

*Coasts and Communities*

# Town and Far Beach

## Beach Plan

2013



CARING  
FOR  
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COUNTRY

# Contents

1.	Introduction	3
2.	Beach unit description	4
3.	Conservation and management issues	8
3.1	Vegetation	8
3.1.1	Native vegetation	8
3.1.2	Non-native vegetation	11
3.2	Waste dumping	11
3.3	Public access and facilities	12
3.4	Wildlife	18
3.5	Cultural heritage	20
3.6	Erosion	20
3.7	Climate change	21
4.	Recommended activities	24
5.	References	27
Appendix 1: Coastal weed control principles		29
Appendix 2: Coastal revegetation principles		30
Appendix 3: Coastal fencing specifications		34

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**Cover image:** Central Queensland southern mosaic 0.5 metre supplied by Queensland Government.

## 1. Introduction

Mackay Regional Council has a major role to play in the management of public coastal lands. Council is responsible for the public area (esplanade) along all beaches, in addition to many other coastal reserves and open space areas. The *Coastal Protection and Management Act 1995* and associated Queensland Coastal Plan (2012) underpin coastal management in Queensland and, along with multiple other pieces of state and national legislation and Council's own Local Laws and Coastal Management Guidelines (2009), direct the management of these public coastal lands.

Mackay Regional Council manages their coastal areas through an integrated program of: planning (Beach Plans), on-ground works, monitoring, and community engagement known as the *Coasts and Communities Program*. The Coasts and Communities Program is a joint initiative of Mackay Regional Council and Reef Catchments, funded through Mackay Regional Council's Natural Environment Levy and Australian Government's Caring for Our Country Program. The aim of the Coasts and Communities Program is to protect coastal ecosystems in the Mackay region and, where opportunities exist, restore these areas to enhance their natural values, whilst allowing for appropriate recreational access and use. Visit [http://mackay.qld.gov.au/environment/coastal\\_management](http://mackay.qld.gov.au/environment/coastal_management) for more information on the program.

Town and Far Beach is one of 26 recognized residential beach/ reserve planning units in the Mackay Regional Council jurisdiction. The objective of the Town and Far Beach Plan is to:

- Identify the values and pressures in the Town and Far Beach coastal planning unit
- Develop strategies to guide the long-term protection of the natural coastal environment of Town and Far Beach.

## 2. Beach unit description

The Town and Far Beach unit stretches for approximately 4.5 kilometres south from the Pioneer River mouth to Shellgrit Creek (Figure 1). The east-facing coastline is characterised by a narrow strip of low beaches and dunes, fronted by a few hundred metres of mangroves in the north and extensive intertidal flats along the length of the beach. Rock walls have been constructed seaward along Binnington Esplanade, and the Illawong Park recreation Reserve.

This beach unit lies adjacent to the Mackay city centre and has extensive areas of residential and tourism development. Since the 1960s this stretch of coastline has been developed primarily for urban land use, and a great deal of mangrove areas have been infilled (Short, 2000). As part of the historic reclamation and sand extraction that occurred in the area, a creek at the southern end of Town Beach (Pothole Creek) has subsequently closed, resulting in a continuous stretch of beach (Queensland Government, 2004).

The public land along Town and Far Beach are either Reserve or State Land tenured (Figure 2). These lands are all under management of Mackay Regional Council, with the exception of the three parcels of land that are tenured State Land (1AP14147, 420CI3277, 2SP145076). Mackay Regional Council is working in partnership with the Queensland Government to deliver coastal management outcomes on these parcels of land as per this Beach Plan. All of the public coastal land is zoned as open space (Figure 3). The open space zone code provides for informal recreation where the built form is not essential to the enjoyment of the space, and includes undeveloped natural coastal areas (6.2.14 Open space zone code; Mackay Region Planning scheme).

The Sandfly Creek Environmental Reserve lies immediately adjacent to Town Beach in the north and has its own detailed management plan (Reef Catchments, 2009). This area is therefore not discussed in this Beach Plan.



Acknowledgements: 2012 Central Queensland southern mosaic 0.5m and 2012 Digital Cadastral Data supplied by Queensland Government.

Figure 1: Extent of Town and Far Beach unit



**Figure 2: Land tenure Town and Far Beach**



**Figure 3: Planning scheme zonation Town and Far Beach**

Note: Mackay Regional Council is in the process of developing a new Planning Scheme for the region, due for adoption June 2014. Some changes in the zones are proposed, view [www.mackay.qld.gov.au](http://www.mackay.qld.gov.au) for more information.

### 3. Conservation and management issues

#### 3.1 Vegetation

##### 3.1.1 Native vegetation

The Town and Far Beach unit has been extensively modified with only 33 hectares of mangrove and associated salt marsh remnant vegetation mapped as remaining on public coastal land, located at the northern end of Town Beach (Table 1, Figure 8). Remnant vegetation is defined as an area of naturally occurring vegetation that has survived clearing since European settlement, and is mapped by the Queensland Government for legislative and management purposes (Queensland Government, 2013).

Although not mapped as remnant, owing to historical clearing and disturbance, there is natural vegetation present on the dune and estuarine system along the length of Town and Far Beach. This vegetation plays a critical role in shoreline stabilisation, natural erosion and accretion processes, and buffering the terrestrial environment from storm tides and wind. Vegetation along the length of the beach is predominantly Coastal She-oak (*Casuarina equisetifolia*) open forest, with coastal grasses and vines as a ground layer, on foredunes (Regional Ecosystem 8.2.1, Figure 4). Approximately 2 hectares of microphyll vine forest on coastal dunes (Regional Ecosystem 8.2.2, 'beach scrub') has been identified in Queensland Government mapping (1:12,000, 2009) on Reserve tenure and is listed as 'Critically Endangered' by federal legislation (*Environment Protection and Biodiversity Conservation Act, 1999*) (Figure 5). There are also some areas of mangrove, saltmarsh, coastal wetlands (Figure 6), and open forest with beach scrub understory remaining along the length of the beach.

Natural vegetation zonation, which is indicative of a functioning coastal ecosystem, is variable along the length of Town and Far Beach. There are localised areas which retain natural dune zonation from herbaceous stabilising plants on foredunes, through to open forest and beach scrub communities on the hind dune, particularly at the southern end of Far Beach. Rock walls and associated mown recreational parklands along Binnington Esplanade and Illawong Park preclude natural vegetation zonation in these areas. The section of coast immediately to the south of the Pioneer River entrance (Town Beach) has shown a trend of accretion over recent history, likely influenced by the southern training wall structure in the river entrance which has essentially anchored the beach in place (Queensland Government, 2004). This has allowed dune vegetation to recolonise unassisted in front of the constructed rock wall (Figure 7).

Current pressures on coastal vegetation at Town and Far Beach include weed invasion, unrestricted vehicle access, and inappropriate fire regimes. These pressures will be considered in further detail throughout this management plan. The buffer zone of open space along the length of the beach provides some opportunities to reinstate dune vegetation zonation within the Town and Far Beach unit.

**Table 1: Vegetation communities at Town and Far Beach**

Regional Ecosystem (RE)	Short description (Queensland Herbarium, 2009)	Approximate area (ha) remnant vegetation *	Vegetation Management Act status 2005	Biodiversity status	EPBC Status
8.1.1	Mangrove vegetation of marine clay plains and estuaries. Estuarine wetland.	33 ha (remnant)	Not of concern	No concern at present	n/a
8.1.2	Samphire open forbland to isolated clumps of forbs on saltpans and plains adjacent to mangroves.	0.2 ha (remnant)	Not of concern	Of concern	n/a
8.2.1	<i>Casuarina equisetifolia</i> open forest to woodland with <i>Ipomoea pes-caprae</i> and <i>Spinifex sericeus</i> dominated ground layer on foredunes.	Disturbed	Of concern	Of concern	n/a
8.2.2	Microphyll vine forest on coastal dunes.	Disturbed	Of concern	Endangered	Critically endangered
8.2.6	<i>Corymbia tessellaris</i> ± <i>Acacia leptocarpa</i> ± <i>Banksia integrifolia</i> ± <i>Melaleuca dealbata</i> ± beach scrub species open forest on coastal parallel dunes.	Disturbed	Of concern	Of concern	n/a

\*Figures do not include Sandfly Creek Environmental Reserve.



