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# Contents

1. Executive Summary ................................................. 7
2. Introduction .......................................................... 8
   2.1 Statutory Obligations ............................................. 10
3. Coastal Unit Description ............................................ 11
4. Environmental Values and Management Issues ....................... 17
   4.1 Vegetation .......................................................... 17
      4.1.1 Remnant Vegetation ......................................... 17
      4.1.2 Vegetation Zonation ......................................... 18
      4.1.3 Non-native Vegetation ...................................... 23
   4.2 Wildlife ............................................................ 27
   4.3 Erosion .............................................................. 29
      4.3.1 Coastal processes and erosion ............................. 29
      4.3.2 Landscape context ........................................... 32
      4.3.3 Sediment transport pathways ............................... 32
      4.3.4 Sediment supply and trajectory ........................... 39
      4.3.5 Shoreline observations ..................................... 39
      4.3.6 Shoreline changes ........................................... 39
5. Social Values and Management Issues ................................ 43
   5.1 Cultural Heritage .................................................. 43
   5.2 Recreational Opportunities ...................................... 43
   5.3 Public Access ...................................................... 45
   5.4 Signage .............................................................. 45
   5.5 Economic Values .................................................. 49
   5.6 Waste Dumping and Litter ....................................... 49
6. Climate Change and Management Issues ................................ 50
7. Recommended Activities ............................................... 52
8. Implementation and Review ........................................... 55
9. References .................................................................. 57
10. Appendices .................................................................. 60

Midge Point Local Coastal Plan 2018
MIDGE POINT SUPPORTS PATCHES OF CRITICALLY ENDANGERED BEACH SCRUB

THE EXTENSIVE ESTUARINE WETLAND, SALTPAN AND MANGROVE COMMUNITIES OF MIDGE POINT PROVIDES IMPORTANT ENVIRONMENTAL SERVICES INCLUDING HABITAT FOR JUVENILE FISH, SEDIMENT TRAPPING AND CARBON SEQUESTRATION

MIDGE POINT SUPPORTS TWO SHOREBIRD ROOST SITES

9.5km OF COASTLINE IN THE COASTAL UNIT

MIDGE POINT SUPPORTS POTENTIAL TURTLE NESTING BEACH

MIDGE POINT IS A POPULAR FISHING LOCATION

THE VULNERABLE BEACH STONE-CURLEW HAS BEENRecordED AT THE SOUTHERN ROOST

SUPPORTS ALMOST 150 ha OF REMNANT VEGETATION ON GOVERNMENT COASTAL LAND

MIDGE POINT IS HIGHLY VALUED BY LOCALS AND VISITORS, WHO LIKE TO ENJOY THE ENVIRONMENT & ITS NATURAL ASSETS

THE COASTAL UNIT CONTAINS ESSENTIAL HABITAT FOR MANGROVE MOUSE

MIDGE POINT IS A THE COASTAL UNIT CONTAINS ESSENTIAL HABITAT FOR COASTAL SHEATHTAIL BAT

THE COASTAL UNIT CONTAINS ESSENTIAL HABITAT FOR MANGROVE MOUSE

MIDGE POINT ENCOMPASSES LANDSCAPES & PLACES OF GREAT IMPORTANCE TO ABORIGINAL COMMUNITIES IN THE MACKAY REGION AND MAY CONTAIN, MIIDENS, FISH TRAPS & OTHER CULTURALLY SIGNIFICANT AREAS

TORG Traditional Owner Reference Group
Mackay-Whitsunday-Isaac

Midge Point Local Coastal Plan 2018
Activities across multiple zones

- Undertake cultural heritage surveys
- Investigate ecotourism opportunities
- Implement Coastcare education and activities program
- Monitor beach profiles, flora and fauna

Zone A
- Weed control and revegetation
- Fencing
- Interpretive and regulatory signage
- Consideration of boardwalk, barbecue area and playground

Zone B
- Weed control and revegetation
- Fencing
- Interpretive and regulatory signage
- Consideration of walking trails
- Address illegal dumping
- Consideration of boat ramp and car parking

Zone C
- Weed control and revegetation
- Fence realignment
- Erosion management
- Formalise beach access track at caravan park
- Interpretive and regulatory signage
- Boat ramp repair

Midge Point
Local Coastal Plan

- Vehicle Access
- Official access
- Access to be formalised
- Reserve
- Road

Management Zones

Data:
Mackay Regional Council Imagery 10 cm Mosaic 2015,
Mackay Regional Council 2016, State of Queensland
(Department of Natural Resources and Mines) 2015

Figure 1: Visual summary of recommendations
Executive Summary

Midge Point is a popular recreational area for locals and visitors to our region. Mackay Regional Council (MRC) (hereafter referred to as Council) manages its coastal land at Midge Point through an integrated program of planning, on-ground works, monitoring and community engagement known as the Coasts and Communities Program. As part of this program, Coastal Management Guidelines (MRC 2012) have been developed to provide a framework for management decisions and activities for coastal land under Council’s jurisdiction. Individual Local Coastal Plans, such as this plan for Midge Point, provide site-specific recommendations for individual coastal units.

The Midge Point Local Coastal Plan describes the environmental and social values of the coastal unit, as well as the key threats and management issues. The Midge Point coastal unit supports rare and threatened species including migratory shorebirds, marine turtles, critically endangered beach scrub vegetation, endangered Melaleuca viridiflora woodland and extensive mangrove and salt flat communities. Key pressures include the presence of non-native vegetation, the removal of native vegetation, waste dumping, erosion and climate change. Recommendations to manage these threats include weed control, revegetation, fencing and access management. Social values are also described and opportunities to improve recreational facilities and values have been identified, including additional beach accesses, walking trails, interpretive signage and park infrastructure. The recommended activities will be implemented on a prioritised basis as resources become available.

Community engagement is recognised as a critical part of the success of on-ground works and opportunities for the community to learn about coastal ecosystems and get involved in management activities at Midge Point will be provided through the Coastcare program.

The activities recommended in this Local Coastal Plan (Figure 1) will help protect and improve the condition of assets in the coastal unit, ensuring that best-practice management principles are implemented and on-ground activities are prioritised and undertaken in a coordinated and strategic way. This plan will help attract additional funding to the region (including from State and Federal sources) to protect coastal resources and improve recreational opportunities for our community.

Key recommendations include:

- Implementation of dune rehabilitation strategies to improve the retention of sand along Midge Point Esplanade Park beach in line with the recommendations of the 2017 SEMP review, including building a geobag revetment wall.
- Upgrade of beach accesses at Midge Point Esplanade Park Beach, including boat ramp upgrades.
- Continue to work with the State Government to address common management issues on Midge Point headland, including investigating opportunities for bush walking trails in this area and formalisation of the boat ramp and associated car parking.
- Weed control across all zones, targeting major weeds including Guinea grass, lantana and revegetation to assist dune stabilisation and supplement native vegetation.
- Installation of regulatory and interpretive signage where appropriate.
- Removal of waste and prevention of future waste dumping at key sites including Jimmys Rock Road.
- Fencing the margins of Herb Winton Park to direct pedestrian access, restrict vehicle access and allow rehabilitation of the coastal vegetation.
- Investigate additional recreational opportunities, such as sporting or play equipment and additional park assets at Herb Winton Park, including a coastal wetland trail.
- Rationalise vehicle access tracks along Conder Parade.
- Revegetation of the foredune at Midge Point Esplanade Park to rehabilitate and stabilise the dune system, including realigning fencing landward where practicable to facilitate regeneration.
2 Introduction

Council has a major role to play in the management of public coastal lands. Council is responsible for the public land along the coast including Esplanade, Reserves and Open Space areas. The Coastal Protection and Management Act 1995 and associated Queensland Coastal Plan (DEHP 2013a) underpin coastal management in Queensland and along with multiple other pieces of State and Federal legislation and Council’s own Local Laws and Coastal Management Guidelines (MRC 2012) direct the management of these public coastal areas.

The Coastal Management Guidelines (MRC 2012) recognise that the coast is characterised by a diverse range of natural features including: sandy beaches, rocky headlands, rainforest, woodland, grassland, extensive intertidal flats and substantial areas of coastal wetland. The Mackay coastline is a dynamic and forever changing landscape, shaped and formed by a range of factors including: wave action, changing tides, predominant winds and human influences. Mackay also has a large tidal range that exceeds six metres (EPA 2004).

The Mackay region is prone to severe storm events and tropical cyclones that impact coastal areas causing localised erosion. After a storm some areas recover quickly. However, if there is not enough time for adequate recovery before another storm event or if the coastline is a predominantly eroding coast, the erosion can accumulate altering the shape of the coastline over time.

Management options to improve the resilience of coastal areas to future storm events are available. Maintaining a sufficient buffer of vegetated dune or other coastal ecosystems such as mangrove acts to bind and retain sediment in coastal areas. The Mackay Coast Study (EPA 2004 p.4) describes the need to protect coastal areas not only for their importance as assets to tourism and recreation, but also as the maintenance of wide sandy beaches and well vegetated dune systems as it provides a natural barrier to storm wave energy and protects inland areas against extreme water levels. Effective coastal management can therefore be viewed as a risk mitigation strategy.

Within the region, development has occurred in some areas that are prone to erosion (EPA 2004). Some areas are already seeing changes in their local coastlines. With future predicted increases in sea level rise and more extreme weather events including cyclones, there is an increasing need to forecast the impact on coastal areas and plan effective, achievable action for protection of coastal values, including:

- The safety and longevity of communities - this includes property, infrastructure and services required for healthy communities.
- Meeting of recreational needs - many locals and visitors utilise coastal areas for activities that add to their health and fitness, provide relaxation and offer opportunities to enjoy nature.
- Continuity of economic services - fisheries and tourism rely heavily on healthy and attractive coastal areas.
- Environmental values – the provision of ecosystem services relies upon healthy coastal vegetation communities and natural environmental processes. Marine turtles and shorebirds require sandy beaches and healthy dune systems for nesting and feeding and many other native flora and fauna require coastal areas for habitat and food.

Adaptation options for coastal areas need to be well considered to ensure the region as a whole is best placed for the future. Maladaptation can occur when proper planning and best science are not incorporated into decision-making processes.

Council manages coastal areas through an integrated program of planning (i.e. Local Coastal Plans (formerly Beach Plans)), on-ground works, monitoring and community engagement known as the Coasts and Communities Program (Figure 2). The Coasts and Communities Program is a joint initiative of Council and Reef Catchments, funded through Council’s Natural Environment Levy and the Australian Government National Landcare 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 biodiversity values, whilst allowing for appropriate recreational access and use.

This Local Coastal Plan is an update of the *Midge Point Beach Plan*, which was adopted in 2010. The 2010 Beach Plan identified key pressures affecting the coastal unit. Since then, strong emphasis has been on the protection, conservation, rehabilitation and management of the coastal unit and its biological diversity. Actions from the 2010 Beach Plan implemented over the last seven years include:

- Weed control and revegetation along the foredunes at Midge Point Esplanade Park.
- Removal of dumped waste and closure of some pathways in the Reserves at the headland, reducing illegal waste dumping. The pathway closures help limit waste dumping and erosion, further protecting native vegetation and habitats.
- Extensive weed control on the Midge Point headland.
- Installation of signage at each beach access track.
- Comprehensive community consultation pre and post Tropical Cyclone Debbie including a review of former Midge Point Sediment Erosion Management Plans and recommendations.

These works were undertaken with a focus on understanding and mitigating local erosion issues, improving habitat condition and increasing the resilience of dune systems.

The objectives of this updated Local Coastal Plan are to:

- Identify the values and pressures in the coastal unit.
- Develop strategies to guide the long-term protection of the natural coastal environment of Midge Point.
- Identify recreational opportunities within the coastal unit.

Council is committed to ensuring that communities are well informed throughout the process of review and implementation.

**Mackay Coasts and Communities Program implementation model**

**Figure 2 Mackay Coasts and Communities program Implementation Plan**
2.1 STATUTORY OBLIGATIONS

There are a range of statutes at Regional, State and Federal level that are relevant to, and may guide the management of natural resources and recreation within the Mackay area. These are shown in Figure 3.

FEDERAL GOVERNMENT
- Biosecurity Act 2015 provides management principles for diseases and pests that may cause harm to human, animal or plant health or the environment, and for other related purposes.
- Environmental Protection and Biodiversity Conservation Act 1999 provides a high level of protection for Matters of National Environmental Significance (MNES). In particular it provides protection for important populations of migratory species.
- Aboriginal and Torres Strait Islander Heritage Protection Act 1984 provides for the preservation and protection of areas and objects in Australia and in Australian waters that are of particular significance to Aboriginals in accordance with Aboriginal tradition.

