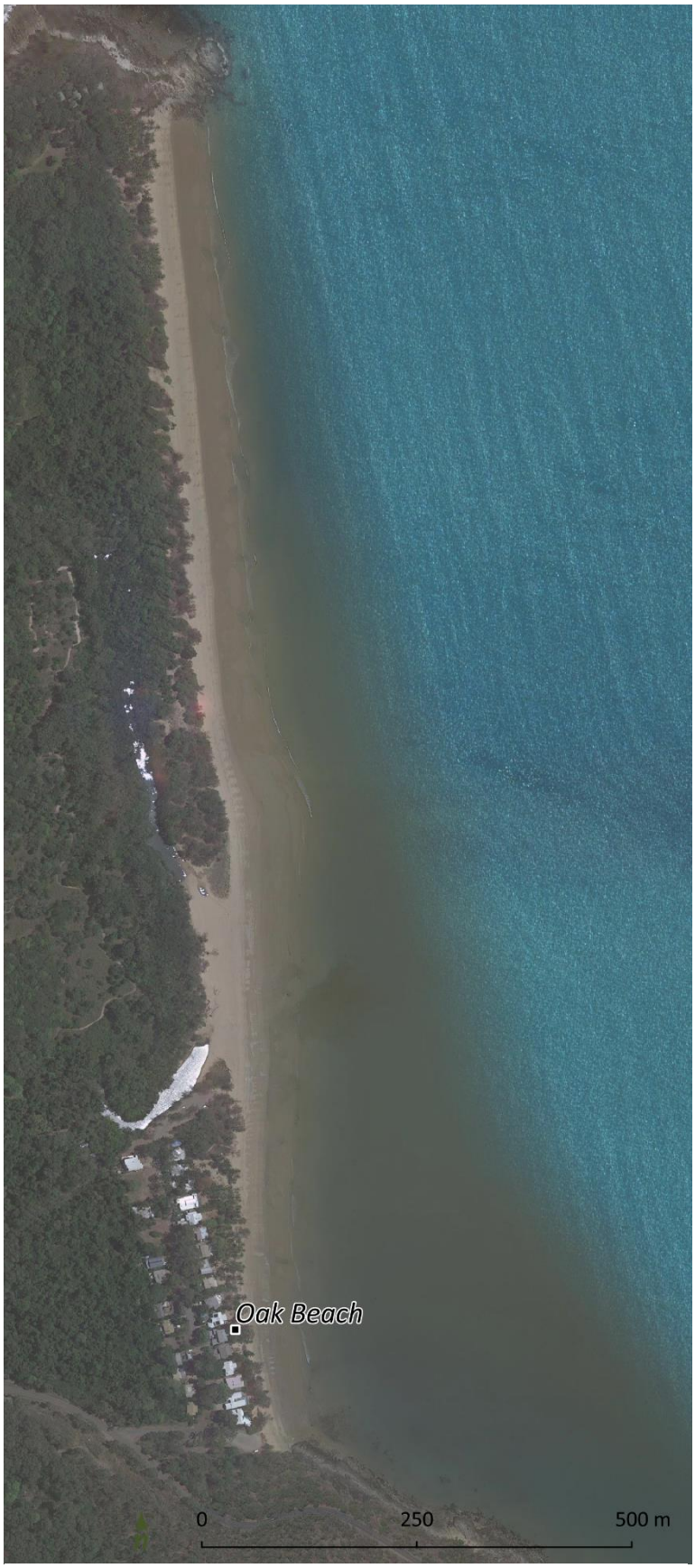

Figure 1. *Oak Beach foreshore management area.*

2 Study area and planning context

Oak Beach is a beachfront community located on a wide, sandy and pebbly beach. The southern end of Oak Beach is bound by a rocky headland and it extends northward to another rocky headland where Thala Beach Nature Reserve Resort is located. The beach is intersected by Grants Creek at the northern end of the residential area. There is a variety of land zoning uses and ecological communities at Oak Beach. The following section will outline and illustrate the DSC land zoning and vegetation and faunal communities that have been identified in a literature review and supported by findings from the site visits and surveys.

2.1 Legislative, policy and strategy setting

Coastal management is guided by Commonwealth, State and local legislation. The legislation results in a complex structure of rights and responsibilities. Key legislation, plans, policies and strategies relevant to foreshore management are summarised in Table 1.

Table 1. Summary of the legislation, policy, plans and strategies relevant to foreshore management

Legislation	Relevance

Biosecurity Act 2014	• This Act provides a comprehensive biosecurity framework to manage the impacts of animal and plant diseases and pests.
	• The purpose of this Act is to:
	  ○ Provide a framework for an effective biosecurity system for Queensland.
	  ○ Ensure the safety and quality of animal feed, fertilisers and other agricultural inputs.
	  ○ Help align responses to biosecurity risks in the State with national and international obligations and requirements.
	• The purpose of the Act is also to manage risks associated with emerging, endemic and exotic pests and diseases.

Coastal Protection and Management Act 1995	• This Act aims to provide for the protection, conservation, rehabilitation and management of the coastal zone, including its resources and biological diversity. • This Act considers the goal, core objectives and guiding principles of the National Strategy for Ecologically Sustainable Development in the use of the coastal zone. • This Act ensures that decisions about land use and development safeguard life and property from the threat of coastal hazards. • This Act encourages the enhancement of knowledge of coastal resources and the effect of human activities on the coastal zone.

Planning Act 2016	• This Act provides for an efficient, effective, transparent, integrated, coordinated and accountable systems of land use planning and development assessment to facilitate the achievement of ecological sustainability by:
	  ○ Coordinating and integrating planning at the local (i.e., planning schemes), regional and State scales
	  ○ Managing the process and effects of development on the environment (including managing the use of premises).

Native Title Act 1993	• The purpose of this Act is for the recognition and protection of native title.
	• It covers:
	  ○ Acts affecting native title.
	  ○ Determining whether native title exists and compensation for acts affecting native title.

Legislation	Relevance
Aboriginal Cultural Heritage Act 2003	• The main purpose of this Act is to provide effective recognition, protection and conservation of Aboriginal cultural heritage.
Vegetation Management Act 1999	• This Act aims to regulate the clearing of vegetation by: o Managing the environmental effects of clearing. o Regulating clearing in a way that conserves remnant vegetation that is an endangered regional ecosystem, an of concern ecosystem, or a least concern regional ecosystem. o Ensuring clearing does not cause land degradation and allows for sustainable land use. o Preventing the loss of biodiversity, maintain ecological processes, and reduce greenhouse gas emissions.
Environmental Protection Act 1994	• This Act aims to protect Queensland's environment while allowing for development that improves the total quality of life, both now and in the future, and that maintains the ecological processes on which life depends. • The Act defines environmental value, environmental harm and best practice environmental management.
Nature Conservation Act 1992	• This Act aims to conserve nature while allowing for the involvement of indigenous people in the management of protected areas. • This is to be achieved by a conservation strategy for Queensland that declares and manages protected areas, protects native wildlife and habitats, ensures use of protected wildlife and areas to be ecologically sustainable, and allows cooperative involvement of Aboriginal and Torres Strait Islander people.
Environment Protection and Biodiversity Conservation Act 1999	• This Act aims to provide protection of the environment, promote ecologically sustainable development and the conservation of biodiversity. • The Act aims to promote the use of indigenous knowledge of biodiversity through a cooperative approach to the protection and management of environments.
Queensland Local Government Act 2009	• This Act provides a system of local government in Queensland, including: o The way in which a local government is constituted and the nature and extent of its responsibilities and powers. o A system of local government in Queensland that is accountable, effective, efficient and sustainable.
Marine Parks Act 2004	• The main purpose of this Act is to provide for conservation of the marine environment. • This purpose as it relates to this plan can be achieved through: o Cooperative involvement of public authorities and other interested groups and persons, including members of Aboriginal and Torres Strait Islander communities. o Recognition of the cultural, economic, environmental and social relationships between marine parks and other areas, whether of water or land.

Legislation	Relevance
Local Laws	• Local laws sit within the *Local Government Act 2009* and under the Act a local government may make and enforce any local law that is necessary or convenient for the good rule and local government of its local government area. • This legislation sets out the laws for the Douglas Shire Council area, including animal management, community and environmental management, local government areas, and facilities.

2.2 Zoning

Land use

The DSC Planning Scheme (2018) has been used to understand the boundaries between different land uses (Figure 2) (DSC 2018a). At Oak Beach, the primary land use within or immediately adjacent to the foreshore area at the southern end is low density residential. There is a small area of land for conservation near Grants Creek. At the northern end of Oak Beach near Thala Beach Nature Reserve Resort, there is also rural and tourist accommodation land use within or immediately adjacent to the foreshore area. These land uses have implications for the management of the foreshore area. Changes within these zones can have flow-on impacts to the foreshore area, including:

- habitat fragmentation (loss of habitat into smaller, isolated areas)
- runoff
- illegal clearing and planting, including weed dispersal and growth
- impacts on fauna (light and noise pollution, road/beach kills).

Residential

Low density residential areas provide for predominantly dwelling houses supported by community uses and small-scale services and facilities that cater for local residents (DSC 2018a). The purpose of the low density residential zone will be achieved through the following outcomes relevant to the foreshore (DSC 2018a):

- Development maintains a high level of residential amenity having regard to traffic, noise, dust, odour, lighting and other locally specific impacts.
- Development reflects and enhances the existing low density scale and character of the area.
- Development is reflective and responsive to the environmental constraints of the land.
- Development is supported by necessary community facilities, open space and recreational areas and appropriate infrastructure to support the needs of the local community.

Conservation zone

The conservation zone provides for the protection, restoration and management of areas identified to support significant biological diversity and ecological integrity (DSC 2018a). Relevant outcomes identified in the Douglas Planning Scheme for the conservation zone include (DSC 2018a):

- Protection of biological diversity, ecological integrity and scenic amenity.
- Recreational or other uses of areas are consistent with the management plans of the controlling authority so that conservation and scenic values of these areas are not adversely affected.
- Any use of land in private ownership does not affect the environmental, habitat, conservation or scenic values of that land or surrounding area.
- Any low intensity facilities based on the appreciation of the natural environment or nature based recreation only establish where there is a demonstrated need and provided they have a minimal impact on the environmental and scenic amenity values of the site or surrounding area.
- The provisions of the Return to Country Local Plan facilitate economic and social opportunities on traditional Indigenous lands.

- Further lot reconfigurations other than amalgamations, boundary realignments to resolve encroachments, or for the practical needs of essential community infrastructure, or to facilitate Return to Country outcomes do not occur.

Great Barrier Reef Coast Marine Park Zoning

The Great Barrier Reef (GBR) Coast Marine Park Zoning classifies the land and waters above (near Grants Creek) and below the high tide mark within the Oak Beach FMP area as Conservation Park Zone. This zoning allows for increased protection and conservation of areas while also providing opportunities for reasonable use and enjoyment (GBRMPA 2021).

Wet Tropics World Heritage Area

The southernmost end of the Oak Beach FMP area is directly bordered by the Wet Tropics World Heritage Area (WTMA n.d.). The goal of this status is to conserve, protect, rehabilitate, present and transmit to future generation. Activities undertaken along the Oak Beach foreshore may have an impact on the Wet Tropics area and needs to be considered accordingly.

Dune vegetation at Oak Beach.

Figure 2. *Oak Beach foreshore area land use zoning (DSC 2018, GBRMPA 2021).*

2.3 Coastal hazards

Oak Beach is vulnerable to coastal erosion (DSC 2019b). This erosion may be temporary or permanent. Temporary erosion is generally caused by storms, winds or waves, and the beach rebuilds during calmer periods. Permanent erosion is more likely to occur over the longer-term due to rising sea levels or significant changes to sediment transport dynamics where sand becomes lost to the coastal system. Erosion may impact the foreshore area, including the vegetation, wildlife habitats, infrastructure, recreational uses or values.

Foreshore management precinct

The foreshore precinct at Oak Beach, which is the focus of the FMP, has been designated as the zone between the highest astronomical tide (HAT) landward to the edge of the low density residential zone (Figure 3).

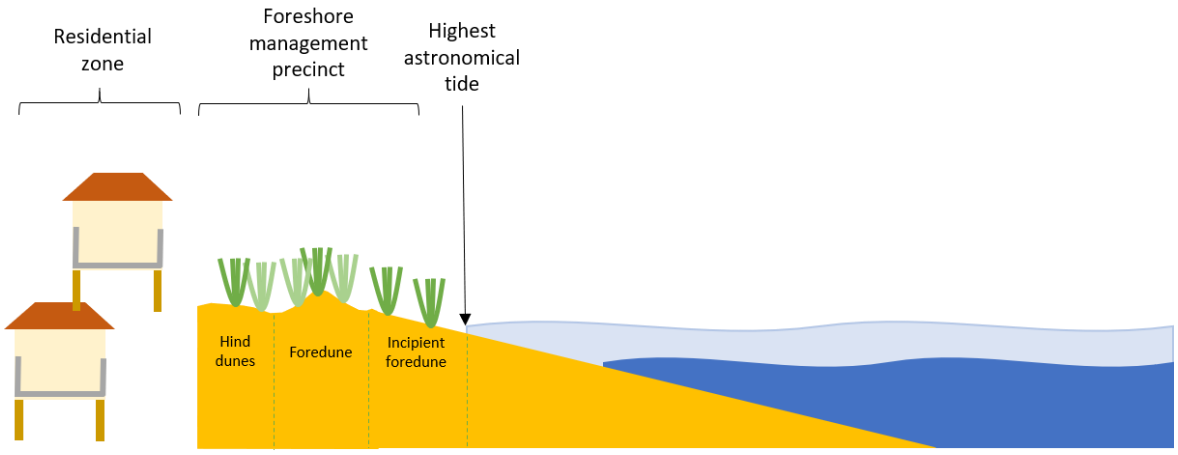

Figure 3. *Graphic representation of the Oak Beach foreshore management precinct.*

The foreshore area includes the dune system behind the beach, immediately landward of the HAT mark and is made up of the following three key sections (Figure 3):

- **Incipient foredune:** a windblown platform that forms in front of the foredune, however is not present on all beaches. This is where vegetation such as grasses and creepers first establish and provides a protective buffer to erosion, and storm effects, including winds and waves.
- **Foredune:** the main sandy formation and is of greater height than the incipient dune. Larger vegetation species establish here, including shrubs, which provide greater wind protection.
- **Hind dune:** a smaller dune system behind the foredune. These systems tend to be well established, including larger vegetation species such as trees.