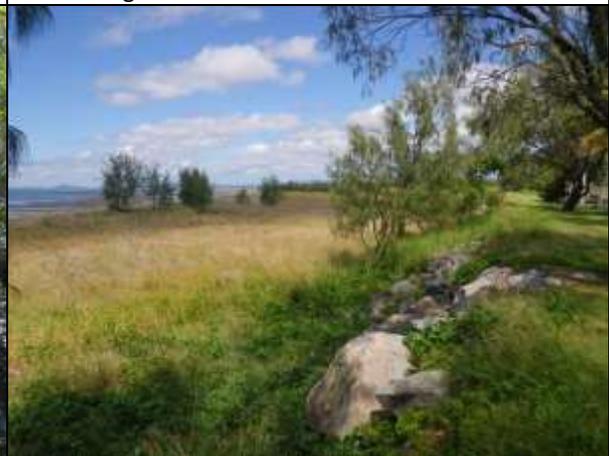
**Figure 4:** Colonising grasses on to open woodlands on foredunes common along Town and Far Beach.



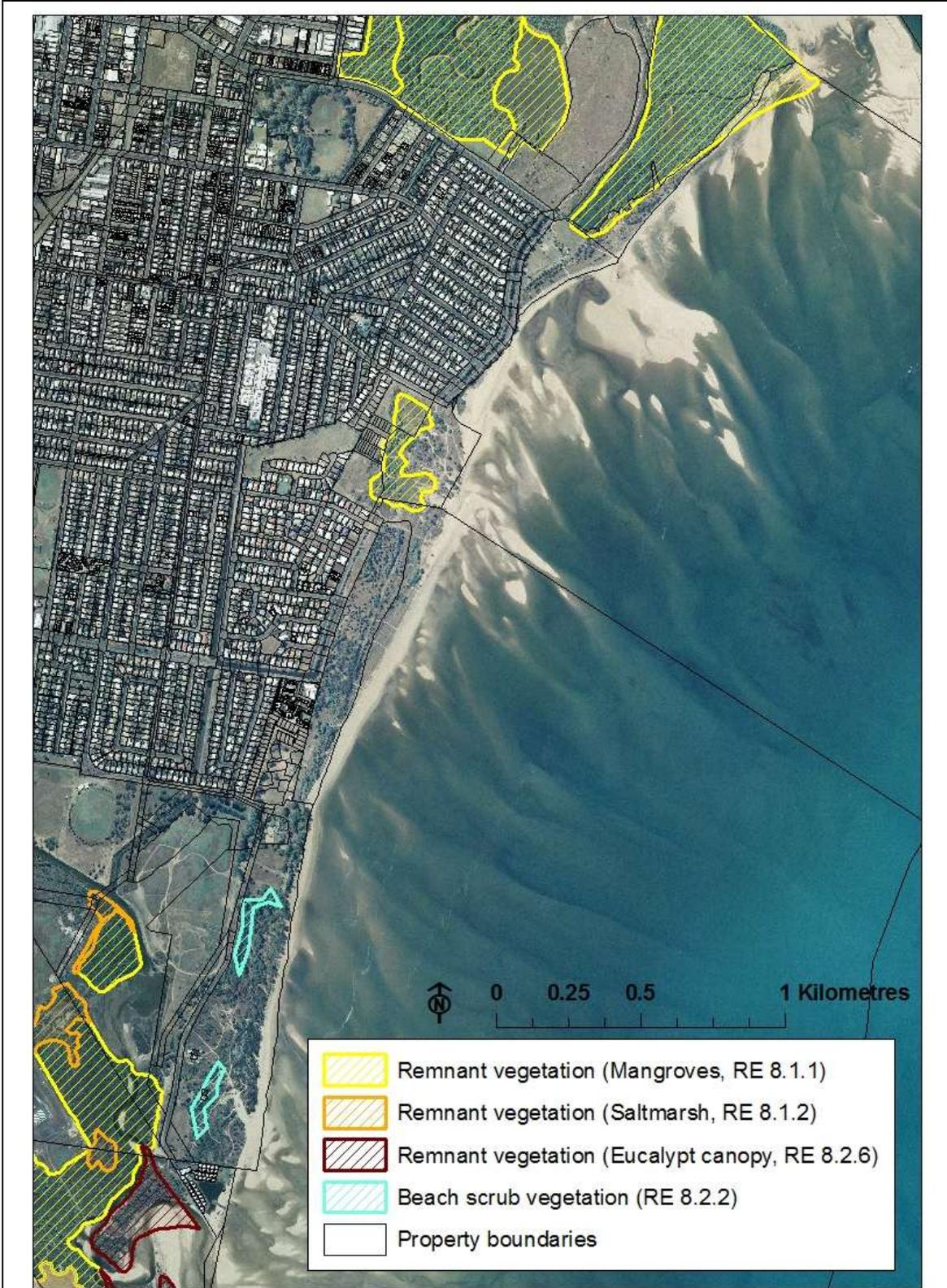
**Figure 5:** Small areas of critically endangered 'beach scrub' vegetation are located at Far Beach.



**Figure 6:** Coastal wetlands at Far Beach.



**Figure 7:** Coastal vegetation recolonising in front of the rock wall along Binnington Esplanade.



**Acknowledgements:** 2009 Central Queensland southern mosaic 0.5m, 2012 Digital Cadastral Data, and 2008 Central Queensland remnant beach scrub mapping 1:12,000 supplied by Queensland Government. 2009 Regional Ecosystem V7 1:100,000 supplied by Queensland Herbarium.

**Figure 8: Remnant vegetation Town and Far Beach and surrounds**

### 3.1.2 Non-native vegetation

Many non-native species are present along Town and Far Beach, reflecting the high levels of past disturbance, current vehicle access, and proximity to urban residence.

- **Declared weeds** recorded at Town and Far Beach such as Lantana (*Lantana camara*), Prickly Pear (*Opuntia* spp.) and Mother of Millions (*Bryophyllum delagoense*) require action for removal under the *Land Protection (Pest and Stock Route Management) Act, 2002*.
- **Environmental weeds** are described as those that can cause major modifications to natural ecosystem function. These species are capable of outcompeting native vegetation and potentially increasing fuel loads in coastal ecosystems which are largely sensitive to fire. Environmental weeds for removal at Town and Far Beach include Lantana (*Lantana camara*), Guinea Grass (*Megathyrsus maximus*) and Para Grass (*Urochloa mutica*).
- **Locally significant weeds** such as Leucaena (*Leucaena leucocephala*) and a variety of other garden escapees have also been recorded present in this beach unit.

The progressive removal of non-native vegetation will improve the condition and resilience of the Town and Far Beach coastal ecosystems. Excluding vehicle access from public coastal land will prevent the re-introduction of non-native species through vegetative waste dumping and vehicle spread.



**Figure 9:** Dense stands of Lantana and Guinea grass are present along Town and Far Beach, outcompeting native vegetation and changing natural ecosystem function.



**Figure 10:** Leucaena is a locally significant weed which has invaded coastal ecosystems at Town and Far Beach.

### 3.2 Waste dumping

Waste dumping on public land reduces the aesthetic value of the environment, is a source of weed spread, and creates a public nuisance for management organisations. Waste dumping is occurring at Town and Far Beach in areas where vehicle access through undeveloped areas is occurring.

Approximately 450 kilograms of rubbish was removed from Town and Far Beach during a coastal clean up in October 2012 (Ecobarge, 2012). This included a variety of materials, including discarded white goods, car tyres and building materials.

Excluding vehicle access from public coastal land will prevent most of the waste dumping that is currently occurring. Ongoing coastal clean ups through existing programs and education around the impacts of illegal waste dumping on public land will also be of value to ensure long term results.



**Figure 11:** Vegetative waste dumping at Town and Far Beach smothers native vegetation and introduces weeds to natural environment areas.



**Figure 12:** General waste dumping where vehicle access is possible.

### 3.3 Public access and facilities

The Town and Far Beach unit is adjacent to Mackay's city centre precinct and the eastern beachfront suburbs, and provides valuable opportunities for recreational access and use.