STATE GOVERNMENT
- Land Act 1994 provides for the designation of the reserves and assignment of Trustees for the protection of environmentally and culturally valuable and sensitive areas and features.
- Recreation Areas Management Act 2006 provides for the establishment, maintenance and use of recreation areas; and aims to coordinate, integrate and improve recreational planning, recreational facilities and recreational management for recreation areas.
- Vegetation Management Act 1999 provides management principles for vegetation within Queensland.
- Coastal Protection and Management Act 1995 (Coastal Act) provides a comprehensive framework for the coordinated management of the Queensland Coast, and establishes the Queensland Coastal Plan 2012 as the primary statutory instrument under the Coastal Act.
- Native Title (Queensland) Act 1993 identifies the presence of Native Title over land.
- Land Protection (Pest and Stock Route Management) Act 2002 provides the regulatory basis for control of pest species. In particular the Act classifies pest species and provides obligations for landholders.
- Fisheries Act 1994 provides protection for marine plants including mangroves and saltmarshes, and provides the regulatory environment for control of recreational fishing activities.
- Sustainable Planning Act 2009 provides the regulatory background for the development of planning schemes.
- Environmental Protection Act 1994 regulates environmentally relevant activities, including release of emissions on land, air or water and noise.
- Marine Parks Act 2004 regulates use of Marine Park to protect marine environment.
- Waste Reduction and Recycling Act 2011 provides regulatory regime for management of litter and illegal dumping.
- Queensland Coastal Plan 2012 provides policy guidance to coastal land managers including best practice coastal management principles which support the development of local management plans.

INTERNATIONAL AGREEMENTS
- China and Australia Migratory Bird Agreement (CAMBA), the Japan and Australia Migratory Bird Agreement (JAMBA), and the Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA) provide for conservation of shorebirds (waders) across the migratory flyway for these species.

LOCAL GOVERNMENT
- Mackay Regional Council Local Law No. 4 (Local Government Controlled Areas, Facilities and Roads) 2011 provides for the management of Council controlled lands by enabling the prohibition of vehicle access and protection of vegetation and infrastructure.
- Mackay Regional Council Local Law No. 2 (Animal Management) 2011 provides for the management of animals in the natural environment, including ensuring that they are under effective control and requiring removal of faeces in a public place.
- Coastal Management Guidelines 2012 provides a framework for management decisions and activities for land under Mackay Regional Council jurisdiction in the coastal zone.
- Mackay Regional Council Planning Scheme Open Space Strategy No. 12 outlines Mackay Regional Council’s commitment to provide a balanced mix of public open space that in turn will provide for a range of active and passive recreational opportunities for the community.
- Reef Guardian Council program recognises Council’s commitment to protect, conserve and enhance the values of the Great Barrier Reef for future generations through effective and responsible land-based management practices. The Coasts and Communities Program is a key initiative under this program.

Figure 3: Regulatory framework
3 Coastal Unit Description

Midge Point is located approximately 70 km north of Mackay’s urban centre and 30 km south of Proserpine. The extent of the coastal unit includes approximately 9.5 km of coastline, stretching from the Midge Point Esplanade in the north around the headland and south to Yard Creek (Figure 4). The coastal unit includes three stretches of sandy beach separated by low rocky headlands and estuarine wetlands including mangroves, salt flats and creeks. The beaches of Midge Point are wide, low-gradient sandy beaches dominated by intertidal flat communities. The northernmost stretch of beach is approximately 800 m and runs along Midge Point Esplanade. A 700m long bay beach occurs north of Midge Point residential settlement along the headland, and a broad sandy beach located in front of the Village, colloquially known as Midgeton, is approximately 1.8 km long. The coastal unit ends at Yard Creek in the west while a smaller, mangrove-fringed creek forms its northern boundary. A small offshore island east of the headland is accessible by foot at low tide.

The coastal unit is divided into three Zones (Figure 5) based on common management values and issues. Zone A stretches along the Midge Point Esplanade and includes Herb Winton Park. Zone B encompasses the Midge Point Headland and Zone C covers the remaining reserve area and includes Midge Point Esplanade Park.

Midge Point can be described as a low-density residential community with large areas of Freehold tenure, where Reserve and Esplanade fringe the coastline (Figure 6). The prominent headland is owned by the State and is under the management of Department of Natural Resources and Mines (DNRM). This land, including the adjacent estuarine wetland, contains a large area of remnant vegetation and is significant for its biodiversity values. The headland is zoned as Open Space with a small area to the west sectioned off for Public Purposes. Three parcels of Freehold Land, all under the same ownership, exist at the northern end of the headland and are surrounded by State Land, Reserve and a servicing road. Council managed land includes 47 ha of Esplanade and 45 ha of Reserve tenure. Freehold tenured land is zoned as Village, Rural, and Rural Residential (Figure 7). Bloomsbury Conservation Park is a National Park located approximately 600 m from Midge Point Esplanade Park on Bundesen Avenue and comprises approximately 3 ha of coastal vegetation, currently managed by Queensland Parks and Wildlife Services.

Common vegetation communities within the coastal unit include *Eucalyptus* woodland with semi evergreen vine forest occurring along the coastal dunes of the headland, *Melaleuca viridiflora* woodland, also containing semi evergreen vine forest, *Corymbia* open forest and semi-deciduous to evergreen vine forest. Estuarine wetlands comprised of samphire forblands, semi-evergreen microphyll vine thicket and a small rise of *Corymbia* open forest dominate the surrounding coastline. Periodic erosion along Midge Point Esplanade Park foreshore has resulted in the decline of native vegetation and loss of parallel ridge and swale dunes (Table 1). Moreover, weed incursion has resulted in the degradation of native vegetation and invasive species including lantana (*Lantana camara*), drooping prickly pear (*Opuntia monacantha*), century plant (*Agave sp.*) and *leucaena* (*Leucaena leucocephala*) have colonised. Common weeds such as Guinea grass (*Megathyrsus maximus*) persist throughout the coastal unit and heighten the risk of fire in the area.

Midge Point offers a village atmosphere and the local community and visitors enjoy the area for its abundant and diverse fishing opportunities. Midge Point provides commercial seafood for supply to the greater Proserpine and Mackay area, which benefits the local economy (C&R Consulting Pty Ltd 2013). Its close proximity to the Great Barrier Reef Marine Park and associated islands is an attraction for boat users. Seagrass beds exist along the foreshore and coastal waters and together with a diverse range of ecosystems including the inshore reef and shoal areas allow for diverse and extensive recreation. Water-based activities including fishing and boating help shape the lifestyle in the Midge Point coastal area (C&R Consulting Pty Ltd 2013). A number of local and linear parks as well as Open Space Reserves are located within the coastal unit. Two parks, Midge Point Esplanade Park and Herb Winton Park provide a range of facilities including barbecue shelters, picnic tables and toilets. Stan Camm Park falls outside the coastal unit however is in close proximity to Midge Point Esplanade Park. Stan Camm Park provides playground facilities as well as additional picnicking facilities, including another barbeque shelter.

The Mackay region is inshore from the Great Barrier Reef and activities must comply with the regulatory zoning conditions introduced by the Great Barrier Reef Marine Park Association (GBRMPA) in 2004. Marine Park zoning is an important component of managing marine areas (GBRMPA 2011). The area offshore from Midge Point is within a Marine National Park (green) Zone (Figure 8). The Marine National Park (green) Zone is a ‘no-take’ area where extractive activities such as fishing or collecting are prohibited for protection and conservation. Low impact activities such as boating, swimming, snorkelling and sailing are permitted. The majority of this zone includes a Whale Protection Area (blue dashed line). A Habitat Protection (darker blue) Zone is located immediately south of Midge Point and around the Repulse Island group to protect and manage sensitive habitats of the Great Barrier Reef Marine Park.

Trawling is not permitted in the Habitat Protection (darker blue) Zone. For additional details regarding restrictions in the Marine National Park (green) Zone, Habitat Protection (darker blue) Zone and the Whale Protection Area (blue dashed line) please visit the GBRMPA website: www.gbrmpa.gov.au
Figure 4: Extent of Midge Point coastal unit
Figure 5: Coastal management zones at Midge Point
Midge Point Land Tenure

- Freehold
- Reserve
- National park
- Esplanade

Data:
Mackay Regional Council Imagery 10 cm Mosaic 2015,
State of Queensland (Department of Natural Resources and Mines) 2015

Scale at A4 is 1: 19 100
Figure 7: Planning scheme zonation at Midge Point
Figure 8: GBRMPA Zoning - Excerpt from Zoning Map 10 (GBRMPA 2011) indicating the zoning around Midge Point. Note the Marine National Park (green) Zone immediately offshore Midge Point and the Habitat Protection (dark blue) Zone south of Midge Point and around the Repulse Islands group.
4 Environmental Values and Management Issues

The coastal unit has been modified for residential development, however 152 ha of remnant coastal vegetation remains on government managed coastal land. Some mapped remnant vegetation is on Freehold or State Land and therefore outside the protection of a Reserve (Figure 9) (EPA 2016). The wetland along the northern section of the Midge Point Esplanade extends beyond the coastal unit, however this area holds high environmental value and as such has been considered as a part of this Plan. The area’s natural environment sustains important marine and terrestrial life and supports wildlife populations of Regional, State and National Significance. These vegetation communities are valuable not only in their own right; but as habitat for native fauna. These tracts of remnant vegetation contain significant Regional Ecosystems and provide important linkages across the landscape. In addition, the ecosystems are important in maintaining natural processes and providing ecosystem services to the local community and region. Carbon storage, water filtration, climate regulation, stabilisation of the shoreline, nutrient cycling and scenic and recreational values constitute just a few examples of the ecosystem services these areas provide to the local community.

This section outlines the distribution and significance of coastal vegetation and wildlife in the Midge Point area and its environmental values. The major threats and management issues relevant to the environmental values will be discussed, including dune systems and erosion processes.

4.1 VEGETATION

The vegetation component of this plan considers three important facets that define the integrity and condition of vegetation in the coastal unit.

Remnant vegetation is the historical vegetative cover of an area and is captured within official Regional Ecosystem mapping. It includes both woody and non-woody vegetation and is dominated by species characteristic of the vegetation’s undisturbed canopy. Remnant vegetation is distinguished by the dominant canopy having greater than 70% of the height and greater than 50% of the cover relative to the undisturbed height and cover of that stratum (Queensland Government 2016).

Vegetation zonation is the sequence of different vegetation communities or zones that occur along a coastline. The zones reflect changes in the nutrient and moisture content of dune soils, which increase in a landward direction, and changes in the degree of exposure to strong winds, salt spray and sandblast, which decrease in a landward direction (DEHP 2015). When vegetation communities are heavily disturbed, for example by weed encroachment or mowing, vegetation zonation is inhibited.

Non-native vegetation is discussed in terms of the weed species that are present and may require management.

4.1.1 Remnant vegetation

Remnant vegetation is mapped at a scale of 1:100,000 by the Queensland Government for legislative and management purposes (Queensland Government 2016). Regional Ecosystems (RE) are vegetation communities in a bioregion that are consistently associated with a particular combination of geology, landform and soil. The Regional Ecosystem Description Database describes each RE and list both the Biodiversity Status and the Vegetation Management Class of each (Table 1). The Biodiversity Status is determined based on an assessment of the amount of a RE remaining (as a percentage of its historic range) and its condition and is used to determine the Vegetation Management Class, under the Vegetation Management Act 1999 (DEHP 2013b). A regional ecosystem is listed as Endangered, Of concern or No concern at Present/Least concern based on these factors. It is important to note that RE mapping provides no indication of the current condition of this vegetation at the local scale.

The importance of coastal vegetation includes, but is not limited to:

- Native dunal vegetation can provide a significant refuge and source of food for local and migratory fauna species.
- Existing native dunal vegetation provides a seed bank for future generations of vegetation, thereby protecting the natural biodiversity of the area.
- Native dunal grasses and groundcover, facilitate dune growth by colonising and trapping windblown sand and preventing it escape from the beach system.

In coastal areas, vegetation can be scorched by high temperatures and salt, as well as abraded by windblown sand. Species that can withstand these effects benefit from onshore winds by intercepting wind-borne nutrients from the sea. These nutrients are deposited on the leaves of coastal plants and washed into the sand by the first showers of rain, thereby introducing nutrients to the system and allowing less hardy species to colonise the coastal area (Gold Coast City Council 2007).

In Queensland, approximately 80% of people live on the coast (DEHP 2013a). As a result, remnant coastal vegetation is often fragmented and subject to high levels of disturbance (Caton and Harvey 2010). Coastal development characteristically results in a loss of coastal vegetation since it often facilitates disturbance throughout the coastal zone and/or mowing and clearing areas of vegetation for recreation. Coastal vegetation remnants, however, remain a critical part of the landscape, providing important ecosystem services, habitat corridors, and recreational values.
General principles for the conservation of remnant vegetation include:

-Controlling weeds to allow native species to regenerate.
-Discouraging the dumping of garden and general waste.
-Replanting areas adjoining remnant vegetation patches with native species, to build a buffer between the core vegetation and adjacent land uses.
-Controlling activities such as four-wheel driving, foot and vehicle traffic (Nordstrom et al. 2000).