A significant proportion of the foreshore includes GBR Coast Marine Park zoning for Conservation Park Zone (see Figure 2). This influences the activities that are permitted in this precinct.

3 Foreshore values

The Oak Beach foreshore is valued by residents and visitors for several reasons. These values play a role in the management of the foreshore area. The following section outlines the social, cultural and environmental values that have been identified for the Oak Beach foreshore area, as well as describing any threats or challenges to these values.

3.1 Knowledge sharing and community engagement

The Oak Beach community has previously been engaged through the Strategy. However, no feedback specific to Oak Beach was provided through this survey.

For this FMP, a survey was distributed to the Oak Beach community and the wider Douglas Shire residents and ratepayers to understand how they use and what they value about the foreshore zone, and how they would like to see it managed. The survey was advertised through the Council Foreshore Management Plans website, Facebook, community noticeboards, emails to residents and community groups, and physical copies available at Council offices. The survey ran from 31st March to 23rd April 2021 and received a total of 317 responses from residents and community groups throughout the Douglas Shire. A total of 41 responses were received from Oak Beach Residents, with most being homeowners.

In addition to the survey, there was also a period of public comment following the release of the draft FMP for Oak Beach. A four-week public comment period provided residents and ratepayers with the opportunity to submit feedback on the draft FMP. A number of open house drop-in sessions were also held at various locations throughout the Shire, including at the Oak Beach foreshore, to allow people to discuss the FMP in greater detail. Feedback from the public consultation has been used to further understand the values and shape the management actions for the final FMP.

Social values

More than half of the respondents live adjacent to the Oak Beach foreshore. The foreshore area is visited at least weekly by over half of respondents. This information indicates that the foreshore area is significant to residents, ratepayers and holiday-home owners at Oak Beach.

Residents at Oak Beach predominantly use the foreshore area for exercise, including walking and swimming (Figure 4). The foreshore is also used for relaxing and by people walking their dogs. Several people also use the Oak Beach foreshore for recreation, including sailing and fishing. Respondents also remarked that they often meet friends along the foreshore. Around one third of respondents also noted that they use the foreshore area as an extension of their yard.

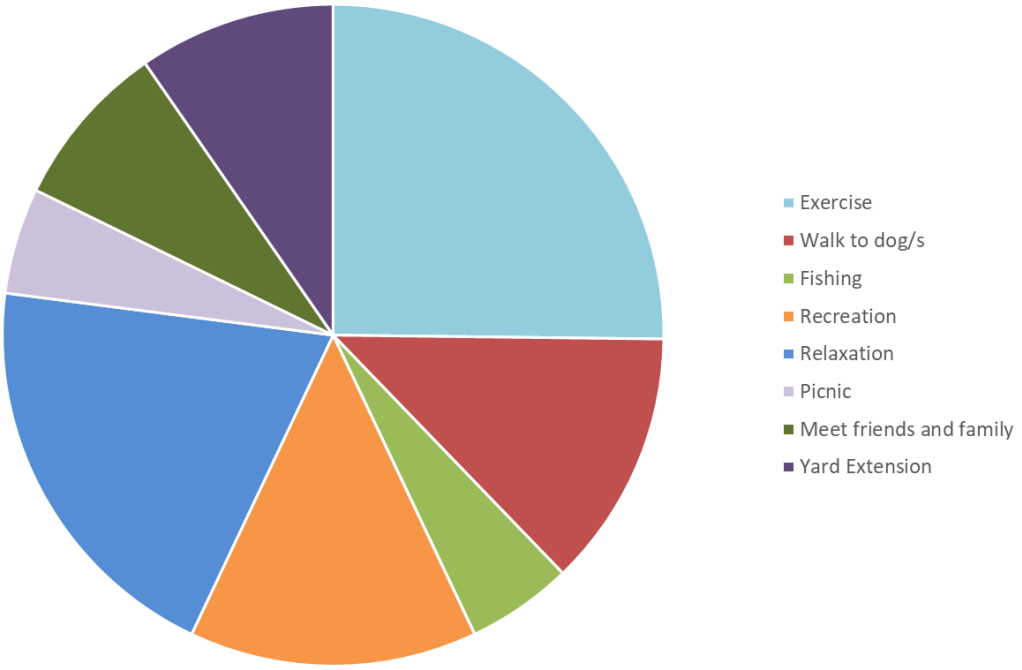

Figure 4. *The most common uses of the foreshore area at Oak Beach.*

Sense of place

The foreshore at Oak Beach is most valued for its natural beauty. The residents feel that Oak Beach is relatively quiet, peaceful and unspoilt. It is viewed as a place to escape the hustle and bustle and also enjoy some privacy due to the low population and lack of tourists. There is a community feel to Oak Beach. The natural habitats are also important to the residents. These habitats include turtle nesting sites, shorebirds and marine animals. Residents also enjoy beach and water views.

Concerns and threats

Residents have noticed erosion is occurring along Oak Beach. It appears to be event-related as the sand eventually returns to the beach, however it is affecting the amenity of the foreshore. Erosion seems to be affecting the southern end of Oak Beach more than the northern end. In some places, large trees along the foreshore have been observed to be undermined by erosion. This would have an impact on the stability of the dune.

Another concern is the land clearing that is occurring along the foreshore in front of properties to create access and ocean views. Some residents have noted vegetation is being poisoned or removed in some areas for this purpose. This includes the She Oaks (*Casuarina equisetifolia*) after which Oak Beach is named. Residents have also noticed weed infestations, particularly at the northern carpark.

Feedback from the survey also highlighted the number of dogs on the beach without a leash. There is the concern from some residents that unleashed dogs are contributing to the waste on the beach. Other noted contributions to

waste on the beach included campers and fishing waste. There is also natural waste such as palm fronds and large trees. Residents frequently collect rubbish along the foreshore during their walks.

3.2 Environmental values

The vegetation along the foreshore at Oak Beach is heavily impacted by illegal clearing to maintain views and access. There is no mapped remnant vegetation along the Oak Beach precincts south of Grants Creek and the foreshore vegetation present is dominated by coconuts with little understorey. North of Grants Creek is mapped as remnant coastal vegetation through to the foreshore adjoining the Thala Beach Resort access area at the northern point where it thins to non-remnant and is dominated by stands coconuts.

Flora composition

A desktop assessment of the vegetation mapping for Oak Beach indicates that there is no remnant vegetation associated with the foreshore area at the southern end and only a small area of regrowth vegetation has been mapped in association with the estuary to the north of the residential area and along the foreshore at the northern end near Thala Beach Nature Reserve (DOR 2020).

The mid-precinct around Grants Creek consists of remnant coastal dune and mangrove vegetation which remains relatively intact with small open areas which are likely of anthropogenic origin. Some natural openings in the vegetation may occur where larger dunal trees have fallen during weather events. Vegetation in each of the progressive foreshore sections of vegetation from swale and hind dune through to incipient dune remain intact in this section.

The northern precinct of Oak Beach contains a non-remnant area associated with beach access from the adjacent resort. This area appears to be fairly heavily trafficked with no native canopy species additional to the coconut palms present. There is no mid-storey vegetation typically associated with the foredune in this area and few ground layer species are present resulting in moderate to severe erosion of the incipient and foredune areas.

Remnant and regrowth vegetation present at Oak Beach relates to three different Regional Ecosystem (RE) types. Descriptions, Vegetation Management (VM) Class and Biodiversity Status (BD) are summarised in Table 2 and Figure 5. A full list of the REs at Oak Beach is provided in Attachment A. The local representation of vegetation in the dune system at Oak Beach is summarised in Table 3.

Table 2. Regional Ecosystems (RE) of Oak Beach

RE	Mapped RE description	VM Class[1]	BD Status[2]	Local representation
7.1.1	Mangrove closed shrub to open forest. Sheltered coastlines, estuaries, and deep swales between dunes, on fine anaerobic silts, inundated with saline water at high tide.	LC	NC	Mixed mangrove species on the banks of Grants Creek. Largely intact with some access tracks and occasional clearings of unknown origin. Merging into littoral rainforest (7.2.2) on the landward side and by foredune vegetation (7.2.7) coastally.
7.2.2	Notophyll to microphyll vine forest. Species commonly include *Cupaniopsis anacardioides*, *Diospyros geminata*, *Canarium australianum*, *Alphitonia excelsa*, *Acacia crassicarpa*, *A. mangium*, *Hibiscus tiliaceus*, *Pleiogynium timorense*, *Chionanthus ramiflorus*, *Blepharocarya involucrigera*,	OC	E	The regrowth vegetation contained *Terminalia* sp. and *Alphitonia exselsa* though the ground layer was largely weedy with guinea grass (*Megathursus maximus*) and other grasses.

[1] VM Class: LC – Least Concern, OC – Of Concern, E – Endangered.
[2] BD Status: NC – No Concern, OC – Of Concern, E – Endangered.

RE	Mapped RE description	VM Class[1]	BD Status[2]	Local representation
	Mimusops elengi, *Polyalthia nitidissima*, *Millettia pinnata*, *Geijera salicifolia*, *Ficus opposita*, Sersalisia *sericea*, *Terminalia muelleri*, *T. arenicola*, *Drypetes deplanchei*, and *Exocarpos latifolius*. Beach ridges and sand plains of beach origin.			
7.2.7	*Casuarina equisetifolia* (coast sheoak) +/- *Corymbia tessellaris* (Moreton Bay ash) open forest +/- groved vine forest shrublands. Beach strand and foredune	OC	E	Sections of remnant vegetation are consistent with the RE description. The southern section and northern most sections of Oak beach are largely impacted and contain few native species within the fore by and contains largely coconut trees rathtThe regrowth vegetation contained Casuarina equisetifolia and the ground layer contained Thuarea involuta, Paspalum vaginatum and Cyperus pedunculatus. This vegetation was well on its way to recovery and should provide suitable habitat within a few years if continued growth is encouraged and impacts avoided.

Table 3. Dune vegetation composition and condition at Oak Beach

Zone	Vegetation	Comments
Incipient dune	Beach vines – coastal jack bean (*Canavalia rosea)*, coastal morning glory (*Ipomoea pes-caprae)* and dune bean *(Vigna marina)*. Grasses and sedges (*Ischaemum muticum*, *Thuarea involute*, *Paspalum vaginatum* and *Cyperus pedunculatus*). Shrubs – sea daisy (*Wollastonia uniflora*) and sea lettuce (*Scaevola taccada*).	• Most exposed area • Prone to atypical erosion – vegetation removed or impacted by anthropogenic activity
Foredune	Trees and shrubs – beach she oak (*Casuarina equestifolia),* beach almonds *(Terminalia catappa, Terminalia arenicola),* beauty leaf (*Calophyllum inophyllum),* boxwood (*Planchonella obovate*) and pandanus (*Pandanus cookii*) Vines – match box bean (*Entada rheedii)* and *Smilax calophyllum* *Casuarina equesitifolia* and *Hibiscus tiliaceus*	• Supports larger trees and shrubs • Coconuts also dominant throughout foredune

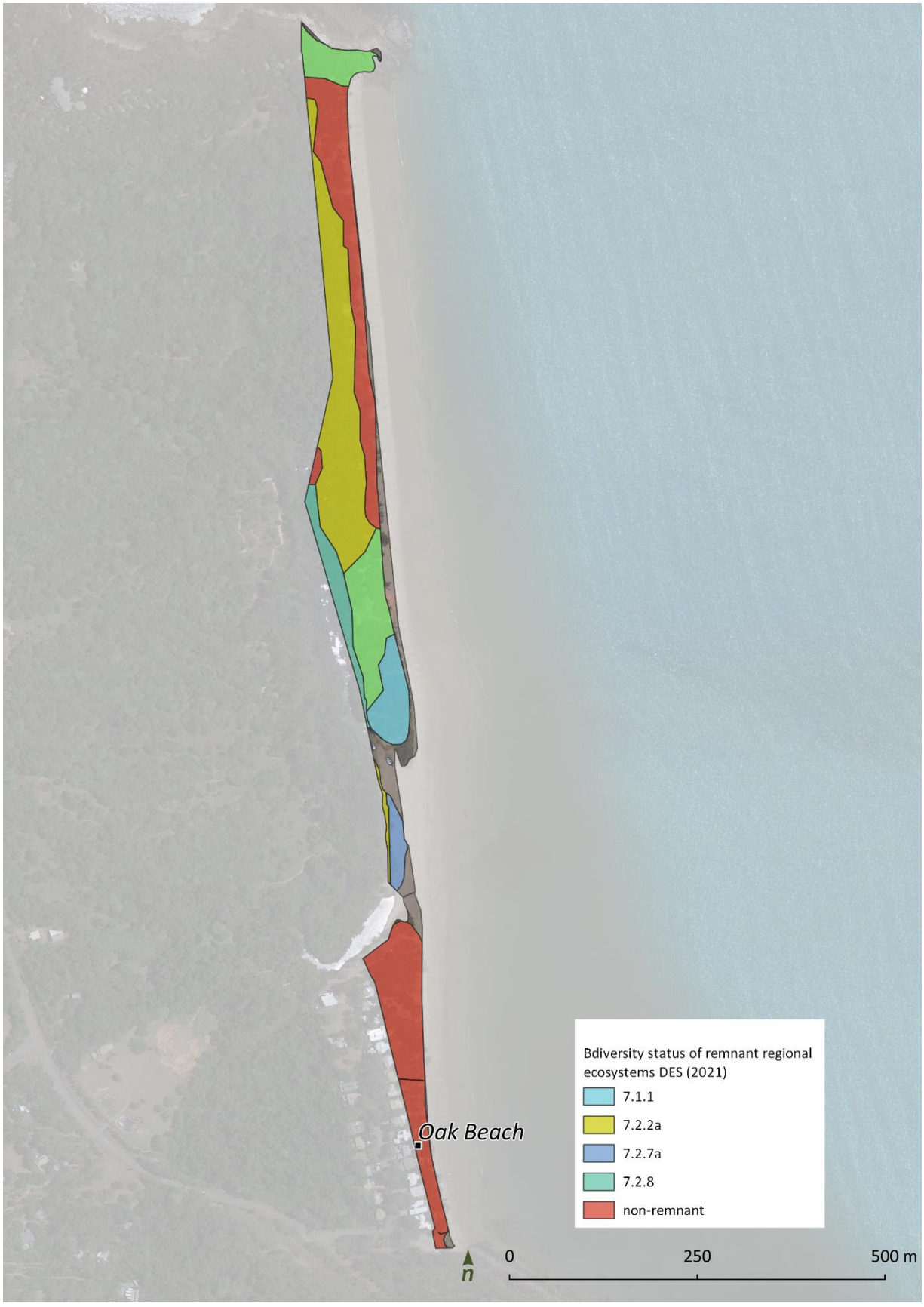

Figure 5. *Remnant regional ecosystems within Oak Beach foreshore area.*

Conservation significance

Several high-risk conservation significant flora species have been mapped at Oak Beach. These include Haines's Orange Mangrove (*Bruguiera* x hainesii), *Canarium acutifolium*, *Diplazium cordifolium*, Ant plant (*Myrmecodia beccarii*), Lesser swamp orchid (*Phaius australis*), *Phaius pictus*, Native moth orchid (*Phalaenopsis amabilis* subsp. *rosenstromiil*), *Toechima pterocarpum*, Dwarf butterfly orchid (*Vappodes lithocola*) and Cooktown orchid (*Vappodes phalaenopsis*).