There are currently 15 designated pedestrian beach accesses provided with fencing and associated infrastructure along Town and Far Beach (Figures 13, 19, 20). Pedestrian accesses are primarily from the recreational parks, or connect with key residential areas along the length of the beach. Rock walls along Binnington Esplanade and Illawong Park currently have no designated access points over them, although are being used to access the beach (Figure 14). Providing formal pedestrian accesses along the two existing seawalls, in an effort to improve pedestrian safety as well as protect dune vegetation, is recommended (Figures 19, 20).

Town and Far Beach (Evan Street to Bridge Road) has one of only four designated dog off-leash areas in the Mackay Regional Council area, attracting dog walkers to the area (Figures 19, 20). The extensive tidal sand

flats and exposed nature of this stretch of beach also make it a popular location for water sports such as kite surfing.

Historically, vehicle access was permitted to this beach and there remain multiple vehicle access points, particularly from the end of Evan Street and along Illawong Drive, which are still being regularly accessed (Figures 15, 16). Vehicles destroy coastal vegetation which is essential for stabilising dunes (Brooke, 2013), and conflicts with other recreational use, such as dog off leash areas. The Queensland Government no longer supports driving on or adjacent to beaches (“unless required for access and being actively managed to prevent significant impacts on ecological values and ensure a safe environment for other beach users”, page 16) (Queensland Government, 2011a). Mackay Regional Council’s Local Law 4 prohibits motorised vehicles from Council-controlled land. In line with this Local Law, installing signage and fencing in relevant areas along Town and Far Beach to exclude vehicle access from public coastal land is recommended.

There are three named parks in the Town and Far Beach unit:

- Iluka Park (Reserve for Park) (Figure 17)
- Quota Park (Reserve for buffer zone and open space)
- Illawong Park (Reserve for recreation and road purposes)

These parks provide facilities such as barbeques, tables, shelters, various multi-use playgrounds, and public toilets. A section of the Bluewater Trail also runs through Iluka Park, connecting up with the Sandfly Creek Environmental Reserve. Together, these parks provide large expanses of open space which add to the intrinsic value of the Town and Far Beach unit.

There are some opportunities to rationalise the amount of coastal land being mown along Town and Far Beach in an effort to reduce maintenance costs in the long term and add to the natural environment infrastructure, where not in conflict with the Mackay Open Space Sport and Recreation Strategy 2010-2016. For example, the mown extent of Quota Park is currently nearly 6 hectares (60,000m<sup>2</sup>), and estimated to cost Council approximately \$79,800 annually in mowing expenses alone (personal communication, Mackay Regional Council, 2013). Recreational facilities are centered at the southern end of Quota Park, lending the northern end (north of Prudhoe Street) to the potential for revegetation activities, without impeding pedestrian access to the beach (Figure 18, 20). Revegetating the mown area north of Prudhoe Street to the east of Binnington Esplanade would reinstate nearly 3 hectares of natural coastal vegetation, eventually become a self-sustaining ecosystem requiring minimal maintenance and providing the additional benefits of shoreline stabilisation, and buffering the terrestrial environment from storm tides and wind. Although there would be an estimated initial cost of \$36,000 (includes 120 metres of fencing to direct pedestrian access and 2.9 hectares revegetation) and annually decreasing maintenance costs for watering and weed control, this would reduce Council’s annual mowing costs by at least \$38,000 every year from that point.



**Figure 13:** 15 pedestrian access points are present along Town and Far Beach with fencing and associated infrastructure.



**Figure 14:** Multiple unofficial tracks are used to access Town and Far Beach over existing rock walls.



**Figure 15:** Vehicle access through public coastal land (hind dunes) destroys coastal vegetation which is essential for dune stabilisation and health.



**Figure 16:** Vehicle tracks on Town and Far Beach.



**Figure 17:** Iluka Park, one of three parks in the Town and Far Beach unit, provides beach front recreational facilities for residents and visitors.