Around 152 ha of remnant vegetation remains on government managed coastal land in the Midge Point coastal unit (Table 1 and Figure 9). The coastal Esplanade to the north west of Midge Point maintains significant remnant vegetation including approximately 5ha of critically endangered semi evergreen microphyll vine forest on coastal dunes, commonly known as beach scrub (RE 8.2.2) (Environment Protection and Biodiversity Conservation Act 1999) (Table 1). The condition of remnant vegetation on the headland is threatened by weed invasion, waste dumping and vehicle and pedestrian access from Jimmys Rock Road. The tract of remnant vegetation at Midge Point has previously been identified as a core vegetation management unit for conservation and protection (Cooper et al. 2001).

Remnant vegetation has been removed from the Midge Point Esplanade Park residential area. Pre-clearing mapping suggests that Casuarina open forest with Ipomoea and Spinifex ground layer and Eucalypt and Acacia open forest with beach scrub understorey (EPA 2013) previously occupied this area. This area still holds high environmental value as a corridor of native coastal vegetation including Spinifex and Casuarina woodland on foredunes. The vegetation in this coastal Reserve is highly weed infested. Regional Ecosystems found on Council managed land are further described in Appendix 2.

Opportunities exist to protect and enhance the native vegetation throughout the coastal unit, mostly via weed control and the landward offset of the post and rail fence to allow natural vegetation restoration. Succession planning of old trees in parklands would ensure the natural and recreational values (shade etc.) of these trees are sustained. Educating residents about tree succession planning would also be beneficial to ensure longevity of tree cover in the area as a whole.

Vegetation restoration will enhance the complexity of vegetation zonation, increase the environmental value of the area, reduce impacts of artificial lighting on turtle hatchlings and act as a buffer against wind, salt and extreme weather events. Additional native vegetation will also provide habitat for local fauna.

In areas where the native vegetation remains largely intact, the approach to be taken will be one of assisted natural regeneration. By controlling weeds and limiting disturbance, natural recruitment of dunal species will occur and large-scale revegetation will generally not be required. Small-scale supplementary planting may be undertaken in these areas to enhance vegetation complexity and to replace removed weed species. In areas where natural recruitment is not occurring (for example, due to mowing), or where vegetation has been cleared, revegetation will be used as a technique to restore and enhance native vegetation.

All revegetation activities should follow the coastal revegetation principles as documented in Appendix 3 and include species from the recommended species list provided in Appendix 4. 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 and the availability of appropriate plants.

4.1.2 Vegetation Zonation

A key feature of dune vegetation is the sequence of different vegetation communities that occur with increasing distance landward. Typically, this involves a gradual transition from bare sand, to ground cover, to open forests or woodlands (DEHP 2015). Zonation processes are those which facilitate this progression and are discussed in this Local Coastal Plan as recruitment and colonisation. Natural zonation refers to what is effectively a normally behaving ecosystem, where recruitment and colonisation can occur unhindered over natural gradients (Figure 10). Zonation processes are hindered along the sandy foreshore areas of Midge Point as a result of development, clearing, weed incursion and mowing.

Parts of the Midge Point coastal unit coastline retains natural vegetation zonation and function. An estuarine wetland made up of mangroves and samphire forland is present around much of the low energy coastline affording the area significant protection (Figure 11). The sandy beaches of the coastal unit include both Casuarina equisetifolia open forest to woodland with Ipomoea pes-caprae and Spinifex sericeus dominated ground layer on foredunes (RE 8.2.1) and semi evergreen microphyll vine forest on coastal dunes (RE 8.2.2) (Figure 12).

An interruption of natural dune zonation occurs where remnant vegetation has been removed along the residential frontage at Midge Point Esplanade Park (Figure 13). At the northern extent of the Midge Point coastal unit, vegetation has been cleared well beyond Freehold boundaries, leaving little to no natural vegetation buffer between the subdivision and the beach and estuarine wetland. This cleared area should be revegetated. Natural zonation is also being restricted around Herb Winton Park where the mown area extends to the estuarine wetland, encroaching into the adjacent remnant vegetation (Figure 14 and 15). The establishment of turf and the mowing of vegetation supresses the growth of the sand dunes (height and width), and inhibits their capacity to act as long-term sand reserves. Revegetation along the coastline in these areas may provide the area increased resilience to storm events into the future.
Table 1: Remnant vegetation communities of the Midge Point coastal unit.

<table>
<thead>
<tr>
<th>Regional Ecosystem (RE)</th>
<th>Short description</th>
<th>Approximate area in hectares (ha) on Reserve and Esplanade tenure</th>
<th>Vegetation Management Act status</th>
<th>Biodiversity status</th>
<th>Environmental Protection and Biodiversity Conservation Act status</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.1.1</td>
<td>Mangrove vegetation of marine clay pans and estuaries (estuarine wetland)</td>
<td>7.32 ha</td>
<td>Not of concern</td>
<td>Not of concern at present</td>
<td>n/a</td>
</tr>
<tr>
<td>8.1.2</td>
<td>Samphire open forbland to isolated clumps of forbs on salt pans and plains adjacent to mangroves (estuarine wetland)</td>
<td>4.23 ha</td>
<td>Least concern</td>
<td>Of concern</td>
<td>n/a</td>
</tr>
<tr>
<td>8.1.3</td>
<td><em>Sporobolus virginicus</em> grassland on marine sediments (estuarine wetland)</td>
<td>0.28 ha</td>
<td>Of concern</td>
<td>Of concern</td>
<td>n/a</td>
</tr>
<tr>
<td>8.2.1</td>
<td><em>Casuarina equisetifolia</em> open forest to woodland with <em>Ipomoea pes-caprae</em> and <em>Spinifex sericeus</em> dominated ground layer on foredunes</td>
<td>4 ha</td>
<td>Of concern</td>
<td>Of concern</td>
<td>n/a</td>
</tr>
<tr>
<td>8.2.2</td>
<td>Semi evergreen microphyll vine thicket to vine forest, on coastal dune (beach scrub)</td>
<td>15.5 ha</td>
<td>Of concern</td>
<td>Endangered</td>
<td>Critically endangered</td>
</tr>
<tr>
<td>8.2.6a</td>
<td><em>Corymbia tessellaris</em> +/- <em>Acacia leptocarpa</em> +/- <em>Banksia integrifolia</em> +/- <em>Melaleuca dealbata</em> +/- beach scrub species open forest on coastal parallel dunes</td>
<td>3.78 ha shared</td>
<td>Of concern</td>
<td>Of concern</td>
<td>n/a</td>
</tr>
<tr>
<td>8.3.1a</td>
<td>Semi-deciduous to evergreen notophyll to mesophyll vine forest +/- sclerophyll emergents, fringing or in the vicinity of watercourses</td>
<td>0.12 ha</td>
<td>Of concern</td>
<td>Endangered</td>
<td>n/a</td>
</tr>
<tr>
<td>8.3.2</td>
<td><em>Melaleuca viridiflora</em> woodland often with emergent eucalypts and grassy/herbaceous ground layer on seasonally inundated alluvial plains with impeded drainage</td>
<td>17.25 ha</td>
<td>Endangered</td>
<td>Endangered</td>
<td>n/a</td>
</tr>
<tr>
<td>8.12.20a</td>
<td><em>Eucalyptus drepanophylla</em> +/- <em>E. platyphtylla</em> +/- <em>Corymbia clarksoniana</em> +/- <em>C. dallachiana</em> woodland on low gently undulating landscapes on Mesozoic to Proterozoic igneous rocks</td>
<td>88.3 ha</td>
<td>Not of concern</td>
<td>Of concern</td>
<td>n/a</td>
</tr>
</tbody>
</table>
Figure 9: Map of remnant vegetation at Midge Point
**Tertiary vegetation**
Taller shrubs and trees further elevate the wind and provide protection for inland plants, animals and property.

**Secondary vegetation**
Shrubs and small trees help to stabilise the foredune and deflect the wind up and over the foredune.

**Primary vegetation**
Grasses and creepers colonise lower parts of the beach and trap sand particles with their roots.

As wind is deflected over the vegetation, sand is trapped on incipient or fore dune.

**Figure 10: Role of dune vegetation**

**Figure 11: Midge Point estuarine wetland with samphire forbland and mangroves**

**Figure 12: Midge Point Esplanade Park dune zonation with a narrow strip of Casuarina open forests and Spinifex ground cover on dunes**
Figure 13: In some areas of Midge Point dune vegetation has been removed and the area has become an extension of neighbouring properties yards, removing and preventing vegetation zonation.

Figure 14: Extension of Herb Winton Park up to the back of the estuarine wetland precludes vegetation zonation.

Figure 15: Herb Winton Park
The absence of sand-trapping vegetation causes sand to be lost from the system and the natural, dynamic system of sand movement is therefore disrupted (Gold Coast City Council 2007). Increasing the area of natural coastal vegetation along Midge Point Reserve should be encouraged to allow for migration and increased stabilisation of dunes. Where opportunities exist, fence lines should be relocated landward to allow natural regeneration and expansion of coastal vegetation into the mown area. Council will liaise with residents regarding an appropriate fence alignment that still allows the community to have access to green spaces and recreational areas. Weed control and rehabilitation activities should be included to improve the dune structure and the condition along the length of the beach. Revegetating the dune system in this way will also enhance connectivity, providing corridors for movement of wildlife. Surrounding areas including street verges and Freehold Land could be considered as corridors linking high value environmental reserves. A street tree program to increase the number of street trees would benefit the Midge Point area. Road verges are large and increased vegetation cover would provide protection from blown sand, reduce wind intensity through the township and provide a cooling effect with improved shade. This will complement the efforts of the mesh fence along Midge Point Esplanade Park to reduce erosion, and increase the aesthetic value of the area.

### 4.1.3 Non-native vegetation

The presence of non-native vegetation can be detrimental to the function of the dunal environment. Non-native vegetation can displace native dunal vegetation due to its ability to grow aggressively, smother native dunal species and compete for available nutrients. Transformative weeds such as Guinea grass and lantana can also increase fuel loading and fire intensity. It is important to note that while not all weeds require immediate removal due to low impacts on native species, under the Biosecurity Act 2014, the Council and the local community have a general biosecurity obligation to take reasonable and practicable steps to minimise the risks associated with invasive plants and animals under their control. This legislation was put into force on the 1st July 2016, and changes the classifications of weed species from what has been referred to in earlier Beach Plans. Subsequently, weeds will now be discussed in terms of:

- **Declared weeds** are described as species that have, or could have, serious economic, environmental or social impacts (DAFF 2013a). Declared weeds recorded at Midge Point such as lantana (*Lantana camara*), Singapore daisy (*Sphagneticola trilobata*), mother-of-millions (*Bryophyllum delagoense*) and drooping prickly pear (*Opuntia monacantha*) 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 in some cases, have the potential to increase fuel loads in coastal ecosystems largely sensitive to fire (DAFF 2013b). Environmental weeds for removal at Midge Point include, but are not limited to, century plant (*Agave sp.*), Easter cassia (*Senna pendula var. glabrata*), Guinea grass (*Megathyrsus maximus*), leucaena (*Leucaena leucocephala*), mile-a-minute (*Ipomea cairica*) and thatch grass (*Hyparrhenia rufa*).

- **Locally significant weeds** are those that impact natural processes at a local scale. Locally significant weeds within Midge Point coastal unit include castor oil plant (*Ricinus communis*) and painted spurge (*Euphorbia cyathophora*)

- **Non transformative/nuisance weeds** are problematic on a local scale and should be managed on a case-by-case basis. A multitude of herbaceous weeds and garden escapes result from the close proximity of coastal Reserve areas to residential zones and include black night shade (*Solanum nigrum*), cobbler’s peg (*Bidens alba var radiata*), common sensitive plant (*Mimosa pudica*), devil’s fig (*Solanum torvum*), mother-in-law’s tongue (*Sansevieria trifasciata*), passionfruits (*Passiflora foetida* and *P. suberosa*), pink periwinkle (*Catharanthus roseus*), poinciana (*Delonix regia*), siratro (*Macroptilium atropurpureum*), snake weed (*Stachytarpheta jamanicensis*) and thatch grass (*Hyparrhenia rufa*).

Numerous weeds are present throughout the coastal unit and commonly appear along the periphery of remnant vegetation. In accordance with the weed management principles found in Appendix 5, weed control priorities include declared and environmental weed species and those capable of altering habitats or ecosystem function. Problematic weeds such as lantana (*Lantana camara*) (Figure 16), leucaena (*Leucaena leucocephala*) (Figure 17), dropping prickly pear (*Opuntia monacantha*) (Figure 18) and Guinea grass (*Megathyrsus maximus*) are dispersed across all zones. Similarly, nuisance weeds such as cobbler’s peg (*Bidens alba var radiata*), passionfruit sp (*Passiflora sp.*), devil’s fig (*Solanum torvum*) and snakeweed (*Stachytarpheta jamanicensis*) are also readily distributed across the coastal unit.