Habitat fragmentation

The foreshore vegetation in the southern section of Oak Beach is heavily disturbed. Dune vegetation in front of the houses at the southern end of Oak Beach has largely been cleared and there is little to stabilise the dune. Several non-native species have been planted in the foreshore area in front of properties. These habitat disturbances may affect the movement of fauna and minimise their habitat connectivity. The remnant vegetation of the mid-section of Oak Beach is relatively confluent with surrounding vegetation communities to the north, south and west retaining good connectivity.

There are several factors that may be contributing to the disturbed foreshore vegetation. These factors and their potential impacts on the foreshore's ecology are listed in Table 4.

Table 4. Disturbances and their impacts to the flora and fauna of Oak Beach

Disturbance	Potential impacts to ecology
Dune erosion	• Further loss of vegetation and fauna habitat • Loss of sea turtle nesting habitat through loss of the foredune vegetation • Increase foredune slope and decreasing suitability for nesting sea turtles • Reduced biodiversity
Vegetation loss	• Increases in foreshore dune erosion • Exposure of hind dune systems and vegetation that are less adapted to extreme weather events • Loss of breeding and roosting habitat for nesting shorebirds and sea turtles • Loss of food trees for southern cassowary
Weeds	• Compete with native species for resources – light, nutrients, space • Reduced biodiversity of flora • Loss of habitat and food plants for conservation significant species • Create barriers for connectivity and fauna population dispersal
Pest animals	• Predation of native animals • Sea turtle nest predation • Reduced fauna populations and diversity
Stormwater and agricultural runoff	• Impacts to marine fauna • Increased sediment runoff and resulting increases in nearshore turbidity • Increased nutrient loads and subsequent algal blooms
Coconut debris	• Fallen fronds and fruit reduce recruitment of native species • Reduced opportunity for sea turtle nesting • Increase habitat for rodents and potential bird egg predation

Fauna

The southern precinct of Oak Beach provides limited habitat features which may support fauna of conservation significance such as nesting turtles; shorebirds and other notable species such as the endangered southern cassowary (*Casuarius casuarius johnsonii*) (southern population). The area from Grants Creek through to the northern precinct remains intact and has good connectivity with mangrove and littoral rainforest communities providing good habitat for most of the abovementioned fauna. The remnant vegetation of Oak Beach is mapped

as 'Essential Habitat' for the endangered southern cassowary and regulated under the *Vegetation Management Act 1999* (VM Act). The full list of these species is provided in Attachment B.

The foredune areas are typically vegetated with larger tree species once well established. It is amongst this vegetation above the high tide area that marine turtles prefer as nesting areas. The vegetated areas provide the ideal temperature and protection for incubation and hatchling survival. The mid-section of remnant vegetation in Oak Beach provides suitable habitat for nesting turtles. Locals have reported turtles nesting in the remnant mid-section of Oak Beach however, there are some sections where the foreshore has eroded to form steep slopes which are not suitable for nesting turtles to traverse as they prefer a more gradual slope. These areas largely relate to areas where the foreshore vegetation has been heavily impacted and the vines and shrubs protecting the foreshore area are no longer present.

Mangroves are considered to be the nursery of the sea, providing suitable protection for breeding sea birds, juvenile fish, and crustaceans. As well as the ecological value of mangroves, they perform a considerable function in the protection of beach and stream banks from extreme tidal and weather events. The mangroves located around Grants Creek are relatively intact and performing their normal functions.

Pest species

During the site inspection, a number of environmental weeds were identified at Oak Beach, one of which is the coconut palm. According to the most recent audit, there are approximately 360 coconut palm specimens on Oak Beach (DSC 2015). Coconut palms will continue to be managed by the Coconut Management Plan (DSC 2015). Other environmental weeds identified at Oak Beach are summarised in Table 5. Environment weeds pose a threat to the biodiversity of a habitat and can kill native vegetation, establishing a monoculture.

Table 5. Weed species identified at Oak Beach (BQ 2020, Conn 2021, DSC 2015, Murphy et al. 2017)

Scientific name	Common name	Dispersal Method	Environmental Impacts
Cocos nucifera	Coconut palm	• Large nuts which fall from trees • Nuts germinate if uneaten	• Identified as a transformer weed in littoral (coastal) rainforests • Outcompetes native species for space, light and nutrients • Falling nuts and fronds cause physical damage to species below
Sphagneticola trilobata	Singapore daisy	• Spreads by cuttings from slashing and pruning	• Outcompetes native species for space, light and nutrients • Invades lawns, irrigated areas, and around drains
Sansevieria trifasciata	Mother-in-law's tongue	• Spreads by dumping of garden waste • Seeds spread by birds and other animals	• Forms dense infestations • Outcompetes native species for space, light and nutrients • Tends to form monoculture
Bryophyllum delagoense	Mother of millions	• Spread by floodwaters • Spread by animals, vehicles and garden waste	• Invades coastal dunes, grasslands and woodlands • Outcompetes native species for space, light and nutrients • Very poisonous to humans and livestock
Opuntia sp.	Prickly pear	• Spread by birds and animals eating the fruit • Spread by animals and floods moving broken stems	• Outcompetes native species for space and nutrients, esp. in hot, dry conditions • Can harm animals and prevent them from eating

Scientific name	Common name	Dispersal Method	Environmental Impacts
Leucaena leucocephala	Leucaena	• Spreads seeds by wind, water and animals • Spreads rapidly to adjacent areas	• Forms dense thickets which hinder movement of wildlife • Strongly outcompetes native plants for space, light and nutrients
Annona glabra	Pond apple	• Generally spreads by water and some animals	• Forms dense stands and may replace native ecosystems

Vegetation management

Douglas Shire Council has a number of instruments to manage the vegetation at Oak Beach. The Coconut Management Plan (DSC 2015) defines the objectives for the management of coconut palms on Council-controlled land. The plan identifies the coconut trees within a given location and provides an assessment of the potential risk, distribution, impacts and associated costs of management.

The Douglas Shire Biosecurity Plan (2017-2021) guides the management of invasive biosecurity matter as well as locally declared pests (plants and animals) as outlined in the *Biosecurity Act 201*4. Under this plan, there are programs being undertaken by DSC to eradicate pest species. Prioritisation of pest species is based on several factors, including (DSC 2017):

- Existing plans and priorities on a national, state and local level
- Impacts and threats
  - Conservation and biodiversity
  - Riparian or aquatic environment
  - Agricultural or production
  - Residential and urban areas
- Capacity to manage
  - Achievability
  - Current extent.

These programs include (relevant to vegetation) (DSC 2017):

- Siam Weed Eradication Program
- Hiptage eradication Program
- Miconia Species (Four Tropical Weeds Eradication Program.

3.3 Amenity and liveability

Due to the undeveloped nature of Oak Beach, there is minimal infrastructure, including formalised access points to and along the foreshore. The accessibility and recreational uses of the Oak Beach foreshore area are summarised in this section and the management implications are discussed.

Infrastructure

There are car parks at the northern and southern ends of Oak Beach which also provide pedestrian access to the foreshore. There is no vehicle or boat access to Oak Beach, however, there are anecdotal reports of residents launching sailing boats from the shore or removing rocks to gain access to the beach for boat launching.

Passive recreation

The accessibility of Oak Beach offers residents and visitors the opportunity to engage in passive recreational activities. As a number of residents have beachfront properties, which makes the foreshore and beach more readily accessible compared to other locations in the Douglas Shire. Examples of such activities include:

- walking along the foreshore and beach
- bird watching
- fishing
- watercraft sports

These activities are relatively low impact but can still affect the foreshore condition. If foreshore users create informal access tracks through the vegetation to access the foreshore and beach, this can lead to a loss of vegetation, destabilisation of the sand or soil which may lead to erosion and dune destabilisation, and it could also contribute to habitat loss and destruction. Activities such as bird watching, water sports and fishing will have similar impacts on the foreshore in relation to access. Dumping of fishing nets or waste may also occur, affecting the visual amenity.

Pedestrian access

A recent audit of the beach access points within the Douglas Shire found that there are 19 access tracks at Oak Beach. The majority of these are private access tracks to houses. There are three formalised access tracks, at the northern, mid and southern points of the beach. The creation of informal access tracks presents challenges to foreshore management, particularly with regards to illegal vegetation clearing and dune destabilisation.

Dog off-leash areas

There are no off-leash dog areas along the Oak Beach foreshore. However, the responses from the survey indicate several dog owners allow their dogs off-leash in this area. Dogs pose a risk to fauna as they may attack or scare vulnerable species, particularly when off-leash.

Oak Beach foreshore towards the southern end.

4 Management precincts

The Oak Beach foreshore area has been divided into four management precincts to allow management actions to be tailored specifically to the threats and challenges within each precinct. The four precincts are:

- Precinct 1 – Thala Beach Nature Reserve Resort
- Precinct 2 – Northern residential area
- Precinct 3 – Central residential area
- Precinct 4 – Southern Oak Beach

Figure 6. *Oak Beach foreshore management precincts.*

The threats and challenges within each management precinct are summarised in Table 6. These threats and challenges have been identified through the background review, site inspections and community engagement feedback.

Table 6. Oak Beach foreshore management precincts threats and challenges

Precinct	Key foreshore threats and challenges
1 – Thala Beach Nature Reserve Resort Private property with foreshore access limited to resort visitors or by boat.	• Pedestrian and other access along foreshore within potential sensitive and vulnerable habitats, including turtle and shorebird nesting areas – access above the intertidal zone during nesting and hatching season may pose a threat to vulnerable species. • Environmental weeds present – may impact the conservation value and native vegetation cover within the precinct.
2 – Northern residential area Residential area set back from foreshore with good vegetation buffer width.	• Environmental weeds present – may impact the conservation value and native vegetation cover within the precinct. • Illegal clearing of the vegetation and encroachment onto the foreshore area – these activities may not meet the conservation objectives, including biological diversity, ecological integrity and scenic amenity. • Pedestrian and other access along foreshore within potential sensitive and vulnerable habitats, including turtle and shorebird nesting areas – access above the intertidal zone during nesting and hatching season may pose a threat to vulnerable species. • Dogs off leash along the foreshore and beach – may impact the conservation and recreation amenity of the precinct.
3 – Central residential area Central section with residential properties on foreshore.	• Illegal clearing of the vegetation and encroachment onto the foreshore area – these activities may not meet the conservation objectives, including biological diversity, ecological integrity and scenic amenity. • Pedestrian and other access along foreshore within potential sensitive and vulnerable habitats, including turtle and shorebird nesting areas – access above the intertidal zone during nesting and hatching season may pose a threat to vulnerable species. • Environmental weeds present and native vegetation clearing – may impact the conservation value within the precinct. • Dogs off leash along the foreshore and beach – may impact the conservation and recreation amenity of the precinct.
4 – Southern Oak Beach Access point for residents and visitors.	• Erosion occurring most often at this end of Oak Beach – may impact the recreation amenity in the precinct and foreshore access. • Insufficient waste disposal facilities – may impact the recreation amenity in the precinct and the foreshore area. • Dogs off leash along the foreshore and beach – may impact the conservation and recreation amenity of the precinct.

5 Management plan

The following section outlines the management actions to address the threats and challenges that have been identified for the Oak Beach foreshore area. The objectives for management have also be identified in order to inform measurements for management success. Priorities have also been set to appropriately guide management of the foreshore threats and challenges over the immediate, medium and longer-term timeframes. In addition, any monitoring and evaluation activities that are to take place following the implementation of the actions will also be summarised to measure the progress of the foreshore management.

5.1 Management objectives

Objectives are useful for measuring the success of the management actions undertaken. They are based on the community values identified through the engagement process. The objectives will guide the metrics for monitoring and evaluation of the management actions. They can be applied at the whole of foreshore (community) and precinct scale.

Management objectives for Oak Beach foreshore

- Maintain the overall natural form and function of the beach.
- Enhance and maintain vegetation condition – littoral rainforests, dune vegetation for vulnerable species and to prevent dune erosion.
- Build positive behaviour change outcomes to minimise adverse impacts of foreshore use.
- Proactively undertake waste management along the foreshore.
- Proactively undertake weed management to restore native vegetation habitats.
- Monitor the presence and health of potential turtle and shorebird nesting sites in foreshore areas.
- Enforce illegal clearing local laws to prevent further establishment of unauthorised and informal beach access tracks.
- Removal of any hard infrastructure on the reserve area that does not have an existing Council approval.

5.2 Management prioritisation

Prioritisation of the management actions has been assigned as immediate, medium-term or future.