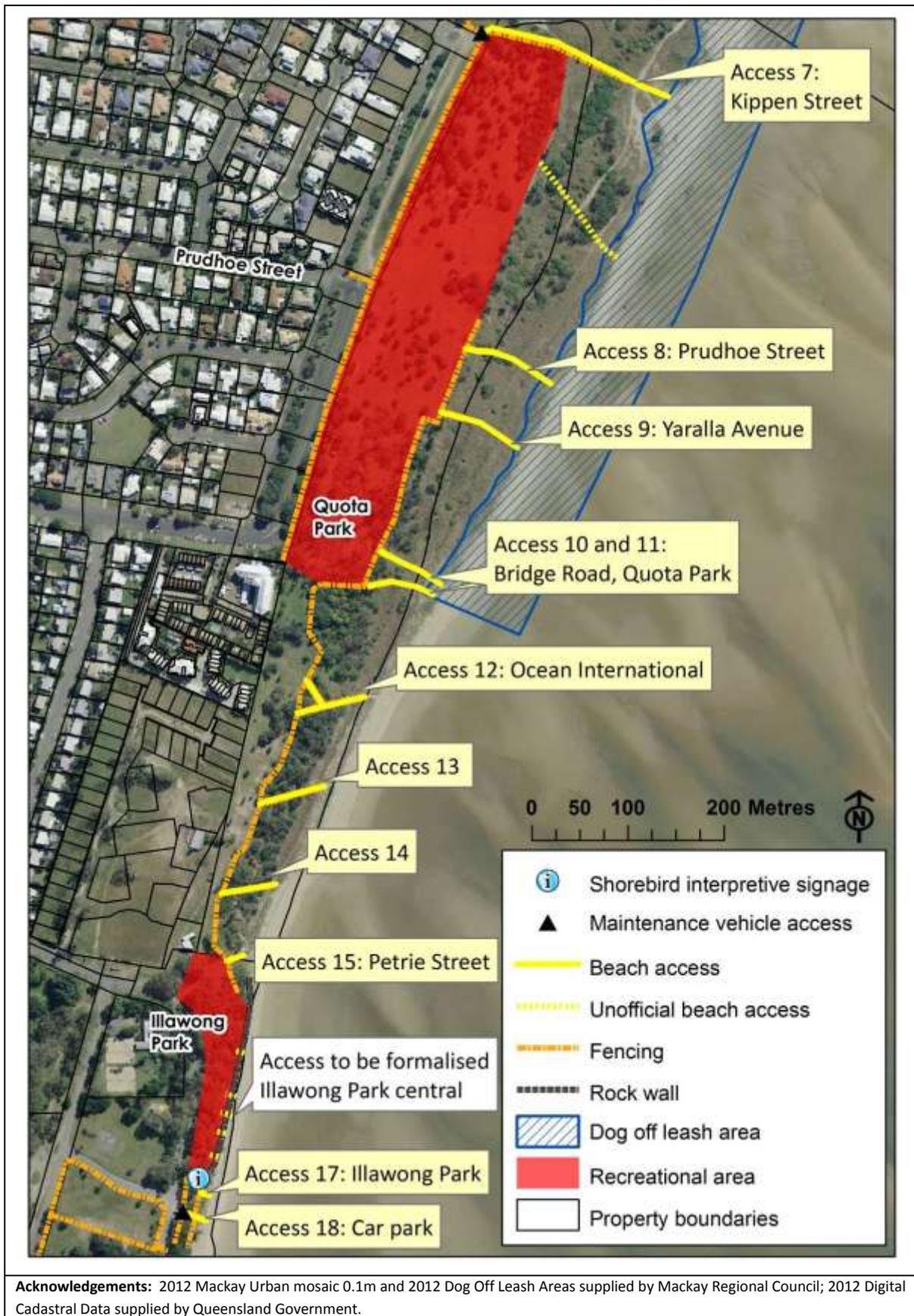


**Figure 18:** Quota Park is nearly 6 hectares in area.

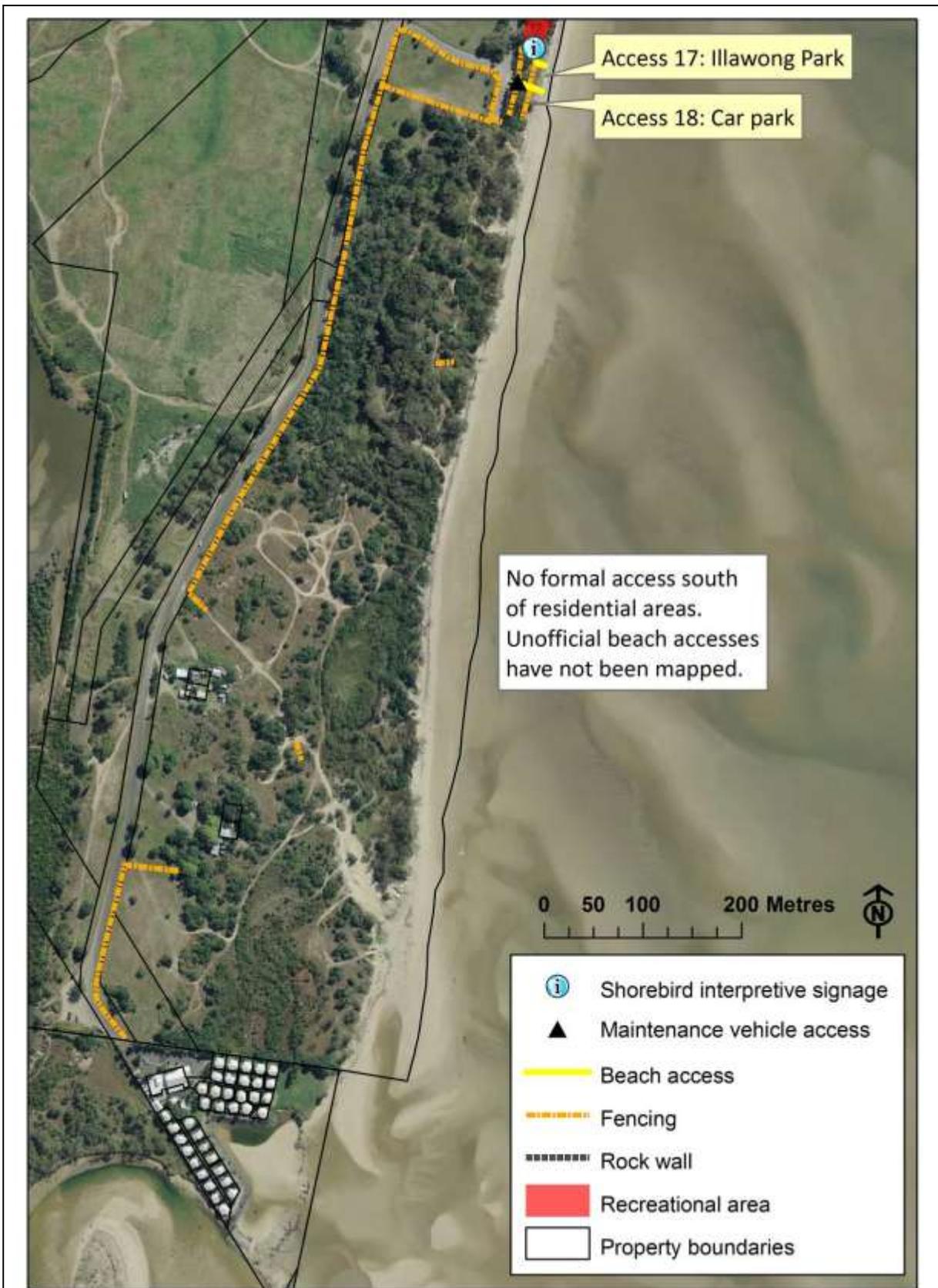


**Acknowledgements:** 2012 Mackay Urban mosaic 0.1m and 2012 Dog Off Leash Areas supplied by Mackay Regional Council; 2012 Digital Cadastral Data supplied by Queensland Government.

**Figure 19: Town Beach access points and recreational areas**



**Figure 20: Far Beach access points and recreational areas**



**Acknowledgements:** 2012 Central Queensland southern mosaic 0.1m supplied by Mackay Regional Council, 2012 Digital Cadastral Data supplied by Queensland Government.

**Figure 21: Far Beach south access points and recreational areas**

### 3.4 Wildlife

There are multiple shorebird roost sites identified in the Town and Far Beach unit, primarily focused around the Pioneer River mouth banks, northern Town Beach, and Shellgrit Creek (Figure 22). Two of these roosts are considered significant for the region (300-1000 birds recorded for Pioneer River mouth banks and Shellgrit Creek entrance; over 1000 birds recorded for Shellgrit Creek), and are threatened by disturbance by pedestrians, fishers, vehicles, and domestic animals (Harding and Milton, 2003; Milton, 2009). Shorebirds feed on the tidal flats at low tide, and rest at high tide at available roost sites. Undisturbed time spent feeding and resting is particularly critical for migratory shorebirds to ensure that they have enough energy reserves to survive the flight back to their northern hemisphere breeding grounds. Interpretive signs highlighting the value of Town and Far Beach as shorebird habitat are installed in Iluka Park and Illawong Park, informing beach users of how they can help to protect these birds (Figures 19, 20). The dog off-leash area has been located in the centre of the beach unit, away from the main shorebird roosting sites at either end of the beach. However, ongoing community education and compliance of dogs on leashes to reduce disturbance to shorebirds, outside of the dog off-leash area, is recommended. Vehicles on Town and Far Beach additionally cause disturbance, direct mortality to the eggs of beach-nesting resident shorebirds, and compaction of sand which is destructive for sand-dwelling invertebrates (Queensland Government, 2011).

Town and Far Beach provides four kilometres in length of potential habitat for nesting marine turtles (Figure 22). Monitoring of nesting turtles has occurred in the region since 1993, including on Town and Far Beach which has had a maximum five nests recorded in one year (Mackay and District Turtle Watch Association, 2012). Adult marine turtles lay their eggs on sandy beaches from approximately October to March each year. Hatchlings emerge from the nest at night some 50 days later and use the natural light horizon of the moon on the ocean to navigate their way to the ocean. Threats for nesting and hatchling marine turtles on Town and Far Beach include light pollution from adjacent residential areas (which disorients nesting females and emerging hatchlings), vehicles on beaches, and domestic animals. Rehabilitating a buffer zone of dune vegetation along the beach to reduce light pollution where possible, and excluding vehicles from the beach, will improve the habitat for marine turtles.

The vulnerable Mangrove Mouse (*Xeromys myoides*) Essential Habitat covers the mangrove communities on the south bank of the Pioneer River, saltmarsh communities remaining at the southern end of Town Beach, and around Shellgrit Creek (listed Vulnerable by *Queensland Nature Conservation Act, 1992*) (Figure 22).

In the absence of detailed fauna surveys, beach scrub ecosystems are considered to provide habitat for the listed Northern Quoll (*Dasyurus hallucatus*), Rusty Monitor (*Varanus semiremex*), and Coastal Sheath-tail Bat (*Taphozous australis*). Approximately two hectares of beach scrub vegetation is mapped on Council Reserve at the southern end of the beach unit (Queensland Government, 2008). The condition of this vegetation community is threatened by weed invasion, vehicle access and illegal waste dumping.



**ACKNOWLEDGMENTS:** 2009 Central Queensland southern mosaic 0.5 metre; 2012 Digital Cadastral Data; 2008 Central Queensland remnant beach scrub mapping 1:12,000; and 2006 False Water Rat Essential Habitat mapping supplied by Queensland Government. 2011 Mackay Whitsunday shorebird roosts supplied by Queensland Wader Study Group and Reef Catchments.

**Figure 22: Wildlife values Town and Far Beach**

### 3.5 Cultural heritage

The Town and Far Beach areas were previously occupied by Traditional Owners and the retention and rehabilitation of natural areas remains of significance to the Yuibera people. Middens, fish traps or other items of cultural significance may be present in the area.

A memorial in Illawong Park exists to commemorate the lives of 29 people lost in a plane crash off Far Beach on June 10, 1960. The TAA Fokker Friendship Abel Tasman flight is reported to have flown into the ocean off Dudgeon Point, 10km off Far Beach, while on final approach to land at night in foggy conditions, becoming the worst civil air disaster in Australian aviation history (Mackay Regional Council, 2010).