Removal of lantana, leucaena, and drooping prickly pear should be the focus for initial weed control efforts, as they are transformative weeds that readily colonise disturbed areas; suppressing native plant regeneration and restricting faunal movement. Removal of Guinea grass (*Megathyrsus maximus*) is also a priority around surrounding fire sensitive remnant coastal vegetation communities. Singapore daisy (*Sphagneticola trilobata*) and mile-a-minute (*Ipomea cairica*) are able to rapidly spread across native ground layer vegetation in coastal areas and should be considered as a priority species for removal. Mother-of-millions (*Bryophyllum delagoense*) and century plant (*Agave sp.*) (Figure 19) often establish as result of waste dumping and readily invade sandy coastal habitats through suckering. Castor oil plant (*Ricinus communis*) (Figure 20) and painted spurge (*Euphorbia cyathophora*) (Figure 21) are locally declared plants within the Whitsunday region and should be removed as they are poisonous to humans.

Non-native species dominate the foredune of Midge Point Esplanade Park and in the absence of native vegetation play a role in dune stabilisation. Simultaneous removal of large tracts of non-native species should be avoided as it may displace native fauna and encourages dune instability. Weeds within Zone 2 need to be managed in an appropriately staged manner.
Figure 16: Declared weeds lantana (Lantana camara)

Figure 17: Leucaena (Leucaena leucocephala) recruiting across Midge Point coastal unit

Figure 18: Drooping prickly pear (Opuntia monacantha)

Figure 19: Century plant (Agave sp.) recruiting near the caravan park beach front in Midge Point Esplanade Park
Figure 20: Castor oil plant (Ricinus communis) at Midge Point

Figure 21: Painted spurge weed (Euphorbia cyathophora) at the northern end of Midge Point Esplanade Park

Figure 22: Palms recruiting

Figure 23: Accumulation of palm fronds
Figure 24: Midge Point wildlife values

Northern quolls’ essential habitat covers the whole coastal unit.

Disclaimer: Ecological data depicted here is indicative of the spatial extent as mapped by State Government and is not to be interpreted in spatially definitive terms.

Data: Mackay Regional Council Imagery 10 cm Mosaic 2015, Mackay Regional Council 2016, State of Queensland (Department of Natural Resources and Mines) 2015
The removal of non-native species from the coastal unit will improve the condition of native vegetation, enhancing habitat quality and its resilience to natural disturbance whilst also reducing the risk of fire.

Council recognises that some community members may value coconuts (Cocos nucifera) (Figure 22 and 23) for their aesthetic appeal. The removal of coconuts from recreational and parkland areas is beyond the scope of this plan. However, adult and juvenile coconuts that occur within areas managed for environmental purposes will be removed in accordance with the coastal weed control principles (Appendix 5). Removal will be undertaken in a staged manner. Coconuts can be a significant risk to pedestrians, increase fire risk and intensity through the accumulation of vegetative waste and smother native vegetation preventing regeneration. It is a common misconception that coconut trees assist foredune stability, however their root system is very shallow and is easily undermined by high waves.

The northern Esplanade of Midge Point, surrounding Herb Winton Park and the subdivision to the north are infested by grassy weed species due to the removal of native vegetation and mowing.

Throughout the Midge Point headland, weeds such as Guinea grass (Megathyrsus maximus) and thatch grass (Hyparrhenia rufa) are present along the margins of Jimmys Rock Road in disturbed areas and along unauthorised vehicle tracks. They pose a threat to remnant communities as they outcompete native species and increase the fire risk to adjacent fire sensitive remnant vegetation. Grassly weeds are also widespread along the northern Esplanade of the coastal unit.

Painted spurge (Euphorbia cyathophora) is found in the northern section of Midge Point Esplanade Park. Poinciana (Delonix regia) is present both in mature and juvenile forms. Leucaena (Leucaena leucocephala) is prolific throughout the Reserve and requires control to prevent further invasion. Repeat treatment of saplings will be required until the seed bank of leucaena is depleted in the Reserve. Following removal of large trees, revegetation may be beneficial to fill gaps and restore native vegetation as quickly as possible.

It is recommended that weed management continues throughout the coastal unit and this, together with revegetation activities to replace removed weed species will prevent future weed re-occurrence and assist the re-establishment of native vegetation. Opportunities for local community members to get involved in coastal management activities will be provided through the Coastcare program. All activities should follow the principles documented in Appendix 3. A list of weed species can be found in Appendix 6.

The removal of non-native species from the coastal unit will improve the condition of native vegetation, enhancing habitat quality and its resilience to natural disturbance whilst also reducing the risk of fire. Using appropriate weed control techniques in a progressive manner as time and resources permit, as per Appendix 5 will assist the rehabilitation of coastal vegetation communities.

High value areas being encroached upon by residential gardens are key areas to focus weed control and community education programs. Weed control priorities include declared species and those capable of altering habitats or ecosystem function. However, some weeds play a role in dune stabilisation (in absence of native vegetation) and should be managed in an appropriately staged manner.

Most vegetation communities within the coastal unit are regarded as highly sensitive to fire. RE 8.3.2 is the exception as it is known to tolerate moderate early winter to winter burns at 5-8 year intervals when subject to natural, unaltered hydrological regimes. Seasonal inundation is a major functional component of this vegetation community as it encourages organic litter decomposition and lowers the rate of fuel accumulation. Adjacent drainage modifications have interrupted the natural inundation patterns of RE 8.3.2 and use of fire as a vegetation management technique should be carefully planned in consultation with vegetation specialists in accordance with Queensland Fire Emergency Services (QFES) and Rural Fire Services (RFS) policies and procedures. All fire management activities should occur in line with the Clarke Connors Range Fire Management Guidelines (Reef Catchments 2009), Appendix 1.

4.2 WILDLIFE

The coastal unit has three separate stretches of sandy beach which provide over 3.3 km of potential marine turtle nesting habitat (Figure 24). Although no official turtle nesting records are available for this area, all sandy beaches in the Mackay region provide potential habitat for marine turtle nesting and turtles are commonly sighted in the area. Significant challenges present for turtle nesting along the Midge Point residential beach including a receding shoreline, residential lights, noise pollution from the road, residential area and campgrounds, and vehicle access to beaches. Green turtles (Chelonia mydas) and flatback turtles (Natator depressus) are listed as vulnerable in State (Nature Conservation Act 1992) and Federal (Environment Protection and Biodiversity Conservation Act 1999) legislation. Given their status, a Recovery Plan for Marine Turtles in Australia has been in place since 2003 and provides an overview of threats and recovery actions required for these species. Key threats to turtles and their reproductive success are identified as the following:

- Light and noise pollution from nearby houses disorientates hatchlings during their movement to the ocean.
- The presence of dogs and other domestic pets in the area, particularly those not on leashes, pose a number of threats including mortality of hatchlings from predation, exposing of clutches from digging and injury to turtles while laying eggs.
- Distribution and type of vegetation (i.e. root system), including excessive shading or lack thereof plays an influential role determining the sex of the hatching.
- Unofficial tracks through the dune system, where tracks appear brighter than surrounding areas due to light reflection and can disorientate both hatchlings and adults.
- Beach vehicle access, as turtles are not able to penetrate the compacted sand or navigate wheel ruts.
An interpretive sign highlighting the value of Midge Point as turtle nesting habitat is installed at the Bundesen Avenue access point. This sign outlines some of the threats that can be locally managed, such as light pollution during nesting season.

Two shorebird roost sites are also identified in the Midge Point coastal unit; an open beach roost in front of the residential area, and a roost adjacent to the mangroves west of the Midge Point headland. Annual survey data is not available for these sites as they are not currently counted by the Queensland Wader Study Group. However, they are still considered to be important roosts. The beachfront roost is accessible to the public and subsequently faces regular disturbance by recreational fishers and pedestrians with domestic animals. Significantly, the vulnerable beach stone-curlew (*Esacus magnirostris*) has been recorded on the beach front south of the residential community (Andrews, M. 2009, pers. comm., 2 July).

Essential Habitat mapping identifies sites and locations considered to contain important habitat for flora and fauna species of conservation significance. It is only mapped over either remnant or regrowth vegetation and is based on either confirmed sightings, records of breeding, known suitable habitat or resources occurring at a location, or habitat that forms part of a potentially important corridor (DEHP 2014).

Essential Habitat for the mangrove mouse (*Xeromys myoides*), which is listed as Vulnerable under the *Queensland Nature Conservation Act 1992*, includes the mangrove communities lining much of the Midge Point coastal unit (Figure 24). Mature animals appear to utilise taller communities dominated by yellow mangrove (*Ceriops tagal*) and orange mangrove (*Bruguiera spp.*), however juveniles are sometimes located in low forests of yellow mangrove. The quantity and quality of storm water entering the catchment will be of relevance to the health of the mangrove mouse population. The coastal unit also contains essential habitat for the coastal sheathtail bat (*Taphozous australis*) (Hourigan 2011). These bats are known to live in highly specialised habitats such as beach scrub, mangroves, *Melaleuca* swamps and coastal heathlands. Any threats to these vegetation communities constitutes a threat to the coastal bat which is classed as Vulnerable under the *Nature Conservation Act 1992*. Coastal sheathtail bats are suspected to be easily disturbed when at roost and could be negatively impacted by noise. There is currently no widespread decline documented for the species, however disturbance due to high rates of human visitation at roost sites can have negative impacts on the species and may cause low breeding success or roosts to be abandoned. The loss of foraging habitat as consequence of coastal development, combined with roost disturbance (with increasing human access to the coast) may pose threat to this species.

Midge Point was declared as a Fish Habitat Area (FHA) in 1986 and is described as a medium priority for action as its coastal waters have a high diversity of fish habitat. A FHA is declared with the aim to protect fish diversity and sustain fisheries productivity. Coral reef fish, especially the young, utilise mangrove areas as nurseries where they find refuge and an abundance of food (Mumby *et al.* 2004). The Midge Point area is popular for recreational fishing with a large number of highly sought after fish targeted including: grunter (*Pomadasys sp.*), mangrove jack (*Lutjanus argentimaculatus*), queenfish (*Scomberoides sp.*), school mackerel (*Scomberomorus queenslandicus*), sweetlip (*Diagramma sp.*), various emperor species (*Lethrinus sp.*), and banana prawns (*Fenneropenaeus sp.*) (DAFF 2012). The mangrove ecosystems at Midge Point also offer habitat for large vertebrates such as the estuarine crocodile (*Crocodylus poros*).

Seagrass, which forms meadows in sheltered coastal waters such as in areas of Midge Point, is an important food source for marine animals including dugongs (*Dugong dugong*) and marine turtles. Globally significant populations of dugong occur in the Great Barrier Reef region (GBRMPA 2007).

Vital ecosystems, in particular Midge Point’s vast mangrove systems and seagrass beds need to be protected as they provide habitat and food resources to an array of species such as fish, marine turtles and dugongs (GBRMPA 2007).

Currently, the major threats to wildlife along the coastal unit include loss of habitat through development, erosion, weed incursion, infrastructure and artificial lighting. Opportunities exist to install interpretive signage featuring key faunal species and ecosystems (such as beach scrub and mangroves) at high profile locations within the coastal unit, such as adjacent to residential properties and the caravan park along Midge Point Esplanade Park. Signage informs the general public as to what they can do to protect significant species and ecosystems.
4.3 EROSION
4.3.1 Coastal processes and erosion

Midge Point Esplanade Park foreshore and a large portion of the broader Mackay region’s beaches maintain sand dunes in the coastal unit. Coastal dune systems play a crucial role in facilitating coastal ecosystem processes and in the protection of property in the coastal unit (DERM 2011a). As part of the broader sand movement process, healthy dune systems act to dissipate the kinetic energy of waves, which may otherwise propel into adjacent infrastructure and property. The sand and dunes create friction when waves pass over them, slowing the waves down and dissipating their energy. Healthy coastal dunes help protect coastal infrastructure during intense wind, storm and cyclone events (Figure 25). The dunes also act to replenish the foreshore with sand after major sand-loss events.

However, human induced changes have altered coastal areas and therefore dune formation. For example, the loss of coastal vegetation for open space and coastal development reduces the capacity of beaches to catch and trap wind-borne (aeolian) sand grains. Once the protective capacity of the dune system is weakened in this way, coastal erosion can take place, leading to significant damage to landforms and infrastructure via coastal recession (Figure 25).

Planners and coastal residents may have a negative association with erosion and coastal recession, though in many cases it is a natural phenomenon. There are constant

Beach erosion/accretion cycle showing no permanent sand loss or coastline retreat (Source: DERM).

Long term beach recession showing profile displaced landward due to permanent sand loss (Source: DERM).

Figure 25: Beach erosion
Midge Point Erosion Prone Areas

- Erosion Prone Area Component 1 of 3 - 40m on HAT
- Erosion Prone Area Component 2 of 3 - Sea Level Rise Area (0.8m)
- Erosion Prone Area Component 3 of 3 - Calculated Erosion Risk Distance

Data:
Mackay Regional Council Imagery 10 cm Mosaic 2015,
State of Queensland (Department of Natural Resources and Mines) 2015

Scale at A4 is 1: 19 100

Metres
interactions between coastal landforms and the ocean, and this creates a dynamic and ever-changing environment. Sandy coastlines migrate landward and seaward in response to natural phases of sand erosion (loss) and accretion (gain). Sand movements can form dunes onshore, sand bars offshore, or instigate beach erosion. All of these movements are governed by wind, waves and tidal activity over varying time scales.