1 **Immediate** (recommend implementation within next 12 months)

Actions for immediate prioritisation include sites where weeds are present and it is necessary to eradicate the weeds and revegetate the site with native vegetation cover. Environmental weeds pose a significant threat to the values of the Oak Beach residents, including the natural habitats and wildlife. Actions also revolve around access and use of the foreshore area, such as for fishing or pedestrians. The uses may pose a threat the sensitive habitats and management actions are focussed on minimising the impact.

2 **Medium-term** (recommend implementation within next 2-3 years)

Medium term priority actions are recommended to be implemented within the next two to three years. These actions are important for the management of the foreshore precinct, however, they require community engagement and education to understand their benefits. There is an element of community involvement with the medium-term actions.

3 **Future** (recommend implementation within 5 years)

Future management actions are those that first require an evaluation of the outcomes from immediate to medium-term actions that have been undertaken before being implemented. It is recommended that future actions are implemented within five years. This timeframe allows sufficient time for immediate actions to be implemented and their progress and success to be evaluated.

Northern Oak Beach.

5.3 Management actions

The approach to foreshore management at Oak Beach is incremental, slowly integrating actions based on their priorities taking into consideration the existing foreshore condition and management. For example, based on site inspections and survey feedback, the dune requires revegetation to stabilise and prevent erosion, and manage land that has been cleared. To ensure that the action is accepted, an incremental vegetation buffer is being established, first starting with a 5 m dune vegetation buffer width that will assist with dune stabilisation against erosion. It should be noted that management actions will not be implemented without prior public consultation.

Management actions and their priorities for the Oak Beach foreshore are summarised in Table 7. Maps of the management actions for each precinct are provided in Attachment C.

Table 7. Oak Beach foreshore precinct management actions

	All precincts	*Precinct 1*	*Precinct 2*	*Precinct 3*	*Precinct 4*
Outcome 1: **Protect sensitive and vulnerable habitats, including dune vegetation, and turtle and shorebird nesting sites.**					
A1.1: Undertake beach monitoring of turtle and shorebird nesting sites in collaboration with local community groups during nesting and hatching seasons to understand the impact foreshore access may have on these habitats. Survey vegetation cover to assess revegetation requirements and progress to support nesting habitats.	3				
A1.2: Establish a platform on the DSC Environmental Hub giving residents and visitors the ability to upload information and photos about flora and fauna species they have noticed in the foreshore.	1				
A1.3: Formalise and maintain existing defined access tracks and install appropriate signage at the beach and land entrances as necessary. Issue fines for people found to be illegally clearing under Local Law No. 4 (Local Government Controlled Areas, Facilities and Roads).	1				
A1.4: Install larger rocks or other appropriate barrier at the beach entrance to prevent vehicles driving on the beach.					2
A1.5: Install signs at formal beach access points indicating that dogs are to be kept on leash along the beach.			2	2	2

	All precincts	*Precinct 1*	*Precinct 2*	*Precinct 3*	*Precinct 4*
A1.6: Install additional rubbish bins at the Council carparks on the foreshore at the end of Oak Beach Rd and the end of Oak St near Grants Creek for general waste and fishing tackle/marine debris.			1		1
***Outcome 2:* Restore the biological diversity, ecological integrity, cultural value, scenic amenity and dune stability of the foreshore, including reducing the presence and impact of environmental weeds.**					
A2.1: Commence a dune protection and maintenance program in partnership with the community. Undertake dune revegetation with native species (see Attachment D) within a 5 m buffer landward of the HAT mark with low-growing species to maintain views, regenerate land that has been cleared and to stabilise the dune to protect against erosion. Install fencing around revegetated area to reduce damage or clearing and encourage regrowth.			3	1	2
A2.2: Commence dune revegetation along the eroded beach using species to regenerate vine forests on beach sands (regional ecosystem).		1			
A2.3: Collaborate with Traditional Owners to maintain and preserve cultural heritage sites within the foreshore area.	1				
A2.4: Collaborate with Thala Beach Nature Reserve to clear coconut debris and re-establish an understorey.		1			
A2.5: Establish a weed eradication and maintenance program in conjunction with the Biosecurity Plan to remove environmental weeds present in the foreshore area and undertake revegetation with native species (see Attachment D).		3	2	1	
Outcome 3: Build positive behaviour change to minimise adverse impacts on the foreshore.					
A3.1: Undertake a community education program in partnership with the Oak Beach community to communicate knowledge around foreshore weeds, including transfer and establishment, awareness and management. Extend this education to include contractors engaged by private landholders.		1		1	

	All precincts	*Precinct 1*	*Precinct 2*	*Precinct 3*	*Precinct 4*
A3.2: Include crocodile awareness information when undertaking new programs (e.g., booklets for walks).		1	1	1	1

5.4 Monitoring and evaluation

The success of the management actions is measured through monitoring and evaluation mechanisms. The monitoring focusses on the sensitive and vulnerable environments, including turtle and shorebird nesting habitats, and key coastal vegetation habitats.

Nesting habitats

The habitat monitoring will be undertaken to observe where turtle and shorebird nesting habitats are present in the foreshore area and to understand the vegetation composition of these habitats. Turtle monitoring should be undertaken based on the Queensland Marine Turtle Field Guide (Attachment E) between October and May to assess the seasonal use of these habitats by turtles (QPWS, DES 2016). Guidelines for shorebird monitoring will need to be developed based on local knowledge.

It is recommended that the monitoring be undertaken in partnership with Indigenous Rangers, and local community groups. In addition, a platform on the DSC Environmental Hub website should be created for residents and visitors to submit photos and information regarding any turtle or shorebirds they notice when using the foreshore. The purpose of the habitat monitoring is to understand which species are accessing the foreshore area for nesting and hatching, as well as the vegetation composition of these habitats.

Vegetation

The vegetation monitoring is a simple measure for the percentage of cover and survival success in relation to the revegetation of the foreshore. This monitoring should be undertaken on a yearly basis to record the survival rate, particularly when undertaking revegetation activities. It is recommended that vegetation is monitored on a yearly basis at the end of the wet season.

The purpose of collecting information about the success of revegetation and other site management issues such as exotic plants (environmental weeds), other threats, habitat quality and connectivity, and significant species values is to be able to refine and direct resources accordingly. Flexibility in program delivery is required to maintain the condition of assets such as plantings, respond to threats as they change through time and account for new values if they emerge during the delivery of the project.

Monitoring and evaluation metrics

Table 8 outlines the monitoring and evaluation metrics for the corresponding management action to evaluate the progress and success of implementation. A detailed method for rapid vegetation assessment is supplied in Attachment E.

Table 8. Foreshore management action monitoring and evaluation metrics

Management action	Monitoring	Evaluation metrics	Timing
Fauna monitoring	• Nesting species • Vegetation composition of nesting habitats	• Turtle tracks, bird nests • Population dynamics • Animal health	Nesting season
Vegetation monitoring	• Species specific observations to identify which species may be doing poorly • Weed cover within each of the canopy layers (top 5 transforming weed species)	• Measure of the percentage survival of revegetation • Percentage survival of key species • Percentage cover over canopy layers of weeds • Percentage of bare/disturbed ground • Natural recruitment • Habitat connectivity • Significant species	Annual

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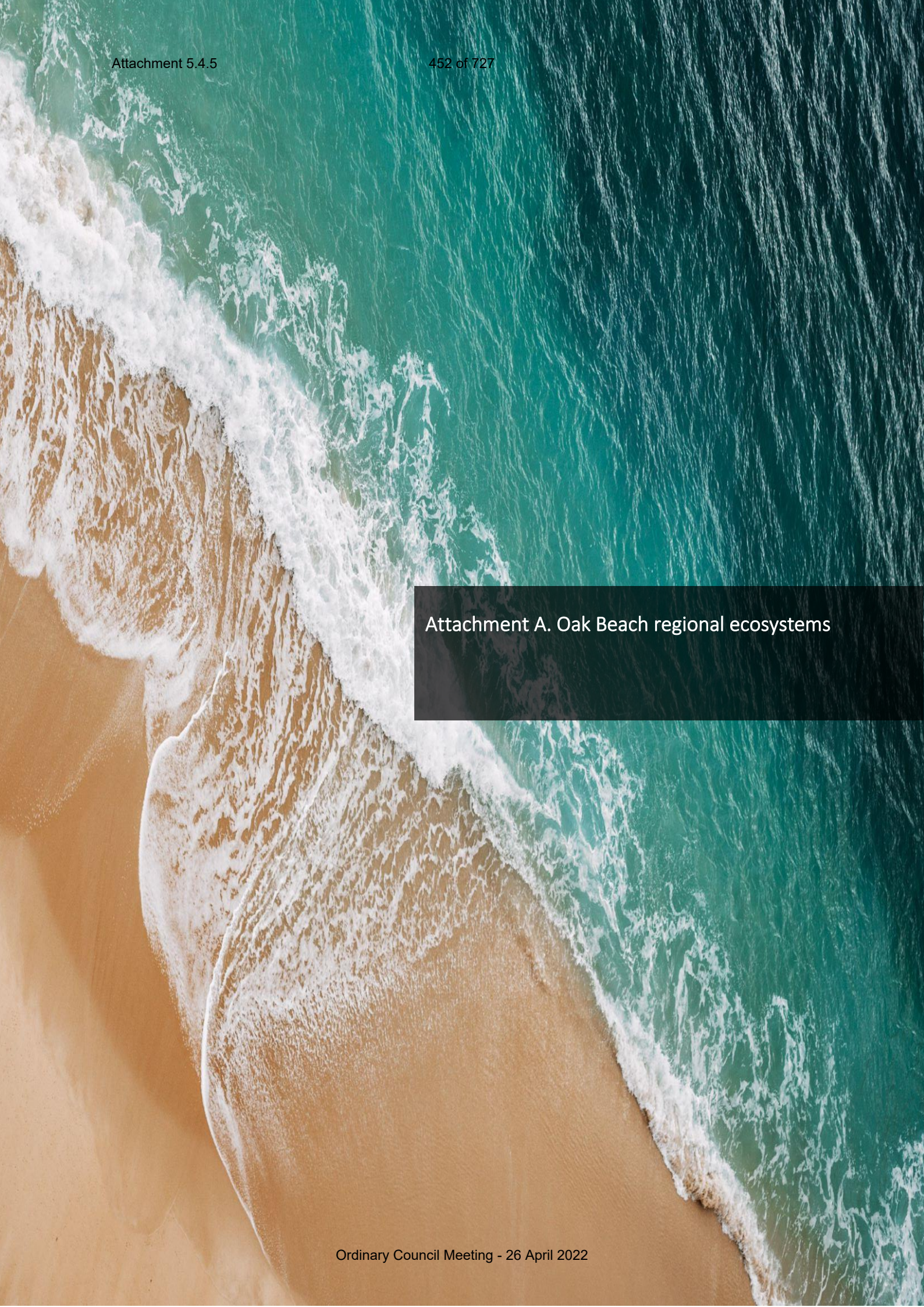
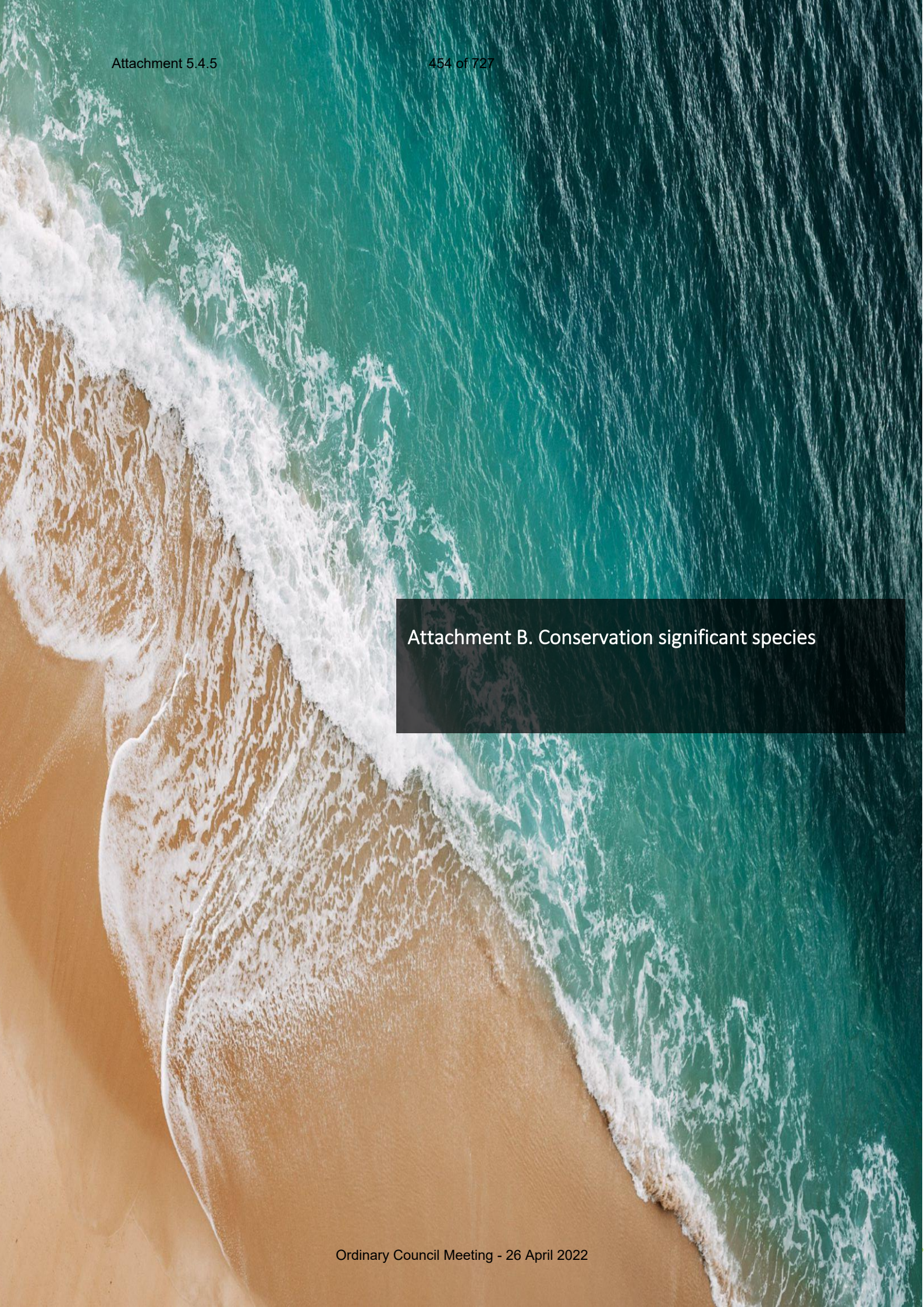