### 3.6 Erosion

Sandy shorelines are subject to natural erosion and accretion cycles caused by the impacts of wave, wind and currents on an open coastline. Ensuring that erosion prone areas remain free of constructed infrastructure allows natural processes to occur unhindered. This provides the best opportunity for managing shoreline erosion and retaining environmental values (Queensland Government, 2006).

Rock walls have been constructed seaward of Binnington Esplanade and Illawong Park to protect existing infrastructure and counter the erosion trend at Far Beach (Short, 2000) (Figure 23). As previously mentioned, Town Beach has experienced an accretion trend in recent years, which is attributed to the effect of the southern river training wall trapping sediment moving north (Queensland Government, 2004).

The protection and rehabilitation of the natural dune system that does remain along Town and Far Beach is important to provide a protective buffer against wind and storm tide inundation. Some sections of the dune along Town and Far Beach are lacking native vegetation, leaving them vulnerable to erosion processes (Figure 24). Where inappropriate vehicle or pedestrian access has occurred, bare sand areas have opened up or been invaded by non-native species and would benefit from rehabilitation activities (Figure 25).



**Figure 23:** A rock wall was built seaward of Illawong Park to counter erosion at Far Beach.



**Figure 24:** Some sections of Town and Far Beach currently lack a well-vegetated dune system to provide a natural buffer from wind and storm tide inundation.



**Figure 25:** Dune erosion can occur where sand is exposed from excessive vehicle access.



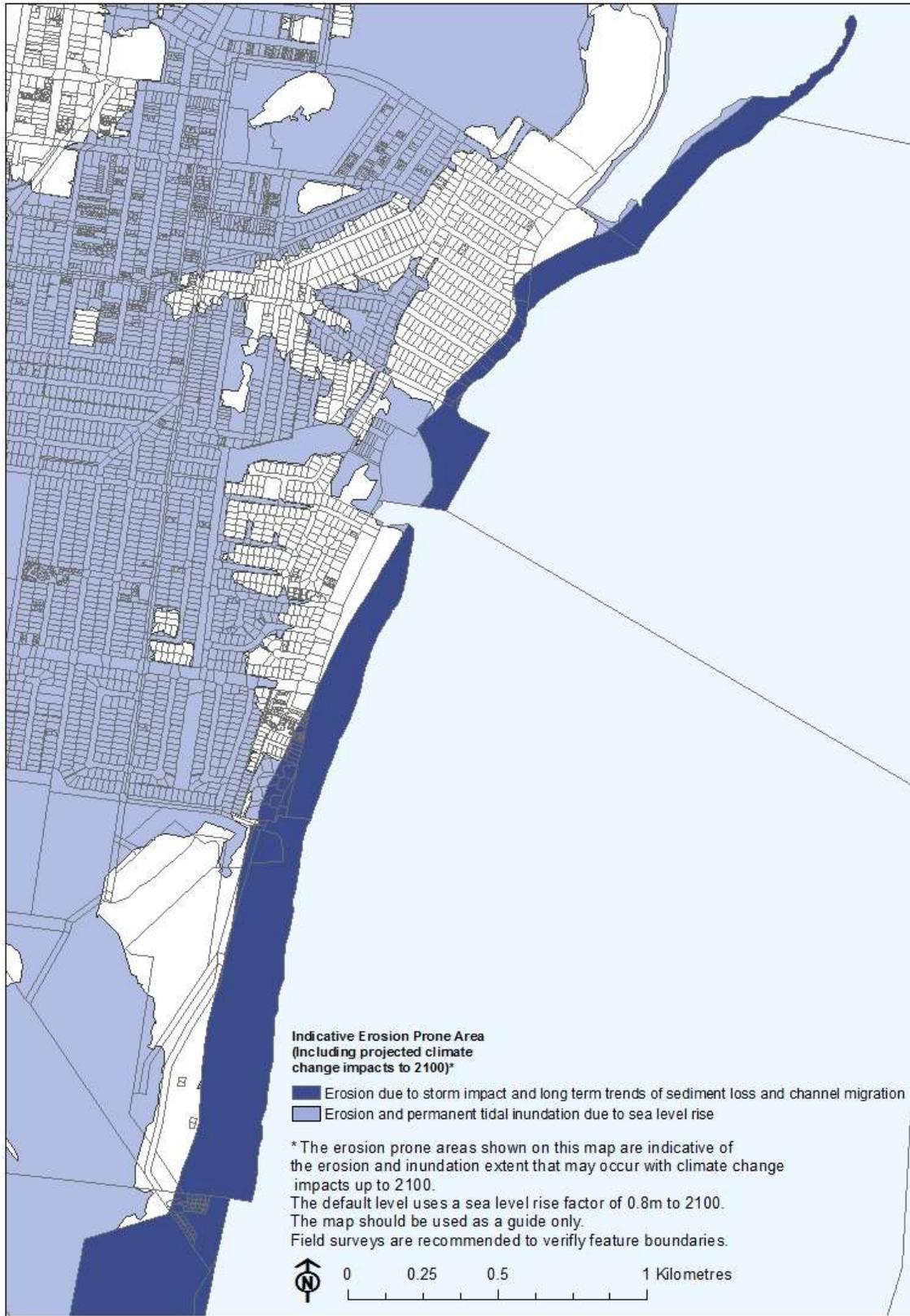
**Figure 26:** King tide at Far Beach in front of Illawong Park, 2013.

### 3.7 Climate change

The response of Australian coastal ecosystems and landforms to climate change will vary but are expected to involve shoreline recession, vertical accretion, increased saline inundation of wetlands, and the modification and southward shift of habitat (Australian Government, 2013).

Town and Far Beach are vulnerable to erosion from storm tide inundation and permanent inundation as a result of expected sea level rise (Figure 27). This map uses the prescribed estimation of 0.8 metre rise in sea level by the year 2100 to model what the coastline will look like, and currently predicts that much of the dune system will be inundated by this time (Queensland Government, 2011b). Current king tides reach the base of the rock wall at Illawong Park (Figure 26). Maintaining and improving the condition of a buffer zone of coastal vegetation, where possible, will provide the best opportunity to build resilience into these ecosystems to cope with changes into the future.

As sea levels rise, vegetation communities in the intertidal zone, such as saltmarsh ecosystems, will be forced to migrate inland. Saltmarsh areas are important for estuarine food chains, provide habitat for marine and terrestrial organisms, balance nutrients and organic matter, and provide hydrologic support (Dale, Knight, Breitfuss, Radke, Rogers, 2013). Where possible, land adjacent to tidal flats should remain free of infrastructure to allow for potential migration of these communities as sea level changes occur. As Figure 28 shows, there are no opportunities in the Town and Far Beach unit for tidal flat communities to migrate inland owing to existing infrastructure developments, including the Pioneer River levee wall in the north, and the multi-storey residential dwelling under development at the southern end of Town Beach.



**ACKNOWLEDGMENTS:** 2012 Digital Cadastral Data 2012 and 2011 Queensland Coastal Hazard Areas mapping supplied by Queensland Government.

**Figure 27: Coastal Hazard Areas Map Erosion Prone Area Town and Far Beach**



**ACKNOWLEDGMENTS:** 2009 Central Queensland 0.5metre mosaic and 2012 Digital Cadastral Data supplied by Queensland Government. Tidal Flat communities from 2009 Regional Ecosystems Version 7 supplied by Queensland Herbarium.