Over short time scales there are natural beach fluctuations in response to intense weather activity. For example, during a storm, strong waves carve away sand from the beach and dunes, resulting in escarpments onshore and sand bars offshore. Gradually, sometimes over many years, the sand that was lost offshore is pushed back onshore by gentler high tides (Figure 25). This process is natural and in many cases, cannot be stopped.

However, long-term erosion or accretion is driven by fundamental changes in the dynamics of sand deposition and removal from a beach system. This is an on-going problem, and preventing beach recession would often require continual nourishing. This is illustrated in Figure 25, where too much sand from coastal dunes is lost seaward to allow the dune to be restored to its original state.

Challenges to dune health are often unavoidable in developed areas such as Midge Point. However, intervention and management can help to protect the coastal landforms.

Dunes should be protected where possible by maintaining and enhancing native vegetation. Ground cover, shrub and tree species stabilise dunes with their root systems, and catch wind-borne sand sediments to replenish the dunes and foreshore. The loss of this vegetation can lead to accelerated rates of erosion of the dunes. The natural build-up of sand in frontal dunes needs to be encouraged as a reservoir for sand during periods of wind and wave erosion. Plant communities provide vegetative cover, which stabilises the dune and thus make the system resilient to pressures such as sea level rise, storms, and floods. Supporting vegetation as a surface cover increases dune stability but also biodiversity and ecological function of the dune system (DEHP 2013a). Coastal vegetation is also important in protecting infrastructure and houses, as it slows wind speeds and reduces the amount of salt and sand transported inland.

Damage to dunal vegetation in the Mackay region often occurs through pedestrian and vehicle traffic, and acts of vandalism. Intentional removal of coastal dune vegetation, as well as inappropriate pedestrian and vehicle access, displaces sand, and where it continuously occurs, can lead to localised eroded areas. Clearly established pathways to the foreshore can help to mitigate the threat of people and vehicles destroying dunal vegetation by funneling activity to a small number of well-maintained pathways. To prevent the degradation of dune systems and for public safety, it is important for users to stay on designated tracks. A range of consultation and education opportunities should be provided to the local community to mitigate damage to dunal vegetation.

Former Midge Point Shoreline Erosion Management Plan (SEMP) recommendations were reviewed in August 2017. The review recommended a suite of works including: establishment of a buried geobag wall, sand nourishment with revegetation, ongoing regenerative works to encourage dune building and vegetation establishment, sand renourishment and review of a timeframe for retreat and potential staged property buy back (Alluvium 2017). Further information can be sourced by visiting www.mackay.qld.gov.au

Human changes (i.e. coastal development and installation of geo-fabric) have also shaped the beach. The sandy beach of Midge Point Esplanade Park foreshore has in the past shown a concerning degree of shoreline erosion. This section describes the geomorphology and processes shaping the Midge Point coastal area, the threats and management considerations.
4.3.2 Landscape context

Midge Point Esplanade Park foreshore is a shallow embayment on the southern side of the Midge Point headland, on the southern shore of Repulse Bay. The sand beach begins at a small un-named tidal creek immediately south of the headland and extends 1.8 km south to the tidal entrance of Yard Creek below the rounded 60 m high Midge Mountain. Midge Point Esplanade Park foreshore is the seaward expression of a sequence of coastal barrier spits that have partly infilled a former embayment and possible tideway between Midge Point Headland in the north and Midge Mountain in the south (Figure 27).

The barriers have extended from north to south and are comprised of at least 19 sub-parallel ridge and swale units behind the modern outermost ridge (C & R Consulting 2013). The ridges converge towards the south and no truncated units are evident, indicating growth was in a consistent orientation (Figure 28). Although there must have been many episodes of storm cut and overwash of the seaward ridges during their development, there is no indication of development of transgressive dunes (blowouts or parabolic dunes). This absence is attributed to a combination of rapid beach recovery, vegetation growth and ineffectiveness of onshore winds to move sand.

The southward extension of the barrier spits has diverted Yard Creek tidal channel to the south against Midge Mountain, and there is a possible palaeochannel (a remnant of an inactive river or stream channel that has been either filled or buried by younger sediment) between ridge sets to the west with an exit in the north at the position of the remnant tidal creek (Figure 28). Residential development is established adjacent to the northern half of the Midge Point Esplanade Park foreshore (Figure 28).

An extensive mangrove community is present to the west of Midge Point headland (Figure 28). Sandy beaches without residential development are present on the Midge Point headland, and to the west of the headland and mangrove communities. These locations were beyond the scope of the Midge Point Shoreline Erosion Management Plan (SEMP) (C & R Consulting 2013), which focused only on the beach in front of the Midge Point Esplanade Park foreshore between the rocky outcrop to the northeast of the community and Yard Creek to the southwest (Figure 28).

4.3.3 Sediment transport pathways

Wave action across the beach is generated predominantly by southeast winds, moderated (reduced in height) and modified (refracted) by the high headland of Cape Conway 21 km to the northeast, the continental islands of the Repulse, Smith, Brampton, and Keswick Island groups to the north and east, and the shallow waters of Repulse Bay. The large tide range (> 6 m) and occasional storms and tropical cyclones are also major factors in determining long-term beach and backshore morphology. Seasonal and cyclic change is therefore expected.

The wave action from the southeast is redirected south along Midge Point Esplanade Park foreshore by the Midge Point headland, and therefore the dominant longshore sediment transport direction along the Midge Point Esplanade Park foreshore is to the south (Figure 29).
Figure 27: Evolution of Midge Point Esplanade Park beach as a former tidal embayment filled by a barrier spit sequence
Figure 28: Geomorphic features at Midge Point and 2016 photo point locations
Figure 29: Midge Point indicative sediment supply and distribution pathways
Figure 30: Intertidal zone wave ripples and channels

Figure 31: Midge Point recreation use light aircraft runway and vehicle access
Figure 32: Comparative shorelines – 2004, 2009, 2015
Figure 33: Midge Point comparative shorelines – Midge Point Esplanade Park - 2004, 2009, 2012, 2015
4.3.4 Sediment supply and trajectory

Sources of historical sediment supply to Midge Point include river systems to the south such as the Pioneer River and multiple smaller river systems, as well as locally from Yard Creek in its paleochannel alignment (Figure 29).

Overall, the net long-term trajectory of sediment supply to the Mackay coastline is likely to be one of reduced supply (Alluvium 2016), which will likely cause beach recessions over the long term. However, further investigation would be required to quantify the trajectory of the sediment budget, and could be combined with a regional study on long term sediment supply for the Mackay coastline.

4.3.5 Shoreline observations

Midge Point Esplanade Park foreshore is oriented east-south-east and curves at the southern end in the lee of 60 m high Midge Mountain. When inspected on 10 July 2016 and again in August 2017 the beach was a wide a low gradient surface of predominantly fine sand with elongate narrow bands of medium sand. The apparent dry-beach width was between 50 to 70 m wide, with tidal flats (the intertidal surface) over 400 m wide and consisting of predominantly fine sand with close-spaced wave-ripples crossed by broad channels of low sinuosity, or curvature (Figure 30). To assess the impact of Tropical Cyclone Debbie, the shoreline of Midge Point Esplanade Park was inspected on 22 June 2017. Subsequent discussions with government departments and Midge Point residents has resulted in the development of recommendations to actively manage long-term regression (Alluvium 2017).

The beach profile currently appears to be flatter overall than shown in data and graphics contained in the Midge Point SEMP (C & R Consulting 2013 p65). The dry beach sand for most of the length is very firm and compacted, evidenced by or partly a consequence of the numerous vehicles and aircraft traversing the surface (Figure 31). The flat beach profile is indicative of a tide-dominated morphology.

4.3.6 Shoreline changes

A review of the Midge Point SEMP occurred in August 2017 and recommended a suite of works including: establishment of a buried geobag wall, sand nourishment with revegetation, ongoing regenerative works to encourage dune building and vegetation establishment (Alluvium 2017).

Remnant vegetation has been largely removed from this dune system. The narrow buffer zone and clearing of native vegetation for pedestrian and vehicle access tracks, parklands and development along the beachfront, drives this problem. As a result, the dune system of Midge Point Esplanade Park has decreased resilience and capability to withstand natural forces, in particular extreme events. Disturbance of the dune system by vehicle and pedestrian access should be minimised to increase vegetation cover to stabilise the system (Figures 34 and 35). In order to best facilitate the growth of native dunal vegetation, it is important to control pests and weeds, undertake revegetation and control waste dumping in the area. The management of pest plants and animals is particularly important where the natural system is weakened or exposed to high pressures, such as those associated with residential development and recreational use. Weed control will need to be on-going in order to prevent re-establishment. Revegetation using local native species within the Reserve boundary would also assist in the function and maintenance of the dune structure into the future.

Unofficial access points providing vehicle access to the foreshore result in the destruction of coastal vegetation and localised erosion (Figure 36 and 37). Restriction of inappropriate vehicle access to the foreshore (Section 5.3)
and some rehabilitation/revegetation in these locations is recommended to stabilise dunes. It is also important for pedestrians to stay on designated tracks in order to reduce the widespread impact of pedestrian traffic. Recreational activities/facilities such as walking tracks and picnic facilities (Figure 38 and 39) should be located outside of the erosion prone area and inside the landward dunal areas (DERM 2011b). Boats, and any other privately owned items, should be removed from the beach and Reserve areas (Figure 40).

In consideration of climate change forecasts it is evident that development has occurred within the erosion prone area along the Midge Point coastal unit (Figure 26). The retention and maintenance of the Reserves in this area is important to prevent threats to private property and infrastructure, by creating a buffer between erosion scarps and property. A beach monitoring program would be beneficial to provide long term data to inform planning.
Figure 38: Unauthorised picnic facilities positioned on the vulnerable dune system at the southern end of Midge Point Esplanade Park

Figure 39: Unauthorised picnic facilities

Figure 40: Boat parked on the vulnerable dune system at the southern end of Midge Point Esplanade Park
5 Social Values and Management Issues

This section provides an assessment of the social values such as cultural values, recreational opportunities and facilities present in the area. The focus lies on a sustainable approach to explore recreational opportunities while conserving the natural environmental values of the area. Provision of adequate facilities that cater for a range of interests and abilities is also an important consideration of this plan.

Midge Point is located at the northern tip of the Council boundary, about an hour drive north of Mackay and 30 minutes drive south of Proserpine. In addition to fishing opportunities, Midge Point offers a long beach and scenic views. The caravan park at the southern end of Midge Point Esplanade Park is adjacent to the beach. Local parks within the Midge Point coastal unit include Midge Point Esplanade Park, Herb Winton Park and Stan Camm Park.

5.1 CULTURAL HERITAGE

The Traditional Owners of the Mackay region are the Yuwi-bara people. Sandy beaches and coastal areas in general were popular hunting and camping sites for Indigenous people of the land. Shell middens, scar trees and other items of cultural significance may be present in the area. Some artifact scatters that are attributed to the Gia people are registered in nearby areas on the Queensland Government’s Aboriginal and Torres Strait Islander Cultural Heritage Database (DATSIP 2016).

Council is committed to managing culturally significant places sensitively in partnership with the Yuwi-bara people. Additional surveys of the area by Traditional Owners may reveal further sites or items of cultural significance. In order to do so, it is suggested that Traditional Owners are employed to document finds and outline clear management objectives for preserving the cultural heritage in the area.

5.2 RECREATIONAL OPPORTUNITIES

Recreational sites are important as they provide a range of social benefits including opportunities for active and passive recreation, tourism, education and social activities. They also support community wellbeing and provide opportunities for improving general health through outdoor recreation. Additionally, through signage and interpretation, there is an opportunity to raise awareness of local wildlife and educate people about the natural coastal processes and vegetation, that support these species. Council’s Draft Planning Scheme (MRC 2017) outlines Council’s vision to provide a balanced mix of public open space that in turn will provide for a range of active and passive recreational opportunities for the community.

Open Space is set aside for recreational and non-recreational activities. Active and passive recreational opportunities are provided to meet the needs of the community, whereas non-recreational Open Space areas are provided for the protection of natural areas, (including environmentally significant vegetation, wildlife habitat areas, waterways, and wetlands) and for the use of land for utilities and storm water management (MRC 2006). In order to develop an integrated and comprehensive Local Coastal Plan, it is important to consider public use and future opportunities that balance the environmental conservation and recreational needs of this coastal unit.

The Mackay Region Planning Scheme (MRC 2017) was considered when assessing the coastal unit for possible recreational and conservation based recommendations, including the risks recreation may pose to local wildlife and native vegetation. Environmental sustainability is prioritised in line with the Coastal Management Guidelines (MRC 2012), with consideration for providing a range of recreational opportunities in order to meet needs of the broader Midge Point and Mackay community. Council’s Recreational Open Space Strategy seeks to achieve recreational diversity and effective distribution of recreational areas, and to create an interactive interface between the environment and the community, and establish a network of open space areas accessible to everyone. This Local Coastal Plan seeks to align this policy, community needs and environmental conservation.