Attachment A. Oak Beach regional ecosystems

Table 9. Oak Beach regional ecosystems (REs)

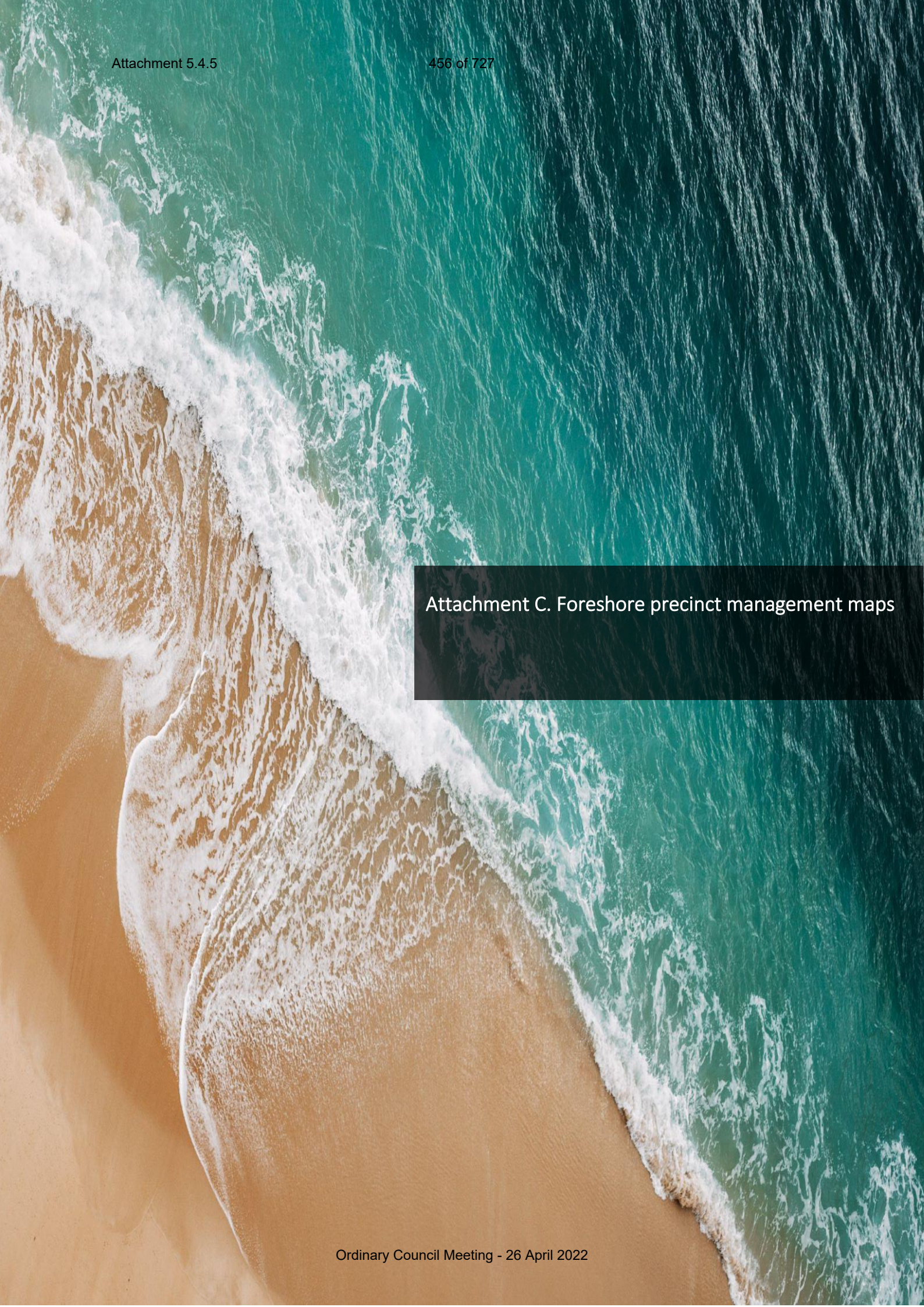
RE	Description	VM Class	BD Status
7.1.1	Mangrove closed scrub to open forest. Sheltered coastlines, estuaries, and deep swales between dunes, on fine anaerobic silts, inundated with saline water at high tide.	LC	NC
7.2.2a	Notophyll vine forests, often with *Acacia* emergents. Species commonly include *Cupaniopsis anacardioides*, *Diospyros geminata*, *Canarium australianum*, *Alphitonia excelsa*, *Acacia crassicarpa*, *Pleiogynium timorense*, *Chionanthus ramiflorus*, *Mimusops elengi*, *Polyalthia nitidissima*, *Millettia pinnata*, *Geijera salicifolia*, *Ficus opposita*, *Sersalisia sericea*, *Terminalia muelleri*, *T. arenicola*, *Drypetes deplanchei*, and *Exocarpos latifolius*. Lowlands on dune sands, of the moist and dry rainfall zones.	OC	E
7.2.7a	Complex of open shrubland to closed shrubland, grassland, low woodland and open forest. Includes pure stands of *Casuarina equisetifolia*, and *Acacia crassicarpa*, *Syzygium forte* subsp. *forte*, *Calophyllum inophyllum* and *Pandanus* spp. woodland to open forest. Beach strand and foredune.	OC	E



Attachment B. Conservation significant species

Table 10. Conservation significant fauna at Oak Beach and likelihood of occurrence

Scientific name	Common name	EPBC Act	NC Act	Likelihood of occurrence
		Shorebirds		
Esacus magnirostris	Beach-stone curlew	—	V	Likely
Casuarius casuarius johnsonii	Southern cassowary	E	E	Possible
Calidris ferruginea	Curlew sandpiper	CE	CE	Likely
Numenius madagascariensis	Eastern curlew	CE	E	Likely
Charadrius mongolus	Lesser sand plover	E	E	Likely
Charadrius leschenaultii	Greater sand plover	V	V	Likely
Calidris canutus	Red knot	E	E	Likely
		Sea turtles		
Natator depressus	Flatback turtle	V	V	Likely
Chelonia mydas	Green turtle	V	V	Likely
Eretmochelys imbricata	Hawksbill turtle	V	E	Likely
Dermochelys coriacea	Leatherback turtle	E	E	Possible
Caretta caretta	Loggerhead turtle	E	E	Likely
Lepidochelys olivacea	Olive ridley turtle	E	E	Likely
		Other		
Hirundapus caudacutus	White-throated needletail	V	V	Likely
Cyclopsitta diophthalma macleayana	Macleay's fig-parrot	—	V	Likely
Crocodylus porosus	Estuarine crocodile	—	V	Likely



Attachment C. Foreshore precinct management maps

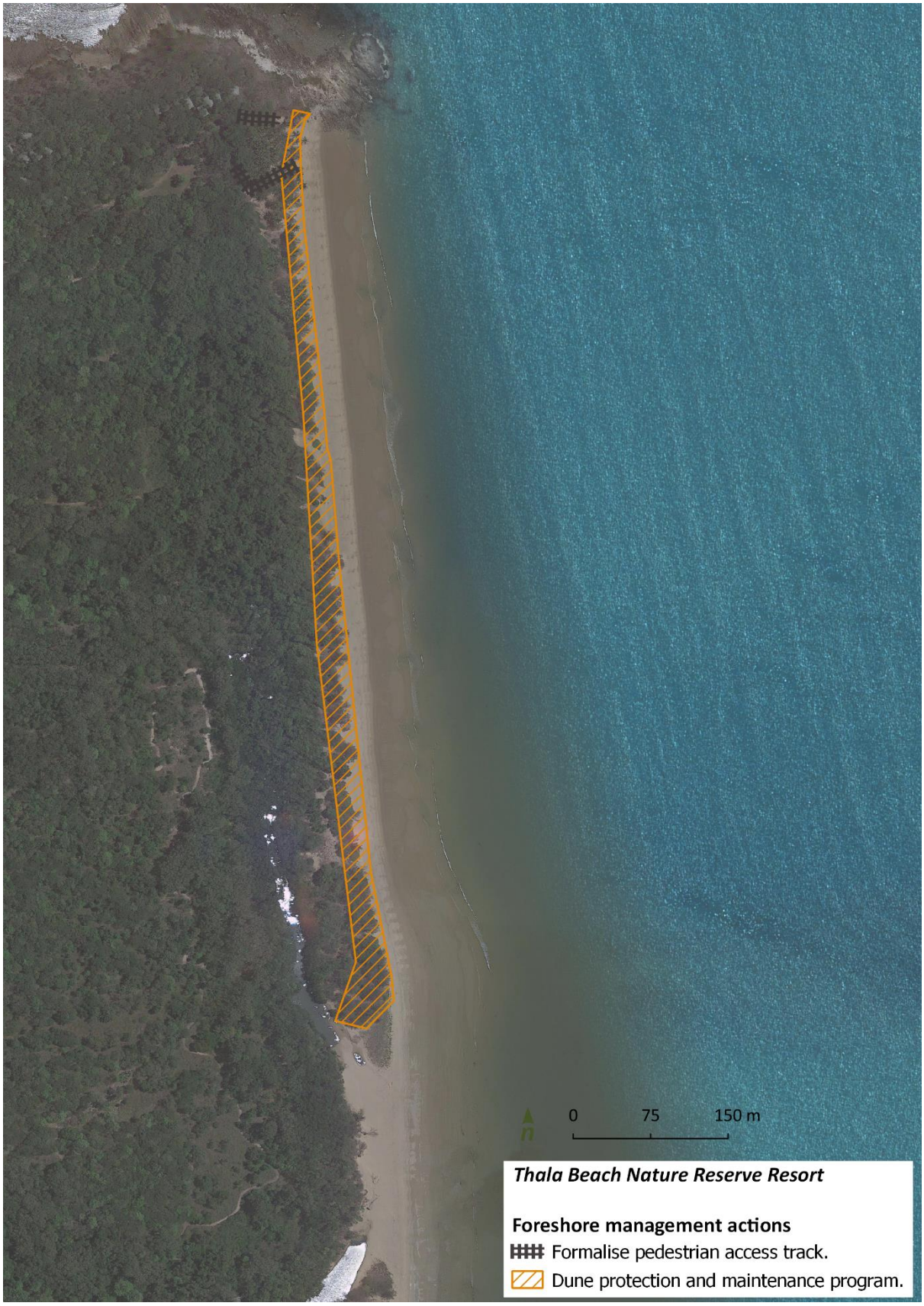
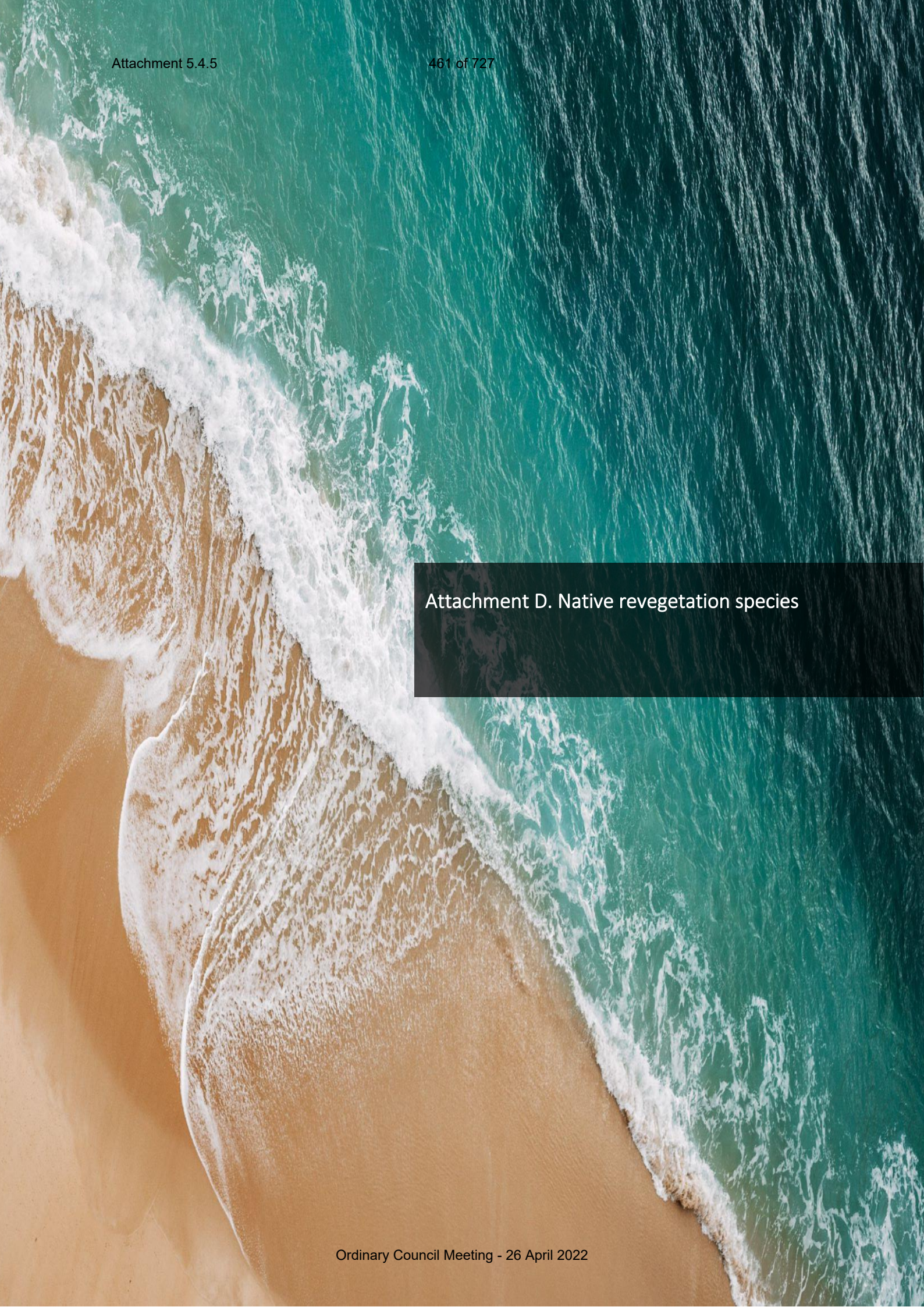