**Figure 28: Current extent of tidal flat communities Town and Far Beach**

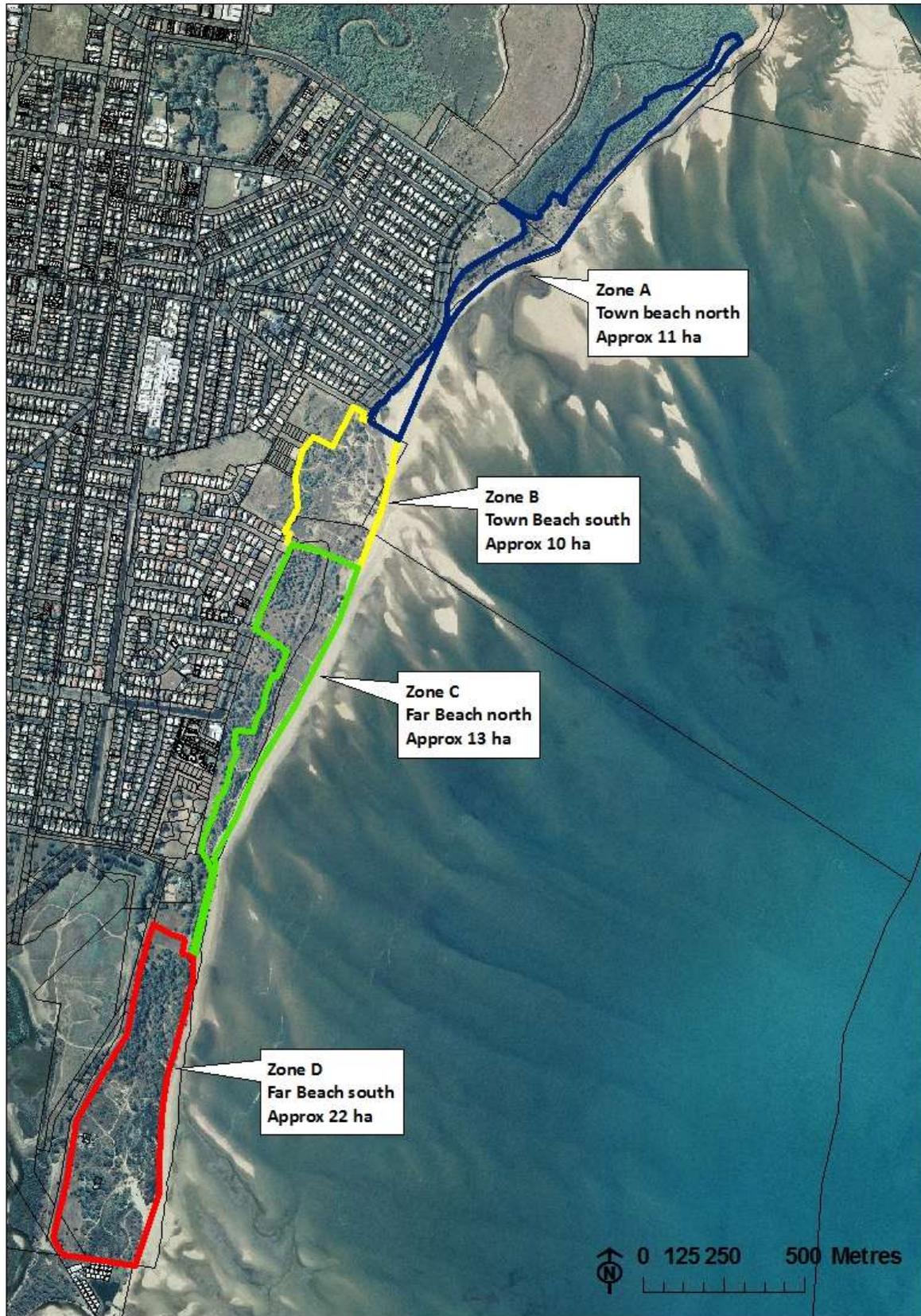
#### 4. Recommended activities

Town and Far Beach unit is divided into four zones (Figure 29) based on common management values and issues. The activities recommended seek to protect and enhance the natural environment values of the coast that have been described, whilst providing for appropriate recreational access and use. Activities will be implemented on a prioritised basis as resources become available.

Coastal weed control and revegetation principles are provided in Appendices 1 and 2. Coastal fencing specifications are provided in Appendix 3.

#	On-ground activity details
<b>Zone A – Town Beach north (Pioneer River to Evan Street)</b>	
1	<b>Weed control and revegetation</b> as required to the east of existing fence line and in undeveloped natural areas north of the Iluka Park area. Target weed species include Lantana ( <i>Lantana camara</i> ), Guinea Grass ( <i>Megathyrsus maximus</i> ), Para Grass ( <i>Urochloa mutica</i> ) and declared species. Weed control on coastal vegetation seaward of the Binnington Esplanade rock wall, with a focus on protecting the native vegetation that is recolonising naturally.
2	<b>Standardise fencing.</b> Wire fencing to be replaced with standard post and rail fencing at the southern end of Iluka Park (approximately 70 metres).
3	<b>Formalise two beach accesses</b> along Binnington Esplanade as per Figure 19 where no designated pedestrian access points currently exist. Providing formal pedestrian accesses will improve pedestrian safety as well as minimise disturbance to dune vegetation.
4	<b>Upgrade beach access</b> at the end of Evan Street to improve pedestrian safety and minimise disturbance to dune vegetation.
<b>Zone B – Town Beach south (Evan Street to Kippen Street)</b>	
5	<b>Fencing</b> from the car park (corner of Evan Street and Binnington Esplanade) to the adjacent Freehold land to restrict public vehicle access to State Land. Excluding public vehicle access will prevent waste dumping, introduction of additional weed species, and the further degradation of coastal vegetation. A gate to allow emergency vehicle access should be incorporated into the fencing (approximately 35 metres total), and signage erected to inform of the exclusion of vehicles from the area.
6	<b>Weed control</b> to improve the condition and resilience of coastal ecosystems between Evan and Kippen Street. Key target species in this zone include Lantana ( <i>Lantana camara</i> ), Guinea Grass ( <i>Megathyrsus maximus</i> ), Para Grass ( <i>Urochloa mutica</i> ) and Prickly Pear ( <i>Oputia</i> spp.). Removal of existing waste dumped may be required. Some revegetation may be required in the future once the full impacts of the adjacent, multi-storey development are apparent, and the pedestrian access points associated with this development have been installed.
<b>Zone C – Far Beach north (Kippen Street to Illawong Park southern car park)</b>	
7	<b>Weed control and revegetation</b> to improve the condition and resilience of coastal vegetation to the east of the existing fence lines. Key target weed species include Lantana ( <i>Lantana camara</i> ), Guinea Grass ( <i>Megathyrsus maximus</i> ), Prickly Pear ( <i>Oputia</i> spp.), Leucaena ( <i>Leucaena leucocephala</i> ). Revegetation may be required where light pollution is identified as an issue, or large areas of non-native species require replacement.

8	<b>Formalise one beach access</b> from Illawong Park as per Figure 20 where no designated pedestrian access points currently exist. Providing formal pedestrian access at a central point will improve pedestrian safety as well as minimise disturbance to dune vegetation. Fencing and/or signage may be required to direct pedestrians to the formal access point.
9	<b>Upgrade beach access</b> from Kippen Street to improve pedestrian safety and minimise disturbance to dune vegetation.
10	<b>Revegetation of northern end of Quota Park.</b> The opportunity exists to consider rationalisation of mown parklands, where not in conflict with the Mackay Open Space Sport and Recreation Strategy 2010-2016. Revegetation of the northern end of Quota Park (north of Prudhoe Street, approximately 29,000m <sup>2</sup> ) would reduce mowing costs by approximately \$38,000 annually. Revegetating this area would reinstate nearly 3 hectares of natural coastal vegetation, eventually become a self-sustaining ecosystem requiring minimal maintenance and providing the additional benefits of shoreline stabilisation, and buffering the terrestrial environment from storm tides and wind. A fence (approximately 120 metres) will be required to define southern boundary of revegetation area and direct pedestrian access to the beach.
<b>Zone D – Far Beach south (Illawong Park southern car park to Shellgrit Creek)</b>	
11	<b>Fencing</b> along Illawong Drive to exclude public vehicle access from the Reserve (approximately 1,300 metres). Fencing alignment will allow private access to the pre-existing Lease Land tenured properties only (Figure 21). Excluding public vehicle access will prevent waste dumping, introduction of additional weed species, and the further degradation of coastal vegetation. A gate to allow emergency vehicle access should be incorporated into the fencing as required, and signage erected to inform of the exclusion of vehicles from the area.
12	<b>Weed control</b> to improve the condition and resilience of coastal vegetation in this 22 hectare Reserve. Key target species in this zone include Lantana ( <i>Lantana camara</i> ), Guinea Grass ( <i>Megathyrsus maximus</i> ), and declared species. Removal of existing waste dumped may be required.
13	<b>Revegetation</b> of undeveloped natural areas currently being mown to the east of existing fence lines, particularly adjacent to Illawong Drive in localised areas at both the northern and southern ends of this zone (approximately 1.8 hectares). Some additional revegetation may also be required if large areas of non-native species require treatment and/or if the recovery of dunes following the exclusion of vehicle access requires additional support.
<b>Other activities across multiple zones</b>	
14	Continue implementation of the beach signage project. This includes updating and rationalising regulatory signage advice regarding dogs on leads, pedestrian and vehicle access points, waste dumping, camping, and illegal fires. Compliance activities to support signage and education campaigns.
15	Educate coastal community on local weed species and promote the use of local native species in residential gardens.
16	Education and compliance activities on the disposal of garden waste and other debris at designated Council refuse sites.
17	Education and compliance activities on the prohibition of public vehicle access on Council-controlled Reserves. Education to include the impacts of vehicles on coastal ecosystems, and include advice on alternative locations for motorised vehicle access.