Midge Point is a low-density residential community, highly valued by locals and visitors for its diverse and rich fishing and boating opportunities. The long sandy beach at Midge Point Esplanade Park facilitates outdoor activities, where locals and visitors can enjoy the environment and its natural assets. A variety of birds can be observed along the beach and scenic views of islands can be admired from the headland. Locals and tourists enjoy Midge Point for its small town charm and its close proximity to the Great Barrier Reef Islands. The area encompasses diverse landscapes, including a sandy beach, rocky headlands and mangrove ecosystems, and its diverse recreational fishing opportunities are attractive to tourists and benefit local businesses.

Herb Winton Park (Figure 41) and Midge Point Esplanade Park (Figure 42, 43) are both local parks within the coastal unit. Herb Winton Park has the potential to become a popular recreational area (Figure 41). Currently, the park provides a picnic table and a drinking fountain. Installation of additional seating options and barbecue facilities similar to those located in Midge Point Esplanade Park will provide an opportunity for locals and visitors to enjoy the park setting with a view of the mangrove ecosystems and island. Nearby Open Space could be used for a basketball, netball or tennis court, providing further recreational opportunities. Natural recruitment of large shade trees within the park boundary should be encouraged. Post and rail fencing would assist vegetation regeneration, allowing adequate protection for young trees to mature. Weed control and infill planting would also assist vegetation establishment, and in doing so restore natural zonation, reduce wind speeds, increase natural shade and provide habitat for local fauna.

Installation of a boardwalk wetland trail with interpretive signage would enhance environmental education and active recreation opportunities in the area. Tourist accommodation (i.e. a caravan park), the local tavern, and a general store...
Figure 41: Herb Winton Park recreation and assets.

Figure 42: Midge Point Esplanade Park and Stan Camm Park recreation and assets.
add recreational value to the small community. Midge Point Esplanade Park provides beach vehicle access, a barbecue shelter, toilet, picnic tables, seats, a drinking fountain and a sign (both regulatory and informative) (Figure 42). Rehabilitation of the dune system including increasing the vegetated buffer strip is a priority along this Reserve. Recreational facilities including the amenities and tables will need to be moved landward and the Reserve fenced and vegetated in accordance with recommendations provided in the Midge Point Sediment Erosion Management Plan review (Alluvium 2017).

Stan Camm Park is a local park in close proximity to the Midge Point coastal unit and Midge Point Esplanade Park. Stan Camm Park provides a range of recreational opportunities, with infrastructure including: a playground and swing, a barbecue shelter, shaded picnic tables, seats, and a drinking fountain (Figure 43). An opportunity exists to improve connectivity between Stan Camm Park to Midge Point Esplanade Park through the establishment of a pathway network.

5.3 PUBLIC ACCESS

To prevent the degradation of dune systems and for public safety, it is important for users to stay on designated access tracks. Pedestrian and vehicle traffic displaces sand, and where it continually occurs, can lead to localised erosion. Recreational activities/facilities (i.e. walking tracks, picnic facilities etc.) where possible, should only be located outside of the erosion prone area and inside the landward dunal areas (DERM 2011b).

A post and rail fence should be installed along the Herb Winton Park reserve boundaries as should a vehicle access track to restrict access into the Reserve and estuarine wetlands. Disturbance to estuarine wetlands, sand dunes and coastal vegetation (e.g. driving, light aircraft landings and horse riding) contributes to sand compaction and limits vegetation recruitment and should be discouraged through post and rail fencing and signage (regulatory and informative). Car parking should be formalised within the park with post and rail fencing and signage. Installation of a boardwalk wetland trail leading from Herb Winton Park would provide a unique tourism destination for locals and visitors alike. Signage should be installed to communicate the significance of estuarine wetlands and highlight the purpose of the protective measures employed. Post and rail fencing should also be installed in an area further north (i.e. the new subdivision).

The headland is predominantly owned and managed by the State Government, with the exception of a small area of Freehold land to the north west and Reserve land that borders the State land (Figure 5). A boat ramp exists at the end of Jimmys Rock Road (Figure 44), as do several unofficial access tracks. Vehicle access via these tracks is facilitating green and general waste dumping which further reduces the condition of remnant vegetation through increased disturbance and the introduction of weed species. Formalising the boat ramp and creating a designated vehicle car park and picnic area with signage installed to highlight the significance of recreational fishing and marine activities in the Midge Point area may reduce vegetation damage, weed introduction and erosion and protect remnant vegetation. Council should survey the usage of this ramp in order to justify considerable investment into actions that improve this boat ramp. Additional recreational opportunities are limited in this area owing to its remote location. However, existing tracks could be transformed into bush walking trails providing yet another tourism opportunity. Installation of distance bollards or similar is recommended along bush walking tracks to discourage the creation of unofficial access tracks. This work would need to occur in partnership and with approval of the State Government.

Nine official beach access paths (MID001-MID009) and one unofficial access path (MID010) occur along Midge Point Reserve foreshore area (Figure 47). Activity is funnelled to official access points by post and rail fencing. Post and rail fencing continues to define the recreational area and direct pedestrians and vehicles to access points (Figure 45). It is however recommended that the fence be relocated landward to allow native plant recolonisation to provide for vegetation zonation and increase the buffer zone between residential properties and the ocean (Figure 46). Fence relocation should incorporate existing native mature trees and allow for existing juvenile recruits to assist vegetation regeneration. Access track MID010 is located in front of the caravan park. This beach access track should be formalised to mitigate irregular disturbance and reduce weed incursion. Creating a designated vehicle car park and picnic area with signage installed to highlight the significance of recreational fishing and marine activities in the Midge Point area may reduce vegetation damage, weed incursion and erosion and protect remnant vegetation.

5.4 SIGNAGE

Signage provides educational and interpretive opportunities for visitors and increases the value that locals place on the natural environment. Signs can highlight areas of high value, provide information about current projects and advise of site-specific restrictions or hazards. Beach access signage is present at the landward and seaward end of each beach access track throughout the coastal unit. It is recommended that signage be regularly audited and updated where required to ensure consistency and accuracy (Figure 48).

There is scope for the installation of new signage detailing the importance of coastal vegetation in reducing erosion. This would be best situated near revegetation sites to further dissuade its removal or destruction via education and awareness raising. Additional interpretive signs could be provided to educate visitors about dune health and function, important or unique native species and communities including marine turtles, and critically endangered beach scrub. Similarly, signage reflecting the cultural history of the area could enhance visitor experience and ensure that the importance of cultural heritage is reflected and appreciated by locals and visitors.
Figure 43: BBQ area at Midge Point Esplanade Park, including a mobile library parking area and toilet facilities.

Figure 44: Unofficial boat ramp at Midge Point’s headland.

Figure 45: Boat launching at MID007 at Midge Point Esplanade Park.

Figure 46: Fenced buffer zone at Midge Point Esplanade Park.
Figure 47: Midge Point beach access points and recreational areas
Figure 48: Beach access signage

Figure 49: Unauthorised access tracks from Jimmys Rock Road utilised to dump waste

Figure 50: Green waste such as lawn cuttings and coconut fronds accumulating throughout the Midge Point area

Figure 51: Unauthorised access tracks from Jimmys Rock Road utilised to dump waste

Figure 52: Waste dumped in remnant vegetation in the northern extent of Midge Point headland

Figure 53: An unofficial access track closed off on Midge Point headland
5.5 ECONOMIC VALUES

Beaches are important economic assets as well as natural resources, as they provide services to people and property that have an economic value, including reduced storm damage, together with recreational and tourism opportunities (Strong 2005).

The tourism industry is important for the Australian economy, comprising approximately three per cent of gross domestic product in 2014-15 (Productivity Commission 2015).

Australia’s tourism industry is dominated by the natural environment, with national parks and protected areas forming the basis of nature-based tourism experiences (Weaver et al. 1999). Beaches are the most popular coastal attractions for visitors, providing opportunities for a range of activities including bushwalking, whale watching and fishing (Clarke and Johnston 2017).

Beach visitors generate income for the local economy through their expenditure. Spending by tourists is a component of the economic activity across a variety of sectors including accommodation, cafes and restaurants, transport and storage, retail trade, cultural and recreational services and education (Pambudi et al. 2009). Income generated by the coastal tourism sector is highly dependent on the quality and extent of beach systems (Jones and Phillips 2007).

Ecotourism is a significant and growing sector of the tourism industry, and provides a way to reconcile tourism and conservation (Weaver 2001). By marketing natural values, ecotourism can maintain the aesthetic appeal of coastal tourist areas while deriving economic value, and simultaneously produce environmental benefits (Clarke and Johnson 2017).

Beach and dune environments are among the most valuable natural habitats on the coast, providing environmental services, landscape values and habitat for marine and terrestrial plants and animals which can serve to attract tourists as well as provide amenity for local residents (James 2000). The costs associated with recreational and tourist usage of beaches includes the cost of infrastructure provision and maintenance.

Beaches provide goods and services to many stakeholders, with a range of market and non-market values which can be worth millions of dollars per year. The way people value the natural environment however can vary. Value can be associated with direct uses, such as fisheries or tourism, as well as indirect uses, such as mangroves providing nursery habitat for juvenile fish species. Indirect uses are usually found outside the market place and are effectively unpriced. Determining the full value of a natural asset is challenging and often overlooked, however if no monetary value is placed on environmental goods and services there is a risk that they will be perceived as having no value (zero worth) and may be vulnerable to exploitation (Kirkpatrick 2011).

Coastal resources in the Mackay region are highly sought after for competing uses including residential, commercial, tourism and recreation. Effective management is required to ensure that the natural values and attributes of the coast are preserved while economic development and population growth are accommodated (EPA 2004).

Climate change is likely to have a range of direct and indirect economic impacts on recreation and tourism in coastal areas. Local and state governments will need to invest in natural assets to ensure the continuation of a strong tourism culture and investigate opportunities to diversify the tourism image for beach-focused destinations while balancing the value of natural coastal assets against trade-offs for other uses such as industry and development (Kirkpatrick 2011).

5.6 WASTE DUMPING AND LITTER

Green and general waste has both aesthetic, social and conservation repercussions. Litter and green waste reduce the visual appeal of beaches, present health threats to visitors (e.g. toxic waste, glass and sharps etc.) and compromise vegetation condition. Green waste, such as palm fronds and lawn cuttings smother large sections of ground cover vegetation throughout the coastal unit. Plastics and other general waste often wash out to sea, presenting dangers for marine wildlife including birds, fish, sharks, turtles and marine mammals. Marine debris may lead to drowning, or cause injury or death through entanglement and internal injuries, or from starvation following ingestion.

Green waste, general waste and marine debris were found throughout the coastal unit, particularly in the Midge Point headland on State Land and Esplanade tenure (Figure 49, 50, 51 and 52). Dumping of green waste and general waste was identified as an issue in the former Midge Point Beach Plan (MRC 2010) and track closure was recommended (Figure 53). Some tracks have been closed and as such have successfully prevented unregulated vehicle access and further waste dumping. Illegal disposal of green waste and general waste continues to occur along unofficial vehicle tracks leading from Conder Parade and Jimmys Rock Road. It is recommended that all unofficial tracks on the headland and into the estuarine wetland be closed.

General and green waste (e.g. tyres and lawn cuttings) are present at the northern end of Midge Point Esplanade Park and adjacent to the caravan park. General waste and green waste including palm fronds should be removed from the coastal unit.

Appropriate regulatory signage and a public education and awareness program on the values of coastal unit and impacts of waste dumping should complement other management actions.
Climate change is the term used to describe long-term changes in global weather patterns, and the gradual increase in mean global temperature. There is strong evidence that suggests that the gradual warming trend over the last fifty years has been driven largely by human activity, for example, the burning of fossil fuels, deforestation and intensification of agriculture (The Royal Society 2010). Climate change is having, and will continue to have, significant impacts on lives and ecosystems on which we depend.

Coastal areas are highly exposed to climate change with sea level rise being one of the greatest threats. The best known model relating shoreline retreat due to an increase in local sea level is that proposed by Per Bruun (1962) (Figure 54).

Projected sea level rise (0.8 m by 2100) is expected to increase erosion and damage property and infrastructure (DERM 2011b) (Figure 26). The response of Australian coastal ecosystems and landforms to climate change will vary, but most are expected to involve shoreline recession, vertical accretion of sand, increased saline inundation of wetlands, and the modification and southward shift of habitat (Australian Government 2013). Additionally, many intertidal ecosystems such as mangroves, seagrass and tidal flat communities will decline.

Key climate change messages for the wet tropics Natural Resource Management cluster, that encompasses the Mackay region, are displayed in Figure 55 (Abbs, D. et al. 2015). Current predictions suggest that much of the dune system will be inundated by 2100 (Queensland Government 2011). Maintaining and improving the condition of a buffer area of coastal vegetation, where possible, will provide the best opportunity to build resilience into these ecosystems to cope with changes into the future. The Draft Mackay, Whitsunday and Isaac Climate Sustainability Plan 2016-2020 contains forecasts local to the Mackay region.

Figure 54 also highlights other key changes associated with Climate Change, such as increased temperatures and more severe tropical storms.