Figure 7. *Oak Beach foreshore precinct 1 management actions.*

Figure 8. *Oak Beach foreshore precinct 2 management actions.*

Figure 9. *Oak Beach foreshore precinct 3 management actions.*

Figure 10. *Oak Beach foreshore precinct 4 management actions.*



Attachment D. Native revegetation species

Table 11. Native species for foreshore revegetation (highlighted species are key components of remnant ecosystems) (Florentine, Pohlman and Westbrooke 2015)

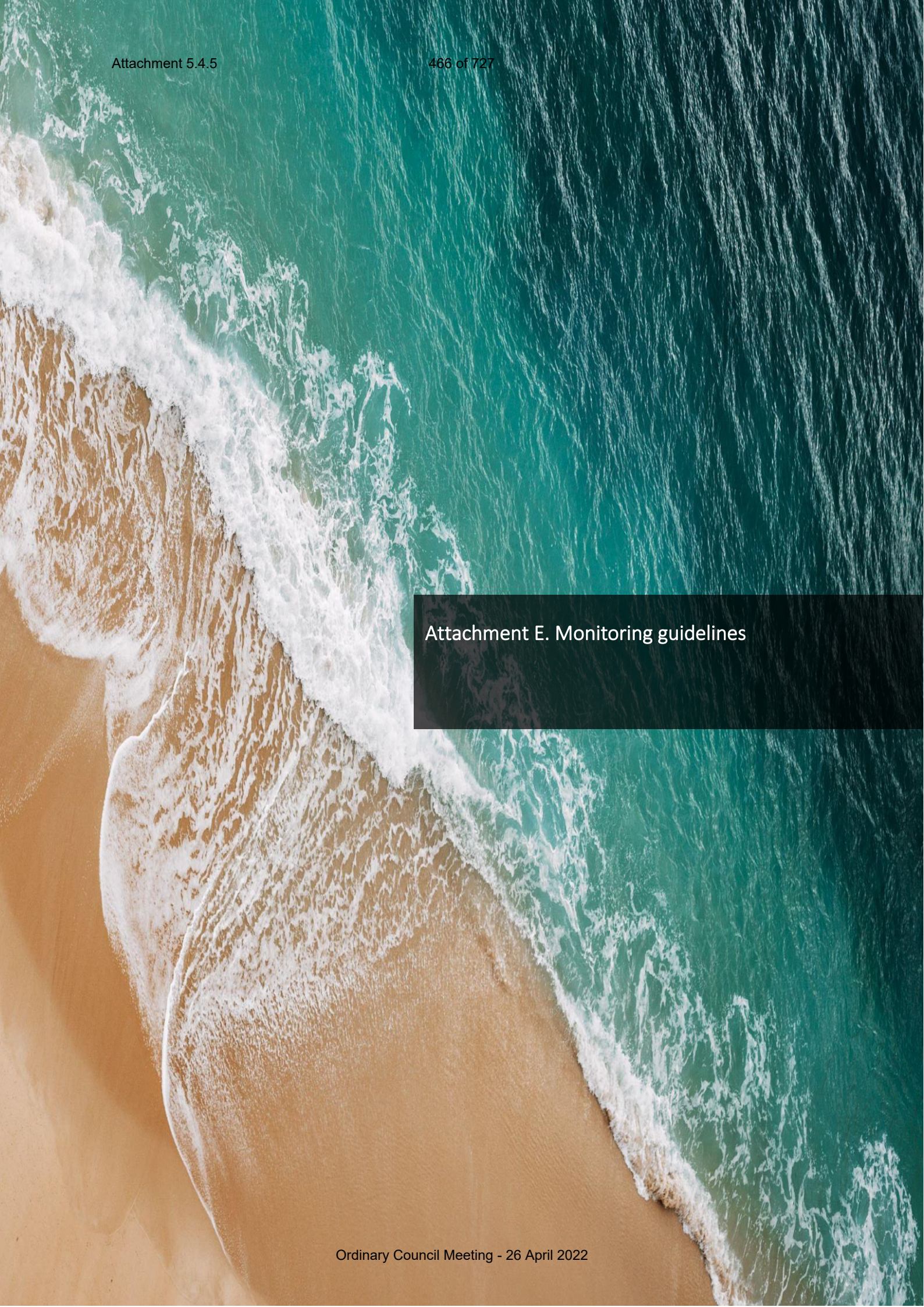
Botanical name[3]	Common name	Precinct 1	Precinct 2	Precinct 3	Precinct 4
*Acacia crassicarpa**	Northern golden wattle	✔			✔
*Acacia mangium**	Broadleaf salwood	✔			✔
*Acacia oraria**	Coastal wattle	✔			✔
Aglaia elaeagnoidea	Coastal boodyarra	✔			✔
*Alphitonia petriei**	Sarsaparilla	✔			✔
Alyxia spicata	Chain fruit	✔		✔	✔
Atractocarpus fitzalanii	Brown gardenia	✔			✔
Barringtonia asiatica	Mango bark, Mango pine	✔			✔
Barringtonia calyptrata	Mango pine	✔			✔
Beilschmiedia obtusifolia	Blush walnut	✔			✔
Blepharocarya involucrigera	Rose butternut	✔			✔
Brachychiton acerifolius	Illawarra flame tree	✔			✔
Breynia cernua	Fart bush	✔		✔	✔
Calophyllum inophyllum	Beach calophyllum	✔			✔
Calophyllum sil	Blush touriga	✔			✔
Canarium vitiense	Canarium	✔			✔
Canavalia rosea	Beach bean	✔	✔	✔	✔
Carallia brachiata	Corky bark, Fresh water mangrove	✔			✔
*Casuarina equisetifolia**	Beach casuarina	✔	✔	✔	✔
Cerbera manghas	Sea mango	✔			✔
Chionanthus ramiflora	Native olive	✔			✔

[3] * denotes pioneer species that will grow and establish quickly, allowing for natural recruitment or planting of secondary species.

Botanical name[3]	Common name	Precinct 1	Precinct 2	Precinct 3	Precinct 4
*Clerodendrum floribundum**	Lolly bush	✔			✔
Clerodendrum inerme	Scrambling clerodendrum	✔		✔	✔
*Clerodendrum longiflorum**	Long flowered clerodendrum	✔			✔
*Colubrina asiatica**	Beach berry bush	✔		✔	✔
*Cordia subcordata**	Sea trumpet	✔			✔
Crinum pedunculatum	Beach lily, Swamp lily	✔		✔	✔
Cupaniopsis anacardioides	Beach Tamarind	✔			✔
Cyperus pedunculatus		✔	✔	✔	✔
Deplanchea tetraphylla	Golden bouquet tree	✔			✔
Dillenia alata	Red beech	✔			✔
Diospyros compacta	Australian ebony	✔			✔
*Dodonea viscosa**	Hop bush	✔		✔	✔
Elaeodendron melanocarpum	False olive	✔			✔
Eucalyptus plattyphylla	Ghost gum	✔			✔
*Euroschinus falcata**	Pink poplar	✔			✔
Ficus benjamina	Weeping fig	✔			✔
Ficus drupacea	Drupe fig	✔			✔
Ficus microcarpa	Small fruited fig	✔			✔
Ficus opposita	Sandpaper fig	✔			✔
Ficus racemosa	Cluster fig	✔			✔
*Ganophyllum falcatum**	Daintree hickory	✔			✔
Glochidion harveyanum	Harvey's buttonwood	✔			✔
Glochidion philippicum	Daintree cheese tree	✔			✔
Gmelina dalrympleana	White beech	✔			✔

Botanical name[3]	Common name	Precinct 1	Precinct 2	Precinct 3	Precinct 4
Gomphandra australiana	Buff beech	✔			✔
*Guioa acutifolia**	Glossy tamarind	✔			✔
Haemodorum coccineum	Blood root	✔		✔	✔
*Hibiscus tiliaceus**	Coast cottonwood	✔		✔	✔
Intsia bijuga	Kwila				✔
*Ipomoea pes-caprae**	Coastal morning glory	✔	✔	✔	✔
Jagera pseudorhus	Foambark	✔			✔
Livistona muelleri	Northern Cabbage Tree Palm	✔			✔
Lophostemon suaveolens	Swamp mahogany, swamp box	✔			✔
*Macaranga tanarius**	Kamala, Blush macaranga	✔			✔
Mallotus philippensis	Red Kamala	✔			✔
Maytenus fasciculiflora	Orangebark	✔			✔
Melaleuca leucadendra	Weeping paperbark	✔			✔
Melaeuca viridiflora	Broad leaved paperbark	✔			✔
Melia azederach	White cedar	✔			✔
Micromelum minutum	Lime berry	✔			✔
Miliusa brahei	Rasberry jelly plant	✔			✔
*Millettia pinnata**	Pongamia tree	✔		✔	✔
Mimusops elengi	Red coondoo	✔			✔
Mischocarpus exangulatus	Red bell mischocarp	✔			✔
Morinda citrifolia	Rotten cheesefruit	✔			✔
Pandanus tectorius	Beach pandan	✔			✔
*Pittosporum ferrugineum**	Rusty pittosporum	✔			✔

Botanical name[3]	Common name	Precinct 1	Precinct 2	Precinct 3	Precinct 4
Planchonia careya	Cocky apple	✔			✔
Pleiogynium timorense	Burdekin plum	✔			✔
*Polyscias elegans**	Celerywood	✔			✔
Pouteria chartacea	Thin leaved coondoo	✔			✔
Pouteria obovata	Yellow boxwood	✔			✔
*Premna serratifolia**	Coastal premna	✔			✔
Ptychosperma elegans	Solitaire palm	✔			✔
Rhus taitensis	Sumac	✔			✔
*Scaevola taccada**	Beach lettuce	✔	✔	✔	✔
Schefflera actinophylla	Umbrella tree	✔			✔
Scolopia braunii	Brown birch	✔			✔
Sporobolus virginicus	Sand couch	✔	✔	✔	✔
Sterculia quadrifida	Peanut tree	✔			✔
Syzygium angophoroides	Yarrabah satinash	✔			✔
Syzygium hemilamprum (Syn. Acmena hemilampra)	Blush satinash	✔			✔
Tarenna dallachiana	Tree ixora	✔			✔
Terminalia arenicola	Brown damson	✔			✔
*Terminalia catappa**	Indian almond	✔			✔
Terminalia microcarpa	Damson plum	✔			✔
Terminalia muelleri	Mueller's damson	✔			✔
*Thespesia populneoides**	Tulip tree	✔			✔
Thurea involuta	Tropical beachgrass	✔	✔	✔	✔
Timonius timon	False fig	✔			✔
Vitex rotundifolia	Beach vitex	✔	✔	✔	✔
*Vigna marina**	Beach pea	✔	✔	✔	✔



Attachment E. Monitoring guidelines

Rapid Vegetation Assessment Method Data collection

General survey information	Survey ID	Description of survey					
	Assessor Name/s	Descriptive text					
	Date of record	Date					
	Assessment number	Assessment	1	2	3	4	5
Specific location	General Location	Descriptive text					
	Easting	GPS spatial data					
	Northing	GPS spatial data					
	Spatial uncertainty	GPS spatial data					

Desired cover by year 5							
	Present	1 (1-5)	2 (6-25)	3 (26-50)	4 (51-75)	5 (76-100)	Absent
Under							
Mid							
Over							

Current overall cover							
	Present	1 (1-5)	2 (6-25)	3 (26-50)	4 (51-75)	5 (76-100)	Absent
Under							
Mid							
Over							

Percentage survival of each layer							
	Present	1 (1-5)	2 (6-25)	3 (26-50)	4 (51-75)	5 (76-100)	Absent
Under							
Mid							
Over							

Species specific observations				
	% Understorey	% Mid-storey	% Overstorey	%
Sp. 1				
Sp. 2				
Sp. 3				
Sp. 4				

Sp. 5							
Environmental weeds cover							
	Present	1 (1-5)	2 (6-25)	3 (26-50)	4 (51-75)	5 (76-100)	Absent
Under							
Mid							
Over							
High threat environmental weeds							
	% Understorey		% Mid-storey		% Overstorey		%
Sp. 1							
Sp. 2							
Sp. 3							
Sp. 4							
Sp. 5							
Bare ground created by disturbance							
	Present	1 (1-5)	2 (6-25)	3 (26-50)	4 (51-75)	5 (76-100)	Absent
Vehicles							
People							
Erosion							
Other							
Natural recruitment							
	Absent		Present		%		
Under							
Mid							
Over							
Connectivity							
	Patch size (ha)		Distance (km)		Connection		
Patch 1					H	M	L
Patch 2					H	M	L
Patch 3					H	M	L
Significant species identified							
	Location	Population size	Threat		Proposed response		