ACKNOWLEDGEMENTS: Central Queensland 0.5metre mosaic 2009 and Digital Cadastral Data 2012 supplied by Queensland Government.

Figure 29: Zones for recommended activities Town and Far Beach

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## Appendix 1: Coastal weed control principles

Principles	Comments
Staged weed removal	<ul style="list-style-type: none"> <li>• Weed removal should be carried out in a staged approach.</li> <li>• Work outwards from intact remnants of coastal vegetation as a priority.</li> <li>• Particularly important in removal of non-native vegetation along the dune scarp.</li> <li>• Large woody weeds should be removed slowly to ensure the replaced native vegetation provides sufficient habitat value and protection against erosion before more removal of woody species.</li> </ul>
Physical weed removal	<ul style="list-style-type: none"> <li>• Physical weed removal, including hand pulling, chipping or cutting weeds is effective in small infestations in environmentally sensitive areas.</li> </ul>
Mechanical weed removal	<ul style="list-style-type: none"> <li>• Mowing or brush cutting will suppress weed growth, discourage seeding and spread.</li> <li>• This method should be used particularly in areas bordering large infestations.</li> <li>• Care should be taken to reduce potential disturbance as excessive mowing and brush cutting can facilitate further weed growth and reduce regeneration of native vegetation.</li> </ul>
Herbicide weed removal	<ul style="list-style-type: none"> <li>• The application of herbicides includes foliage or basal spraying, cut/ paste and stem injection where applicable.</li> <li>• Spraying may be carried out on large or robust weed infestation, particularly to gain initial control of an infestation. However the majority of spraying is likely to be small scale 'spot spray' applications to minimise non-target impacts.</li> <li>• Roundup Bi-active<sup>®</sup> is recommended due to its low toxicity to wildlife and humans.</li> </ul>
Timing	<ul style="list-style-type: none"> <li>• Weed control on foredunes to occur between April and October only, to avoid turtle nesting season (November to March).</li> <li>• Weed control on hind dunes can occur at any time of the year depending on local weather conditions. Herbicide application is ineffective if carried out during rain periods, or once the plants have entered their non-active period during extended dry periods.</li> </ul>
Consideration of fire risk	<ul style="list-style-type: none"> <li>• Once treated, remaining dead woody weeds (such as Lantana) should be pulled away from native trees to reduce the fire risk to fire-sensitive coastal vegetation should 'accidental' fires occur. This woody, dry biomass serves as fuel for fires and by pulling it away from native trees it reduces the chances of fire reaching the canopy.</li> <li>• Mulching down of large, dense areas of dead woody weeds using brush cutters or hand tools, would similarly reduce fire risk and allow native plants a better chance at regeneration.</li> </ul>
Preventing re-infestations	<ul style="list-style-type: none"> <li>• Keep maintenance vehicles on the existing tracks where possible to reduce disturbance.</li> <li>• Clean maintenance vehicles before and after access to the site to prevent weed spread or introduction.</li> <li>• Monitor the success of weed control techniques and native regeneration following several wet seasons to assess whether revegetation might be needed in large areas of infestation.</li> </ul>

## Appendix 2: Coastal revegetation principles

Encouraging the natural regeneration of native species is the best method for restoration of an area. For this to occur a viable seed bank must be present, and re-growth must include all native plant species from each stratum level. In areas where natural regeneration is to occur, the area should be clearly marked to exclude public access. In these areas, ongoing maintenance is required to minimise re-growth of weed species. However, the planting of local native vegetation (revegetation) is sometimes required due to insufficient cover or re-growth of native species.

### Revegetation techniques

Revegetation in natural areas aims to reinstate Regional Ecosystems communities as described by Queensland Herbarium (Regional Ecosystem Description Database). In disturbed areas, pre-clearing mapping is available to inform what Regional Ecosystems were present prior to vegetation clearing.

Suggested techniques for coastal revegetation in the Mackay Regional Council area include:

- Local native species for planting should be sourced from within the Sarina Proserpine lowlands Subregion of the Central Queensland Coast Bioregion.
- Site preparation, such as weed control, should be carried out prior to planting.
- Depending on the site-specific circumstances coastal plantings may benefit from the use of mulch, weed mats, stakes, and/or tree guards.
- Tubestock planted in sandy soils will benefit from the addition of a wetting agent and fertiliser at the time of planting (eg. Terracottem).
- Ongoing maintenance of the site is required.

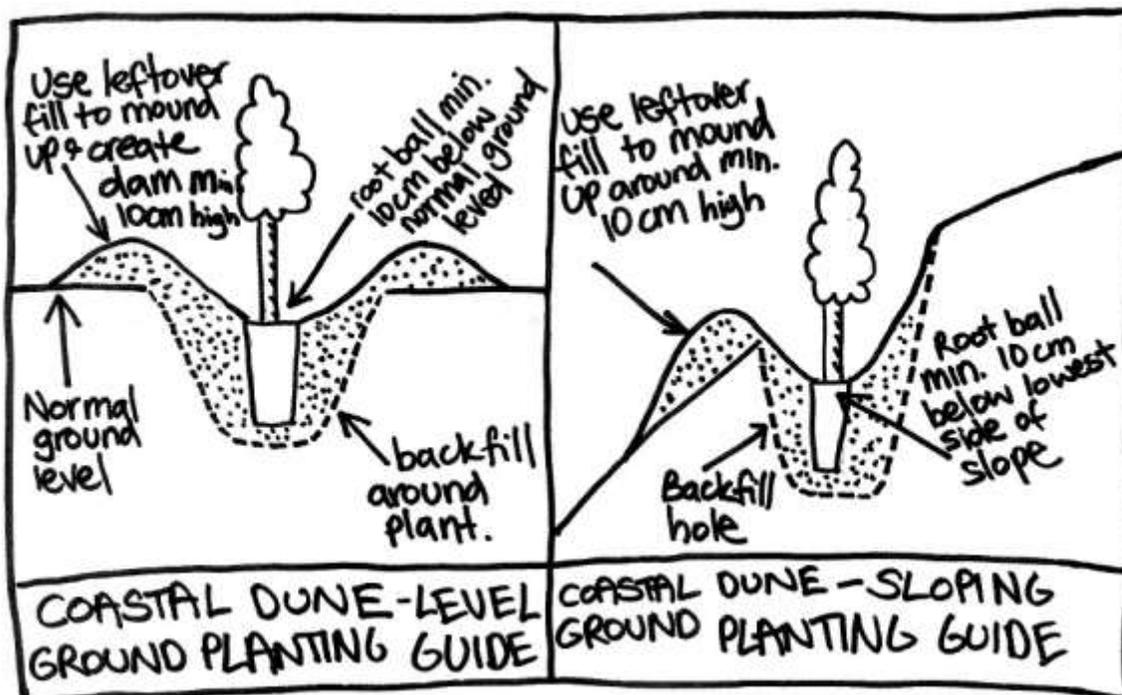


Figure 1: Coastal dune planting guide

### Consideration of fire risk

State Planning Policy 1/03 under the *Sustainable Planning Act 2009* deals with the mitigation of adverse impacts of bushfire, and includes a natural hazard assessment for bushfires and the subsequent provision of safety buffers. According to this policy, a low hazard score and no prescribed safety buffer width is allocated to “narrow strips of coastal vegetation with a linear shape, less than 50 hectares in area and more than one kilometre from the nearest extensive vegetation, on 0-5% slope, with an eastern aspect” (Queensland Government, 2003).