The presence of a buffer zone and natural vegetation zoning along much of the Midge Point coastal unit coastline means it is well placed to withstand the effects of climate change. However, erosion is evident along an approximately one-kilometre stretch of sandy beach (Zone C), and will likely be further impacted by the predicted effects of climate change. Sand nourishment and the establishment of a buried geobag wall have been recommended as a way to replenish the beach (Alluvium 2017).

In order to protect the tidal flat communities that extend around much of the coastal unit, adjacent land should remain free of development and infrastructure to allow for migration of these communities as sea level changes occur. These are highly sensitive areas that should be fenced to restrict vehicle and pedestrian access. Sea level rise will also likely cause the spread of Yard Creek into the swales of the Midge Point Reserve coastal unit (C & R Consulting 2013). The influx of water from the creeks at Midge Point adds an additional consideration to the rising sea levels when determining options for protecting or retreating from rising waters.

Retreat is likely to be required in the longer term in some places. Rising sea levels will also see the loss of habitats such as sand dunes that are not provided space to retreat landward. This will be the case for most of the coastal unit. The loss of this important habitat may have impacts on local turtles, birds and other flora and fauna.

The challenge for future planning will be to identify suitable ecological retreat zones for our developed sections of coastlines, informed by geomorphic processes, to accommodate for climate change processes and preserve unique habitat in specific geographic regions. For example, it may be important to limit development around estuary areas and coastal wetlands and waterways, in order to preserve a zone to accommodate ecological retreat. Adaptation planning is recommended to ensure that this is comprehensively considered to mitigate risk to social and environmental values in the area.

Residents of the coast are already familiar with the risks of living close to the ocean, such as storm surges, cyclones and erosion. However, the intensity of these threats is expected to increase with a warming global climate, so it is important to understand and prepare for this. Reducing environmental pressures will increase the resilience of coastal ecosystems, thereby increasing the likelihood of their persistence into the future.
KEY MESSAGES FOR THE WET TROPICS

- Average temperature will continue to increase in all seasons.
- More hot days and warm spells.
- Changes to rainfall possible but unclear.
- Increased intensity of extreme daily rainfall events.
- Mean sea level will continue to rise. Height of extreme sea-level events will also increase.
- Fewer but more intense tropical cyclones.
- On annual and decadal basis, natural variability in the climate system can act to either mask or enhance any long-term human induced trend, particularly in the next 20 years and for rainfall.

Figure 55: Key climate change messages for the wet tropics Natural Resource Management (NRM) cluster (Source: Abbs, D. et al., 2015).
# 7 Recommended Activities

<table>
<thead>
<tr>
<th>RECOMMENDED ACTIVITIES</th>
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<tbody>
<tr>
<td>**Zone A</td>
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<tr>
<td><strong>1</strong> Vegetation management</td>
</tr>
<tr>
<td>1.1 Control major target weed species including castor oil plant, Guinea grass, lantana, mile a minute, prickly pear and thatch grass.</td>
</tr>
<tr>
<td>1.2 Supplement removed weed species with native vegetation, particularly along the frontal dune.</td>
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<tr>
<td>1.3 Rehabilitate cleared areas and bare patches such as illegal access tracks or mown areas.</td>
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<tr>
<td>1.4 Control weeds on and around beach access tracks including highly dispersive weeds such as cobbler’s peg and Seaforth burr.</td>
</tr>
<tr>
<td>1.5 Monitor and where suitable, manage other problematic weed species including, but not limited to: annual stylo, black nightshade, Brazilian nightshade, centro, Chinese burr, cobbler’s peg, common guava, corky passionflower, couch, devil’s fig, leucaena, pink periwinkle, snake weed, stinking passionfruit, tridax daisy and siratro.</td>
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<tr>
<td><strong>2</strong> Recreational opportunities</td>
</tr>
<tr>
<td>2.1 Consider additional recreational opportunities at Herb Winton Park such as a playground or sports court, more tables and a barbecue area.</td>
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<tr>
<td>2.2 Consider installing a boardwalk wetland trail from Herb Winton Park through the mangroves and salt flats.</td>
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<td>2.3 Install interpretive signage where appropriate to highlight biodiversity values.</td>
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<tr>
<td><strong>3</strong> Access management</td>
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<tr>
<td>3.1 Install post and rail fencing to clearly define areas for conservation and recreational purposes at Herb Winton Park and at the subdivision.</td>
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<tr>
<td>3.2 Fencing to delineate a car parking area at Herb Winton Park.</td>
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<tr>
<td><strong>4</strong> Waste management</td>
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<tr>
<td>3.1 Remove waste and regulate hot spot locations with signage.</td>
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<tr>
<td>**Zone B</td>
</tr>
<tr>
<td><strong>5</strong> Vegetation management</td>
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<tr>
<td>5.1 Control major target weed species including coconut, Guinea grass, lantana, leucaena, prickly pear and thatch grass.</td>
</tr>
<tr>
<td>5.2 Supplement removed weed species with native vegetation, particularly along the frontal dune.</td>
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<tr>
<td>5.3 Rehabilitate cleared areas and bare patches such as illegal access tracks.</td>
</tr>
<tr>
<td>5.4 Control weeds on and around beach access tracks including highly dispersive weeds such as cobbler’s peg and Seaforth burr.</td>
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<td>5.5 Monitor and where suitable, manage other problematic weed species including, but not limited to: annual stylo, black nightshade, Brazilian nightshade, centro, Chinese burr, cobbler’s peg, common guava, corky passionflower, couch, devil’s fig, leucaena, pink periwinkle, snake weed, stinking passionfruit, tridax daisy and siratro.</td>
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<tr>
<td><strong>6</strong> Recreational opportunities</td>
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<tr>
<td>6.1 Investigate opportunities to create a bush walking trail network in this area.</td>
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<tr>
<td>6.2 Investigate the upgrade and formalisation of the boat ramp with associated car parking.</td>
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<tr>
<td><strong>7</strong> Access management</td>
</tr>
<tr>
<td>7.1 Fencing (either star picket and wire or post and rail) on both sides of Jimmys Rock Road to define the Road Reserve, and to prevent unauthorised access into the nearby estuarine wetland, State land and Reserve land.</td>
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</table>
### Table 2: Recommended activities for the Midge Point Local Coastal Plan

#### Waste management

8.1 Remove waste and regulate hot spot locations with signage.

#### Zone C | Midge Point Esplanade Park (6 ha)

#### Vegetation management

9.1 Control major target weed species including century plant, coconut palms, Easter cassia, Guinea grass, prickly pear, leucaena, lantana, prickly pear and Singapore daisy.

9.2 Supplement removed weed species with coastal vegetation, particularly along the frontal dune.

9.3 Rehabilitate cleared areas and bare patches such as illegal access tracks or mown areas.

9.4 Control weeds on and around beach access tracks including highly dispersive weds such as cobbler’s peg and Seaforth burr.

9.5 Monitor and where suitable, manage other problematic weed species including, but not limited to: annual stylo, black nightshade, Brazilian nightshade, centro, Chinese burr, cobbler’s peg, common guava, corky passionflower, couch, devil’s fig, leucaena, pink periwinkle, snakeweed, stinking passionfruit, tridax daisy and siratro.

#### Recreational opportunities

10.1 Consider a pathway linkage between Midge Point Esplanade Park and Stan Camm Park to improve connectivity of recreational areas in Midge Point.

#### Access management

11.1 Offset fencing landward, where practicable, to allow dune growth and to increase the vegetated buffer in the area. Liaise with residents regarding an appropriate alignment before moving the fence. Incorporate a designated parking area for visitors and the mobile library.

11.2 Install post and rail fencing to clearly define areas for conservation and recreational purposes in front of the caravan park in the south to prevent encroachment of the mown areas further into the Reserve.

11.3 Formalise the beach access track MID010 in front of the caravan park.

11.4 Investigate formalisation of vehicle access track MID005 and MID007 in line with the 2017 SEMP design requirements.

11.5 Remove private Infrastructure such as seating and boats parked on the beach.

#### Dune rehabilitation

12.1 Implement dune rehabilitation strategies to improve the retention of sand along Midge Point Esplanade Park beach in line with the recommendations of the 2017 SEMP review, including building a geobag revetment wall.

12.2 Consider using sediment trapping fencing in restoration area to reduce wind-blown sand and assist with sand retention.

#### Other activities across multiple zones

13 **Cultural Heritage**

13.1 Engage Traditional Owners to undertake cultural heritage surveys of the area to outline clear management objectives for the preservation cultural heritage within the coastal unit.

#### Signage

14.1 Audit all beach access signs across the unit and update or install:

- Signage at the landward end of each beach access point that clearly identifies the beach access number, restricted activities, hazards present and provides information on the appropriate first aid treatment for marine stingers.

- Beach access numbering signage at the seaward end of each beach access point.

14.2 Install pathway linkage signage that describes pathway routes and beach access tracks and include measured walking distances where appropriate.

14.3 Accompany rehabilitation areas with signage (both regulatory and informative).
<table>
<thead>
<tr>
<th>15</th>
<th>Waste management</th>
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<tbody>
<tr>
<td>15.1</td>
<td>Inform residents of appropriate waste disposal methods. Follow up with education, regulation and enforcement activities.</td>
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<tr>
<td>15.2</td>
<td>Educate the community on the impacts of waste on native vegetation, dune health, and wildlife.</td>
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<tr>
<th>16</th>
<th>Tourism</th>
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<tr>
<td>16.1</td>
<td>Investigate opportunities for increased tourism visitation to the beach and area.</td>
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<tr>
<th>17</th>
<th>Education</th>
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<tbody>
<tr>
<td>17.1</td>
<td>Partner with Coastcare and others to deliver education programs about:</td>
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<tr>
<td></td>
<td>* Local weed species and the use of local native species in residential gardens.</td>
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<td></td>
<td>* Garden waste and general waste disposal.</td>
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<td></td>
<td>* Responsible pet ownership and how to protect native wildlife i.e. impacts of illegal fires, domestic animals etc.</td>
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<tr>
<th>18</th>
<th>Monitoring</th>
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<tr>
<td>18.1</td>
<td>Undertake beach profile monitoring and monitor sea level rise to guide future coastal planning and works.</td>
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<td>18.2</td>
<td>Consider a regional study on the long-term sediment (sand) supply for the Mackay coastline.</td>
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<tr>
<td>18.3</td>
<td>Monitor, or in partnership with others, assist with the monitoring of shorebirds and turtles.</td>
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<tr>
<th>19</th>
<th>Climate change</th>
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<tr>
<td>19.1</td>
<td>Consider how to manage future predicted reduction in coastal land to retain buffer above the high tide mark (e.g. rolling boundaries).</td>
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<tr>
<td>19.2</td>
<td>Review existing revegetation list to ensure that species reflect diversity of all Regional Ecosystems present in coastal unit and in preparation for future predicted climates.</td>
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<th>20</th>
<th>Legislation and local laws</th>
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<tbody>
<tr>
<td>20.1</td>
<td>Use available legislation to protect existing native vegetation on Esplanade and Reserve tenure as required.</td>
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<tr>
<td>20.2</td>
<td>Using existing laws, undertake enforcements and compliance activities across the area, particularly relating to unrestrained dogs and motor vehicles in park and beach areas.</td>
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<tr>
<td>20.3</td>
<td>Review and update this document in line with changing legislation.</td>
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<th>21</th>
<th>Community involvement</th>
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<tr>
<td>21.1</td>
<td>Provide opportunities for community members to be involved in coastal management activities at formal Coastcare events.</td>
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<tr>
<th>22</th>
<th>Enhancement of surrounding areas</th>
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<tbody>
<tr>
<td>22.1</td>
<td>Implement a tree succession plan across the length of the coastal unit.</td>
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<tr>
<td>22.2</td>
<td>Implement a roadside vegetation program to increase the amount of street trees along roads.</td>
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<th>23</th>
<th>Access management</th>
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<tr>
<td>23.1</td>
<td>Install regulatory signage to protect shorebird and potential marine turtle populations.</td>
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<tr>
<td>23.2</td>
<td>Consider pathway linkages in neighbouring areas to improve connectivity between parks and reserves including Stan Camm Park and Midge Point Esplanade Park.</td>
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<th>24</th>
<th>Vegetation maintenance</th>
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<tr>
<td>24.1</td>
<td>Continue to protect and enhance vegetated dune systems.</td>
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8 Implementation and review

The challenge for future planning will be to identify suitable ecological retreat zones for our developed sections of coastlines, informed by geomorphic setting and processes, to accommodate for climate change processes and preserve unique habitat in specific geographic regions. For example, it may be important to limit development around estuary areas and coastal wetlands and waterways, in order to preserve a zone to accommodate ecological retreat. Adaptation planning is recommended to ensure that this is comprehensively considered to mitigate risk to social and environmental values in the area.

Residents of the coast are already familiar with the risks of living close to the ocean, such as storm surges, cyclones and erosion. However, the intensity of these threats is expected to increase with a warming global climate, so it is important to understand and prepare for this. Reducing environmental pressures will increase the resilience of coastal ecosystems, thereby increasing the likelihood of their persistence into the future.