Sp. 1				
Sp. 2				
Sp. 3				

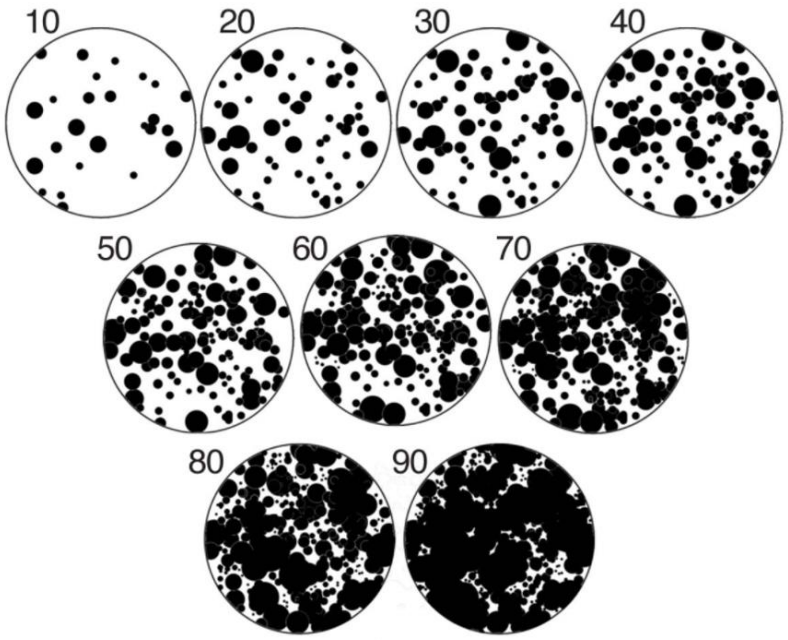
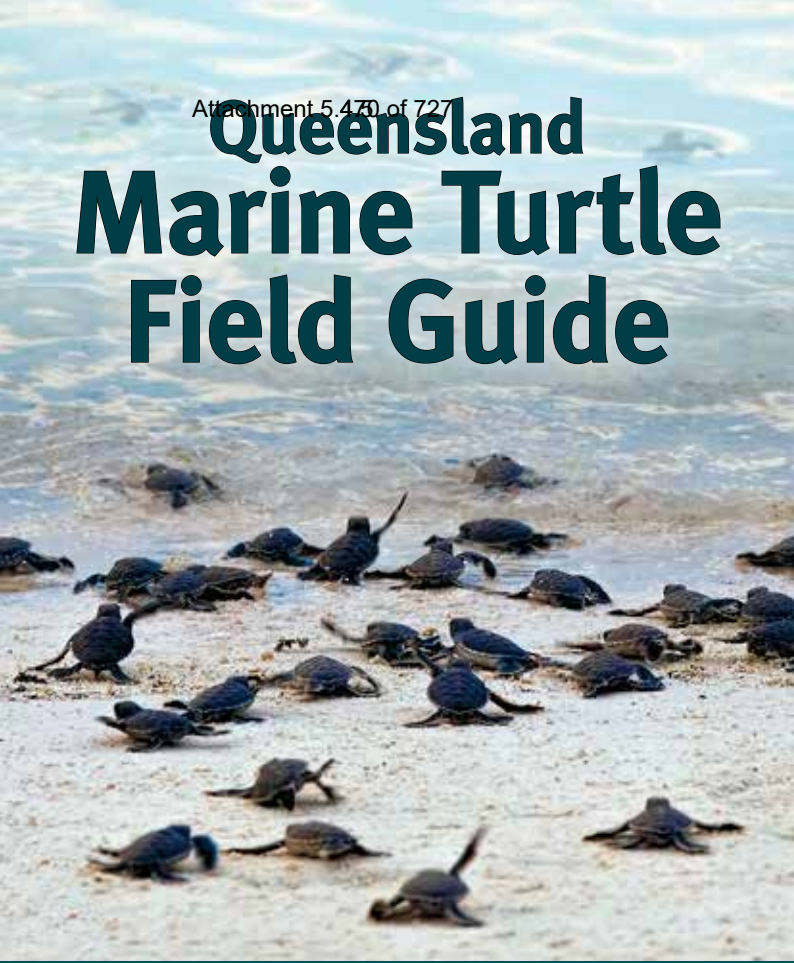


Figure 11. *Schematic representation of percentage cover categories.*

Queensland Marine Turtle Field Guide



Nest to Ocean Turtle Protection Program

Australian Government

Queensland Government

Queensland's coast has some of the most important marine turtle nesting sites in the world. Six species of threatened marine turtles nest along our idyllic beaches. These rookeries support significant nesting populations of green, loggerhead, hawksbill, flatback and olive ridley turtles.

One of the most serious threats to nesting turtle populations is the destruction of their eggs and hatchlings by predators. Feral pigs have been found to be responsible for destroying over 70 per cent of turtle nests at nesting beaches on Cape York, continued loss at this rate is not sustainable. Other predators include foxes, dogs, dingoes and goannas.

To reduce predation on marine turtle nests and help the recovery of threatened marine turtle populations, the Australian and Queensland Governments have together invested nearly $7million in the Nest to Ocean Turtle Protection Program. The program supports predator control and turtle monitoring at priority nesting beaches. It also assists Traditional Owner and community groups to increase their participation in these important activities.

This field guide has been developed as part of the Nest to Ocean Turtle Protection Program. Correctly identifying marine turtles, and the animals that prey on their nests, provides valuable information about turtle populations and shows where predator control activities are most needed.

Nest to Ocean
Turtle Protection Program

Front Cover: Turtle Hatchlings © Kyburgh
Inside Cover: Steven Marpoondin (APN Cape York) © *Brian Ross*

Contents

Marine Turtle Species Identification Key

Indo-Pacific Marine Turtles

Carapace with:
- 5 distinct continuous ridges
- No large scales
- No claws on flippers

Leatherback Turtle
Dermochelys coriacea

Carapace with:
- No continuous ridges
- Large scales
- Claws on flippers

4 pair costal scales

5 pair (rarely 6) costal scales

Carapace longer than wider
Red-brown to brown
No pores in scale of bridge

Loggerhead Turtle
Caretta caretta

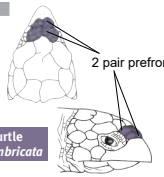
6 pair or more costal scales

Carapace more circular
Grey-green
Pores in scale of bridge

Olive Ridley Turtle
Lepidochelys olivacea

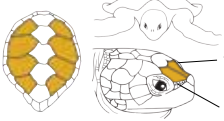
2 pair prefrontal scales
Thick overlapping carapace scales

2 pair prefrontal scales



Hawksbill Turtle
Eretmochelys imbricata

1 pair prefrontal scales
No thick overlapping carapace scales

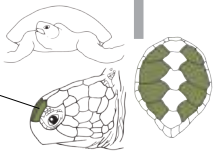


1 pair prefrontal scales

Preocular scales

Low domed carapace with upturned edges
Preocular scales
Olive grey

Flatback Turtle
Natator depressus



High domed carapace
No preocular scales
Light to dark green with dark mottling

Green Turtle
Chelonia mydas

Photographs of Adults and Hatchlings

Green Turtle *Chelonia mydas* Page 10

Olive Ridley Turtle *Lepidochelys olivacea* Page 14

Hawksbill Turtle *Eretmochelys imbricata* Page 18

Marine Turtle Track Identification Key

Alternating Stroke

Flipper marks alternate

Track Features

Early morning monitoring is best as tracks will deteriorate over time. The clarity of tracks can be affected by flipper damage, terrain, sand moisture, tides, wind and weather. Look for several key identifying features, along different sections of track.

The key track identification features are:

- Stroke Style
- Track Width
- Hind Flipper Marks
- Front Flipper Marks
- Plastron Drag
- Tail Drag

Loggerhead

Track Width
Less than 1 meter

Hind Flipper

Front Flipper

Plastron Drag

Tail Drag
Not present

Hawksbill

Track Width
Approx. 70-80 cm

Hind Flipper

Front Flipper

Plastron Drag

Tail Drag

Olive Ridley

Track Width
Approx. 70-80 cm

Hind Flipper

Front Flipper

Plastron Drag

Tail Drag

Breast Stroke

Flipper marks side by side

Green

Track Width
Approx. 94-144 cm

Hind Flipper

Front Flipper

Plastron Drag

Tail Drag

Flatback

Track Width
Approx. 90-100 cm

Hind Flipper

Front Flipper

Plastron Drag

Tail Drag

Leatherback

Track Width
Greater than 2 meters

Hind Flipper

Front Flipper

Plastron Drag
Not Visible

Tail Drag

Track Direction

Clues to determine track direction:

Turtles push sand backwards, the higher sand mound is at the back.

If track overlaps, the top track is the returning track.

Sand is always thrown back over the emerging track when digging.

Measuring Width

Measure from outer edge of track. This may be the front or rear flipper, depending on species.

Basic Beach Monitoring

Guidelines on how to **Record** data and implement **Action** during a basic beach survey (see page 9). These may be tailored to suit individual monitoring programs and implemented in accordance with training.

Record

Species Identification: Use track or sighting to identify species.

GPS Nest Location: Note GPS coordinates & waypoint number.

False Crawl: Track with no nest.

Extent of Damage: Partial or complete destruction of nest.

Evidence of Predation: Diggings, tracks, sighting.

Predator Identification: Use track or sighting to identify species.

Hatchlings Emerged: Yes, hatchling tracks or sighting.

Tag Information: Note tag ID number and its location on turtle.

Curved carapace length (CCL): From front (where skin and carapace meet), down midline to back edge of carapace (over tail).

Action

Photograph: To verify species and/or nest damage/predation.

Mark Nest: Install marker to indicate nest location (if required).

Bury Eggshells and Mark Track: To avoid record duplication; mark track line above the high tide mark.

Submit Data: Project manager to submit data to the relevant Queensland Department.

Basic Beach Survey

Traverse beach to locate fresh turtle tracks.
Walk along the high tide line or drive on the wet sand just below the high tide mark

Equipment Checklist

- GPS (Use datum WGS 84 and decimal degrees)
- Data sheets or charged data recording device
- Pencil
- Tape measure
- Camera
- Personal safety gear
- Torch (night monitoring)
- Spare batteries
- Monitoring field guide

Record fresh tracks only

Adult Track No nesting turtle

Identify Species

refer to **Track Identification** (Pages 6-7)

Is there a nest or is it a false crawl?

Nest

Record / Action
- Species ID
- GPS Nest Location
- Mark Nest

Is nest damaged?

No

Yes

Record / Action
- Extent of Damage
- Evidence of Predation
- Predator ID (refer to pages 22-25)
- Photograph
- Bury Eggshells

False Crawl

Record / Action
- Species ID
- False Crawl

Unsure

Record / Action
- Species ID
- GPS Nest Location
- Mark Nest
- Photograph

Adult Track Nesting turtle

Identify Species

refer to **Species Identification** (Pages 3-5, 10-21)

Once female has settled into laying or has completed nesting

Record / Action
- Species ID
- Tag Information
- Curved carapace length
- GPS Nest Location
- Mark Nest

Hatchling Tracks Hatchlings

Identify Species

if hatchling present refer to **Species Identification** (Pages 3-5, 10-21)

Record / Action
- Species ID
- Hatchlings Emerged
- Marked Nest ID or GPS Nest Location
- Evidence of Predation
- Predator ID (refer to pages 22-25)

Refer to Page 8 for Record / Action monitoring protocols

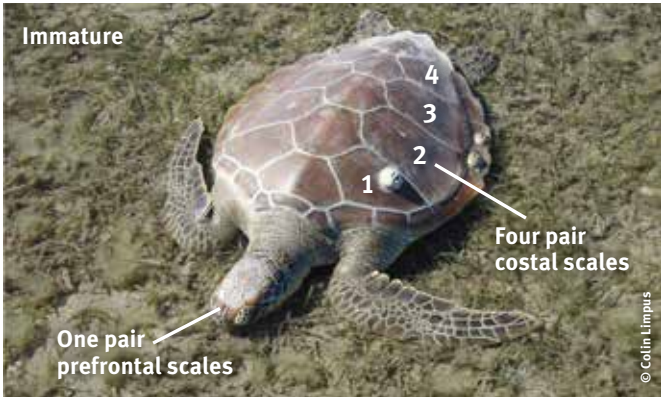
Mark monitored track with a line, above high tide mark, so it's not recorded twice

Continue and complete survey

Submit data forms and photographs for verification to project manager

Green Turtle, *Chelonia mydas*

Status: Nationally Vulnerable, Queensland Vulnerable



Key Identification Features

Breast Stroke Track

Carapace Scales

4 Pair Costal Scales

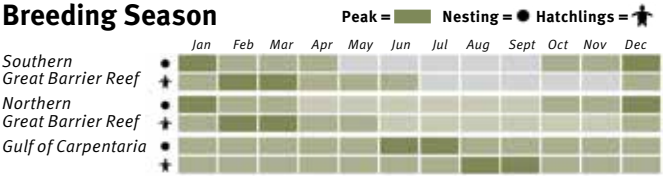
1 Pair Prefrontal Scales

Qld Nesting Sites

Adult: *Carapace is a high dome. Colour is light to dark green with dark mottling. Plastron colour is cream-white.*

Hatchling: *Black-dark brown with white margins, white plastron.*

Breeding Season



Loggerhead Turtle, *Caretta caretta*

Status: Nationally Endangered, Queensland Endangered

Key Identification Features

Alternating Track

Carapace Scales

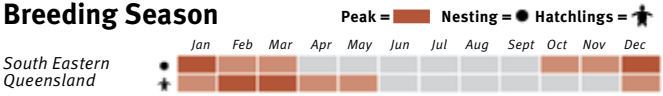
5 Pair Costal Scales

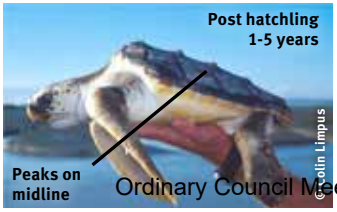
Qld Nesting Sites

Adult: *Carapace is longer than wider. Colour is red-brown to brown. Plastron colour is yellow.*

Hatchling: *Dark brown with 5 costal scales and dark plastron with 3-4 inframarginal scales.*

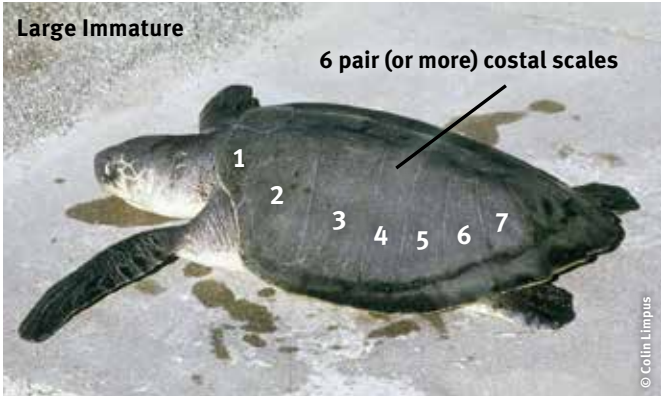
Breeding Season





Olive Ridley Turtle, *Lepidochelys olivacea*

Status: Nationally Endangered, Queensland Endangered

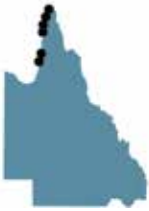


Key Identification Features

Alternating Track

Carapace Scales

6 Pair (or more) Costal Scales

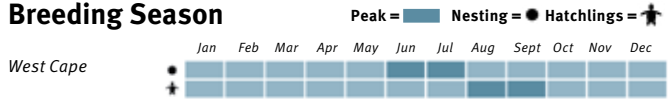


Qld Nesting Sites

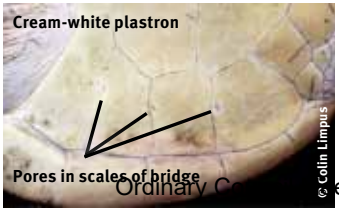
Adult: *Carapace is circular. Colour is grey-green with no conspicuous markings. Plastron colour is cream-white.*

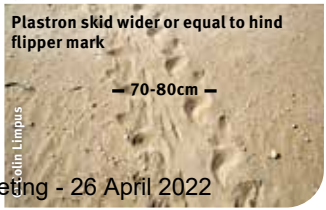
Hatchling*: Charcoal-grey/black-brown on both sides.*

Breeding Season



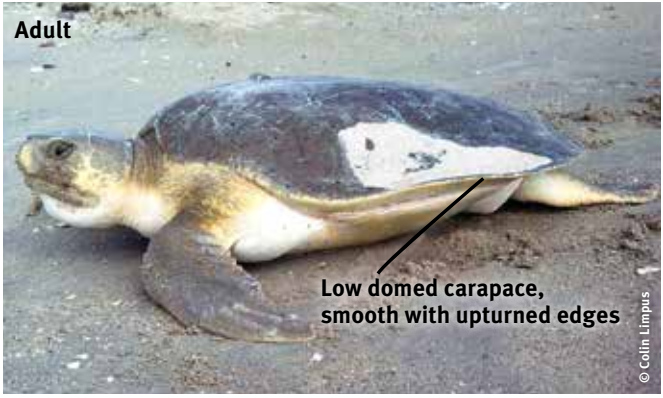
All year, peaks during dry season.