All revegetation activities undertaken as part of coastal projects will be done so with consideration of this State Planning Policy. Designated space for fire breaks and emergency vehicle access will be provided between freehold properties and natural environment areas being revegetated, as per Mackay Regional Council Coastal Management Guidelines (2009).

### Selecting plants for revegetation

The table below provides a generic list of recommended species for dune revegetation in the Mackay region, compiled from characteristic species of relevant Regional Ecosystems (8.2.1, 8.2.2, 8.2.6 and 8.2.9), various coastal species lists from Subregion 2, revegetation recommendations, and field observations.

The species selected for revegetation at any particular location will ultimately depend on current and pre-clearing Regional Ecosystem mapping, and site-specific conditions (such as aspect, topography, existing vegetation, soil condition, availability of appropriate plants, etc).

Regional Ecosystem number	General Description	Occurs
8.2.1	<i>Casuarina equisetifolia</i> open forest to woodland with <i>Ipomoea pes-caprae</i> and <i>Spinifex sericeus</i> dominated ground layer on foredunes.	Foredune, includes strand
8.2.2	Microphyll vine forest (beach scrub) on coastal dunes.	Dune swales and protected hind dunes
8.2.6	<i>Corymbia tessellaris</i> ± <i>Acacia leptocarpa</i> ± <i>Banksia integrifolia</i> ± <i>Melaleuca dealbata</i> ± beach scrub species open forest on coastal parallel dunes.	Coastal parallel dunes
8.2.9	Grassland on coastal dunes	Coastal dunes

Species name	Common name	Habit	Regional Ecosystem
<i>Acacia leptocarpa</i>	Northern Wattle, Slender-fruited Wattle	Tree	8.2.6
<i>Acacia oraria</i>	Coastal Wattle	Tree	8.2.2; 8.2.6
<i>Acronychia laevis</i>	Yellow Wood, Hard Aspen, Glossy acronychia	Tree	8.2.2
<i>Alphitonia excelsa</i>	Red Ash, Soapy ash	Tree	8.2.1; 8.2.6
<i>Argusia argentea</i>	Octopus bush	Tree	8.2.1
<i>Banksia integrifolia</i>	Coastal banksia	Tree	8.2.6
<i>Calophyllum inophyllum</i>	Beauty Leaf, Beach Calophyllum, Ball nut	Tree	8.2.1
<i>Canavalia rosea</i>	Beach bean	Groundcover	8.2.1
<i>Capparis lucida</i>	Coastal caper	Tree	8.2.1; 8.2.2
<i>Casuarina equisetifolia</i>	Coastal she oak	Tree	8.2.1
<i>Chionanthus ramiflora</i>	Native olive	Tree	8.2.2; 8.2.6
<i>Clerodendrum floribundum</i>	Lolly bush	Tree	8.2.2; 8.2.6
<i>Clerodendrum inerme</i>	Coastal lollybush	Shrub	8.2.1
<i>Corymbia tessellaris</i>	Moreton Bay ash	Tree	8.2.6
<i>Crinum pedunculatum</i>	River Lily, Swamp lily	Tufty	8.2.1
<i>Crotalaria mitchellii</i>	Sand rattlepod	Herb	8.2.9
<i>Cupaniopsis anacardioides</i>	Tuckeroo	Tree	8.2.1; 8.2.2; 8.2.6
<i>Cymbopogon refractus</i>	Barbed Wire Grass	Grass	8.2.9
<i>Cyperus pedunculatus</i>	Pineapple sedge	Sedge	8.2.1; 8.2.9
<i>Dianella caerulea</i>	Blue flax lily	Tufty	8.2.6; 8.2.9
<i>Dianella longifolia</i>	Smooth flax lily	Tufty	8.2.6a; 8.2.9
<i>Diospyros geminata</i>	Scaly ebony	Tree	8.2.2; 8.2.6
<i>Dodonaea viscosa</i> subsp. <i>viscosa</i>	Sticky hop bush	Shrub	8.2.1
<i>Drypetes deplanchei</i>	Yellow tulip	Tree	8.2.2
<i>Eragrostis interrupta</i>	Coastal love grass	Grass	8.2.6; 8.2.9
<i>Eriachne triodioides</i>	Wanderrrie grass	Grass	8.2.6; 8.2.9
<i>Eugenia reinwardtiana</i>	Beach cherry	Shrub	8.2.2
<i>Euroschinus falcatus</i>	Ribbonwood	Tree	8.2.2; 8.2.6
<i>Eustrephus latifolius</i>	Wombat berry	Climber	8.2.2; 8.2.6
<i>Ganophyllum falcatum</i>	Scaly Ash	Tree	8.2.2; 8.2.6
<i>Geitonoplesium cymosum</i>	Scrambling lily	Climber	8.2.2; 8.2.6
<i>Heteropogon triticeus</i>	Giant spear grass	Grass	8.2.6; 8.2.9
<i>Hibbertia scandens</i>	Golden Guinea Flower, Snake Vine	Climber/ground cover	8.2.1
<i>Hibiscus heterophyllus</i>	Native hibiscus	Shrub	8.2.6

<i>Hibiscus tiliaceus</i>	Cottonwood, Cotton Tree, Cowtucker	Tree	8.2.1
<i>Imperata cylindrica</i>	Blady Grass	Grass	8.2.6; 8.2.9
<i>Ipomoea pes-caprae</i>	Goats foot convolvulus	Groundcover	8.2.1
<i>Jagera pseudorhus</i>	Foam bark	Tree	8.2.6
<i>Jasminum didymium</i>	Native jasmine	Climber/Shrub	8.2.2; 8.2.6
<i>Lomandra longifolia</i>	Spiny-headed Mat-rush	Tufty	8.2.6
<i>Macaranga tanarius</i>	Macaranga	Tree	8.2.2; 8.2.6
<i>Mallotus philippensis</i>	Red kamala	Tree	8.2.2; 8.2.6
<i>Melia azedarach</i>	White cedar	Tree	8.2.6
<i>Mimusops elengi</i>	Red coondoo	Tree	8.2.2
<i>Morinda citrifolia</i>	Giant Morinda, Cheese Fruit, Smelly cheese tree	Tree	8.2.1
<i>Pandanus tectorius</i>	Beach Pandan, Coastal Screw Pine Pandanus	Tree	8.2.1; 8.2.6
<i>Pittosporum ferrugineum</i>	Rusty pittosporum	Tree	8.2.2; 8.2.6
<i>Planchonia careya</i>	Cocky apple	Tree	8.2.6
<i>Pleiogynium timorense</i>	Burdekin plum	Tree	8.2.2; 8.2.6
<i>Scaevola taccada</i>	Sea lettuce	Shrub	8.2.1
<i>Sophora tomentosa</i>	Silver bean	Shrub	8.2.1
<i>Spinifex sericeus</i>	Beach spinifex	Grass	8.2.1
<i>Sporobolus virginicus</i>	Marine couch	Groundcover	8.2.1
<i>Stephania japonica</i>	Tape vine	Climber/ground cover	8.2.1; 8.2.2; 8.2.6
<i>Sterculia quadrifida</i>	Peanut tree	Tree	8.2.2; 8.2.6
<i>Terminalia muelleri</i>	Coast Damson	Tree	8.2.1; 8.2.2; 8.2.6
<i>Themeda triandra</i>	Kangaroo grass	grass	8.2.6; 8.2.9
<i>Thespesia populnea</i>	Tulip tree	Tree	8.2.1
<i>Thuarea involuta</i>	Birds beak grass	Grass	8.2.1
<i>Vigna marina</i>	Vigna	Groundcover	8.2.1
<i>Vitex rotundifolia</i>	Creeping Vitex, Beach Vitex	Groundcover	8.2.1
<i>Vitex trifolia</i>	Coastal vitex, Common blue vitex	Shrub	8.2.1
<i>Xerochrysum bracteatum</i>	Golden Everlasting Daisy	Annual herb	8.2.9

# Appendix 3: Coastal fencing specifications