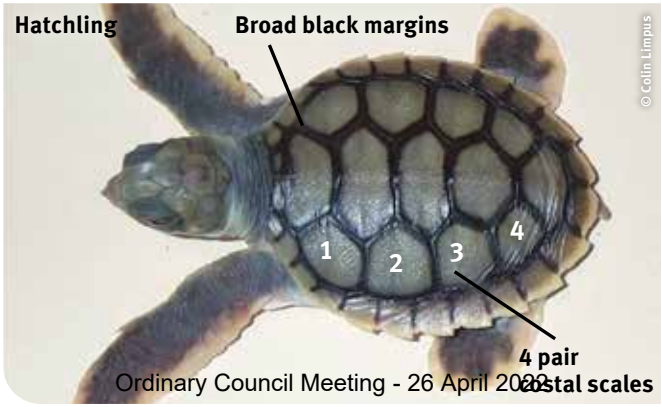




Flatback Turtle, *Natator depressus*

Status: Nationally Vulnerable, Queensland Vulnerable





Key Identification Features

Breast Stroke Track

Carapace Scales

4 Pair Costal Scales

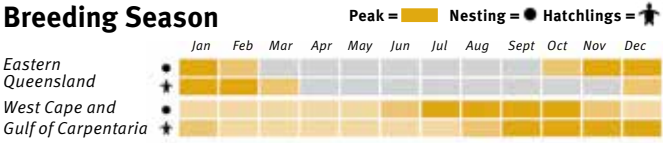
1 Pair Prefrontal Scales

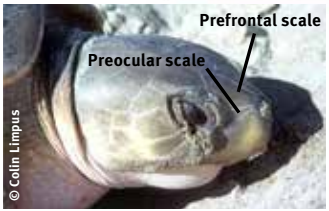
Qld Nesting Sites

Adult: *Carapace is a low dome, smooth with upturned edges. Colour is grey to pale-grey or olive. Preocular scales. Plastron is creamy-yellow.*

Hatchling: *Olive-green, scales with broad black margin. Plastron is a solid white.*

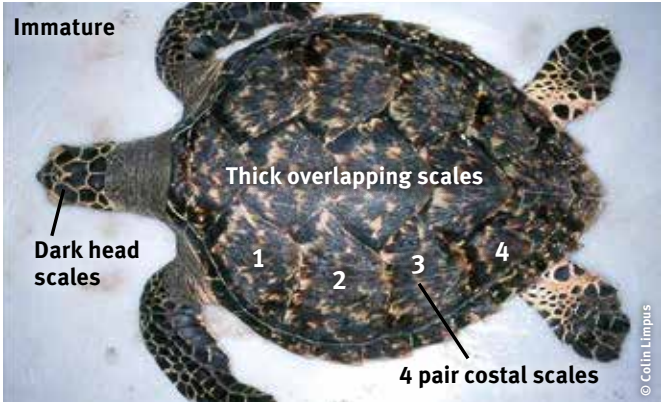
Breeding Season





Hawksbill Turtle, *Eretmochelys imbricata*

Status: Nationally Vulnerable, Queensland Vulnerable



Key Identifcation Features

Alternating Track

Scales Thick Overlapping

4 Pair Costal Scales

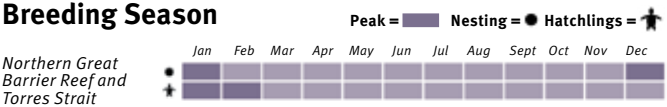
2 Pair Prefrontal Scales

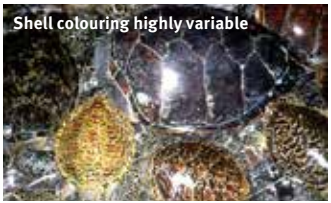
Qld Nesting Sites

Adult: *Carapace has thick overlapping scales. Colour is olive green or brown and is extensively variegated with brown/black markings. Adult plastron is yellow or white with black spots.*

Hatchlings: *Dark brown.*

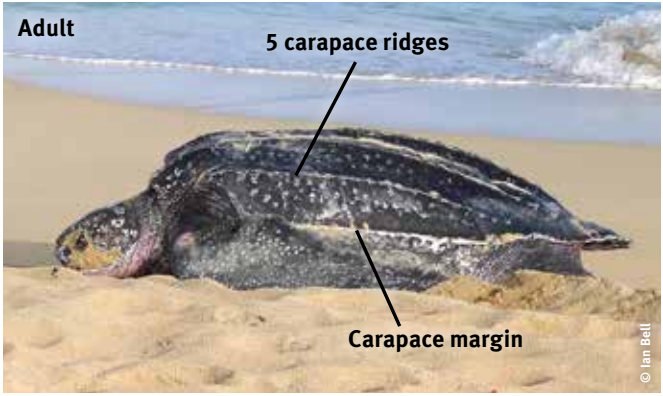
Breeding Season

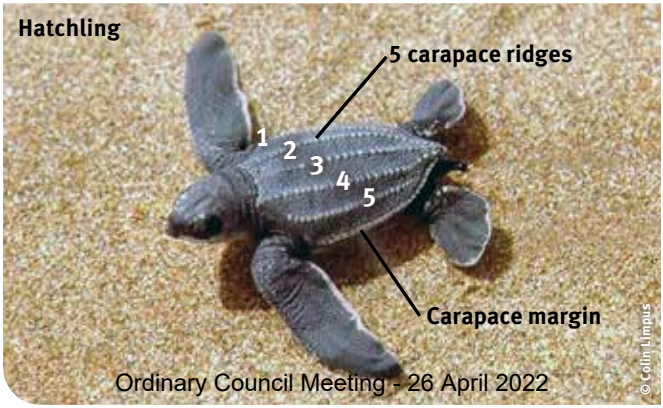




Leatherback Turtle, *Dermochelys coriacea*

Status: Nationally Vulnerable, Queensland Endangered





Key Identification Features

Breast Stroke Track

No Carapace Scales

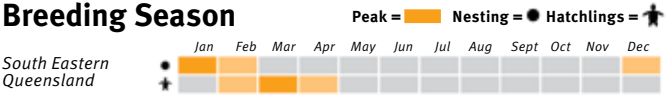
5 Carapace Ridges

Qld Nesting Sites

Adult: *Carapace is long and pointed. Long ridges run down the length of carapace. Colour is a uniform black-brown. Soft leathery skin.*

Hatchlings: *Finely beaded, black with white markings on the carapace ridges and plastron.*

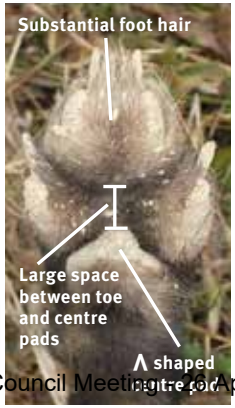
Breeding Season



Fox

Track Identification Features

- Front foot is larger than back foot.
- Elongated oval shaped claws, may not show on track.
- Substantial foot hair, sometimes visible on track impression.
- Large space between centre pad and toe pads.
- Centre pad has a distinct inverted V shape.
- Tracks are straight, hind feet reusing front feet impressions.
- Small track width.



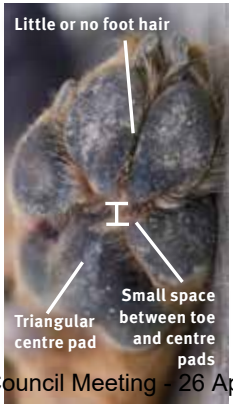
Management Options

- Den detection and fumigation
- Ground shooting
- Trapping
- Baiting
- Exclusion fencing
- Nest protection (cages)

Wild Dog or Dingo

Track Identification Features

- Front foot is larger than back foot.
- Little or no foot hair in between pads.
- Small space between centre pad and toe pads.
- Centre pad almost triangular.
- Foot imprint rounded.
- Tracks are straight but not as neat and aligned as a fox's track.



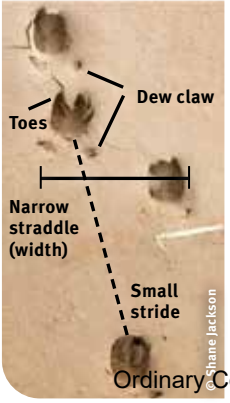
Management Options

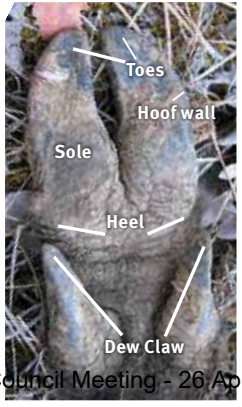
- Ground shooting
- Leg hold trapping
- Baiting (1080 or strychnine)
- Exclusion fencing
- Nest protection (cages)

Feral Pig

Track Identification Features

- Back feet slightly larger than front.
- Foot print consists of a two toe hoof and two dew claws.
- Dew claws distinctive identification feature but may not be present in harder soils.
- Small stride and narrow straddle.





Management Options

- Ground/aerial shooting
- Trapping
- Baiting
- Exclusion fencing
- Nest protection (cages)

Goanna

Track Identification Features

- Both walk and run tracks have alternating foot prints.
- Trail drag usually visable.

Nest Predation Identification

- Goannas burrow into nest at an angle from the side of the nest, not vertical from directly above.
- The burrow is typically domed shape, not circular.

Management Options

- Trapping
- Exclusion fencing
- Nest protection (cages)

Principles of Pest Management

Managing pest animals requires long-term control programs and a variety of approaches. Effective programs are designed around these eight principles:

1. INTEGRATION

Ensuring pest management programs are an integral part of the management of natural areas.

2. PUBLIC AWARENESS

Raising public awareness and knowledge of pests to increase community and individual participation in pest management.

3. COMMITMENT

Gaining a commitment to long term programs by the community, industry groups and government entities.

4. CONSULTATION AND PARTNERSHIP

Establishing partnerships between local communities, industry groups, state government agencies and local governments to achieve a collaborative approach.

5. PLANNING

Consistent planning at local, regional, state and national levels ensures combined resources target the agreed priorities.

6. PREVENTION

Preventing the spread of pests, and using early detection and intervention to control pests.

7. BEST PRACTICE

Using ecologically and socially responsible pest management practices to protect the environment and natural resources.

8. IMPROVEMENT

Research and regular monitoring and evaluating of programs helps improve and refine pest management practices.

Threats to Marine Turtles

Marine turtles are long-lived and slow to mature. Depending on the species they can take anywhere between 8–50 years to reach breeding age. Due to the range of threats, at their different life stages, it is thought that only 1 in 1000 hatchlings will survive to adulthood and then return to the beach to nest. For this reason it is critical to address the range of threats throughout their lifecycle.

Threats include:

- Native and introduced animals predating turtle eggs and hatchlings.
- Vehicles compacting turtle nests or forming tyre ruts that trap hatchlings.
- Humans taking turtle eggs.
- Bycatch of marine turtles in fisheries.
- Marine debris.
- Impact to breeding habitat from coastal development and artificial lighting.
- Deteriorating water quality.
- Unknown and possibly unsustainable levels of turtle harvesting, in and outside Australian waters.

What you can do:

- Support the management of predators such as pigs, dogs and foxes around turtle nesting beaches.
- Report turtle nests and predated turtle nests to your local ranger.
- Keep your dogs on a lead when walking on the beach during nesting/hatchling season.
- Drive slowly on beaches and avoid driving over nests. Drive on the wet sand below the high tide mark to avoid making wheel ruts.
- Pick up marine debris from the beach and waterways.
- Report ghost nets to your local ranger.
- At night, minimise lights on the beach, including campfires.
- Support sustainable, traditional use of turtle and turtle eggs.

Acknowledgements

The Queensland Parks and Wildlife Service Nest to Ocean Turtle Protection Program Team would like to acknowledge the contribution of staff from the following organisations in the development of the field guide: Western Cape Turtle Threat Abatement Alliance supported by Cape York Natural Resource Management, Balkanu Cape York Development Corporation, Aak Puul Ngantam, Feralfix, World Wildlife Fund for Nature, and University of Queensland. Also acknowledged is the input and advice of staff from our partnering Australian and Queensland Government departments.

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