The implementation of the *Midge Point Local Coastal Plan* will occur on a prioritised basis as resources become available.

In addition to Council’s Natural Environmental staff and Natural Environment Levy funding, multiple external funding and resources to assist in the implementation of the Local Coast Plan exist. These include:

- Federal Government grant opportunities.
- State Government grant opportunities.
- Corporate grant opportunities.
- Regional Natural Resource Management (NRM) group (Reef Catchments Mackay Whitsunday Isaac) partnerships.
- Specialist organisations with interest in the Reserve (such as the Mackay and District Turtle Watch Association, Birdlife Mackay, and Queensland Wader Study Group).
- Local community groups.
- Local community volunteers as part of the Coastcare program.

A formal review of the *Midge Point Local Coastal Plan* should take place every five years as feasible. However, Council may seek to update the Plan at any stage based on the results of monitoring programs, and in line with further protecting the natural environment values of the area.
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The Clarke Connors Range Bushfire Management Guidelines

The Clarke Connors Range Bushfire Management Guidelines is a Reef Catchments initiative with funding support from the Australian Governments Caring for Our Country and Queensland Governments Blueprint for the Bush.
Introduction

Reef Catchments and the Clarke Connors Range Bushfire Consortium

Reef Catchments is a community-based, not-for-profit organization that has a proven track record in advancing natural resource management in the Mackay-Whitsunday Region. Reef Catchments works seamlessly across the private and all levels of the public sectors to deliver the results where they matter. For more information and contact details visit the website www.reefcatchments.com.au

The Bushfire Consortium was formed to begin reducing the threat of inappropriate fire on the outstanding natural and economic values of the Clarke-Connors Range on the Central Queensland coast. This area experiences an extremely variable climate and satellite imaging illustrates that numerous large and intense dry season wildfires have occurred over the last 10 years. The concern is that a drier and hotter climate may further increase the incidence of these fires with consequent environmental and economic impacts. Rural communities recognise the magnitude of these fires, and their effects on life, property, productivity, and the environment. However, the wider community has not had access to good information on appropriate fire management practices until now.

Reef Catchments, in partnership with Volunteer Rural Fire Brigades, Government and non-Government landholders, and the Queensland Fire and Rescue Service, has taken up the challenge of providing the best information available on fire management and planning in the region. These Fire Management Guidelines are the culmination of extensive discussions with experienced members of Volunteer Rural Fire Brigades and other respected fire managers and fire scientists.

These Guidelines are one of the products of the Bushfire Consortium and are intended to be used by Volunteer Rural Fire Brigades and landholders who are on the frontline in managing fire in rural communities. They are intended to be used to help land managers plan hazard reduction burning, and in undertaking planned burns for improved production and conservation outcomes.

Using these guidelines

These Fire Management Guidelines have been developed for 12 landscape types in the Mackay-Whitsunday region. These landscape types are composed of vegetation types that require similar fire prescriptions.

Four important factors to consider when planning for fire management are:
1. Fire Frequency - how often should an area be burnt.
2. Fire Intensity - how hot does the fire need to be.
3. Season - what time of year will usually provide the desired conditions for a planned burn.
4. Burning mosaic - the percentage of ground cover remaining unburnt after a fire.

Other important factors to consider are fuel loads, wind speed, humidity, fuel curing, slope and aspect.

These guidelines are not intended to account for all circumstances. Seasonal, yearly and even daily conditions can vary dramatically. Plan ahead to carry out burns when conditions are suitable and always obtain and adhere to conditions of a permit from your fire warden.

Green - Under most circumstances the number of years between burns should fall within the GREEN range. This range is generally considered appropriate for fire hazard management, production and conservation outcomes.

Orange - Under some circumstances there may be a need for more or less frequent fire but this should fall within the ORANGE range. Generally, this would occur as a 'one off' e.g. two fires in 3 years to reduce a lantana infestation.

Red - Generally, it would be considered undesirable for fire frequency to fall within the RED range. For example these long periods of time between fires would result in undesired vegetation thickening and loss of pasture productivity.

Note. Defining frequency by 'Years' can be misleading e.g. in times of drought or particularly high rainfall. Some fire managers prefer using 'average years. (defined by having received +/- 20% of the local average annual rainfall by May).

Green - Under most circumstances the desired conditions will be available within the GREEN range of months.

Orange - Desired fire conditions will sometimes fall within the ORANGE range of months and/or the specific requirements for a particular burn will differ in a particular circumstance e.g. Storm burning requires relatively high soil moisture.

Red - Under most circumstances, conditions within the RED range of months would result in damaging fire and/or fire that is difficult to control.

Patchy fuels produced by mosaic burns can be very effective in reducing the intensity and spread of wildfire without risking the complete loss of pasture grasses, loss of soil and nutrients, weed infestations or environmental damage that sometimes result from complete removal of the ground layer from large areas.

Different fire intensities perform different land management tasks as described within the guidelines:
LOW intensity fire is < 1 m in height.
MODERATE intensity fire is < 2 m in height.
HIGH intensity fire is > 2 m in height.
Mangroves and Estuarine Wetlands

Mangroves, saltmarsh, saltwater couch, areas of saltpan and fringing melaleuca forests and pandanus.

BURNING IS GENERALLY NOT RECOMMENDED IN THIS LANDSCAPE
Hazard Reduction
Saltmarsh and saltwater couch grasslands are regularly inundated by high tides which maintain high soil moisture and ensure continual green growth throughout the year. Because of this these areas rarely represent a fire hazard risk. Risk is further minimised by the fact that the grasslands rarely accumulate large amounts of fuels and tend to be broken up by patches of saline clay and sparse saltmarsh.

The native ground cover within fringing melaleuca woodland and forests is also saltwater couch and this does not represent a high fire hazard. However, in many areas Guinea grass and other exotic grasses have invaded and these can accumulate high fuel loads that pose a fire risk in the dry season. Guinea grass and many other exotic grasses tend to quickly increase their biomass after fire, often reaching a similar fuel load in as little as one season. The most effective long-term fire hazard reduction strategy is to remove these grasses using herbicide such as glyphosate.

Production
Because of high salt levels in the soil, weed infestations are rarely a problem in saltwater couch grasslands and burning for weed control does not need to be undertaken. Saltwater couch is a perennial grass and pasture condition is strongly dependant on normal tidal cycles. Fire does not improve productivity and indeed, fire can lead to loss of important nutrients. Saltmarsh and saltwater couch grasslands are an important food source, and refuge for juvenile fish. There is strong evidence that juvenile fish feed heavily in these areas on high tides. A decrease in biomass through removal by fire, or overgrazing, may have a significant impact on coastal fisheries production.

Conservation
Apart from their values to coastal fisheries, mangroves, saltmarsh and saltwater couch grasslands provide essential habitat for a range of conservation dependant species. Minimising fire and other disturbance within these areas provides significant positive benefits for migratory and resident shorebirds, seabirds and the threatened mangrove mouse.
Beaches and foreshores

Coastal she-oak & beach scrub (rainforest) in protected areas.

This landscape is extremely fire sensitive - no burning.
Hazard Reduction
Coast she-oak and beach scrub habitats are fire sensitive and will be killed or severely degraded by even low intensity fire.

The native ground cover within beach scrubs and coastal foreshores does not accumulate large amounts of fuel and does not represent a high fire hazard. However, infestations of exotic grasses and weeds can significantly increase hazardous fuels, especially along disturbed edges of this landscape.

Hazard reduction burning is generally not suitable in coastal areas as Guinea grass and other fire loving grasses quickly increase their biomass after fire, often reaching a similar fuel load in as little as one season.

An effective long-term strategy is the use of registered herbicide to reduce fuel hazards where required. Apply when grasses are actively growing, preferably prior to dry season.

Production
Many remaining areas of beach scrub are islands in a sea of cleared land, and much remaining foreshore vegetation is the only buffer between the land and the sea.

Undisturbed foreshores and beach scrubs are fairly resistant to weed invasions, however smaller patches and disturbed areas are more prone to weed invasions and associated fire risk.

Disturbance caused by stock trampling and the presence of feral pigs can encourage spread of lantana and other weeds into otherwise intact areas. Management of stock access and provision of shade and watering points away from beach scrub and foreshores will reduce the impacts of disturbance in the long term.

Reducing weed impacts by means other than fire around buffers and in degraded areas will protect, and facilitate recovery of, these sensitive coastal areas.

Conservation
Fire is a key threat to remaining areas of beach scrub (rainforest on sand dunes) - a critically endangered ecological community under the National Environment Protection and Biodiversity Conservation Act (1999). Beach scrubs and foreshores are key habitats for many rare and threatened plants and animals and migratory birds. Foreshores are breeding sites for marine turtles and shorebirds such as the beach stone-curlew (pictured above).

Disturbance of these habitats, commonly due to arson; clearing/mowing of undergrowth; stock trampling; 4WD and pedestrian tracks, leads to weed invasions and increased fire risk. Wood management, rather than fire management, should be used to protect and rehabilitate remaining areas.

Very careful use of fire in adjacent fire prone landscapes is required; check that these is little to no scorch into beach scrubs and foreshores as an indicator of successful fire management.
Mixed vegetation on hind dunes (behind main beach and foreshore areas) including; Moreton Bay ash, acacia, coastal banksia, paperbarks, bloodwoods, black she-oak, peppermint and stringy barks & grasslands on sand dunes.
Hazard Reduction
Burning is not generally recommended in coastal dune systems and adjacent buffer zone unless for rehabilitation or protection purposes in special circumstances.

Exotic grass infestations such as Guinea grass are common along the edges of coastal dune vegetation. Many introduced grass are favoured by disturbance and rapidly re-grow after fire, often accumulating similar fuel loads in as little as one season.

Landowners in some built up areas may desire protection burning to reduce hazards. Fire should only be used to gain initial control of weedy areas as part of a long term weed management strategy. Burn with low intensity fire; ensure good soil moisture is present (e.g. after 50mm of rain) no more than once every 3-5 years. Avoid regular or repeated burning and do not burn in dry conditions when risk is high.

Management of exotic grasses and other weeds is best achieved by using a registered herbicide when the plant is actively growing. Guinea grass is easily killed after fire with minimal herbicide use.

Production
Clearing and introduction of exotic pasture species coupled with impacts of stock can severely impact on fragile dune systems. Exotic species can out-compete natives in disturbed areas and alter natural fire regimes.

Open dune grasslands supporting native grasses such as black spear grass would tolerate a low intensity fire every 3-7 years. Planned burns should only be conducted when rapid regeneration of the grassy layer is expected; burn with good soil moisture and where there’s a good chance of follow up rain. Avoid regular or repeated burning as loss of groundcover and soil nutrients will encourage weeds and less favourable grasses.

Disturbance of ground layer leads to weed invasions and loss of native grasses. Minimise disturbance from stock trampling and manage weeds using other methods than fire.

Conservation
Lack of knowledge of this ecosystem and its need for fire is a major obstacle to effective fire management. In general, fire should only be applied for regeneration of native grasses and canopy trees and responses carefully monitored.

Fire management could be trialled in areas supporting a native grass ground layer. A low intensity fire no more than once every 3-7 years with good soil moisture is advised. Indicators of successful fire management include: germination of canopy tree species; maintaining native grass density; fauna abundance; and reducing exotic grass dominance.

Many areas supporting beach scrub pioneer species in the understorey will naturally revert to beach scrub, actively exclude fire from these areas.

Coastal landscapes support a diverse range of plants and animals and their habitats are vulnerable to disturbance. Reducing disturbance and managing weeds rather than fire will protect coastal habitats and wildlife such as the orange footed scrub fowl (pictured above).
Eucalypt forest and woodlands on hill slopes, ranges and ridges

Variable woodlands to open forests of ironbark, Moreton Bay ash, bloodwoods, poplar gum, blue gum, yellow stringybark, brushbox, white mahogany, lemon scented gum, depending on altitude and exposure.
Hazard Reduction
Fire intensity, and therefore risk, increases as the dry season progresses when fuel and soil moisture is low. Conversely, fires in the early dry and wet seasons are usually of lower intensity and more patchy.

Guinea grass and other fire-favoured introduced grasses rapidly colonise burned or otherwise disturbed areas, often reaching very high fuel loads in as little as one season. Because of its superior adaptation to fire, guinea grass will out-compete native and desirable species if burnt too regularly or in dry conditions, and spread into new sites.

To reduce the severity of wildfires and the threat they pose to life and property:

- Coordinate controlled burns with neighbours to manage fuel hazards and maintain a mosaic of different ages of vegetation in the landscape;
- Aim to burn 20–40% of a patch or property in a year. Remaining grassy patches can be re-ripped or sprayed in protection zones post-fire;
- Vary the timing and frequency of burning & burn with good soil moisture. Burning is generally not advised between September & December unless after rain with a high chance of follow up rain;
- Observe response of vegetation and fuel load accumulation and adapt management if needed;
- Construct and maintain strategic fire breaks in populated areas or “hot spots”, potentially across several properties.

Production
Burning season and years between burns will vary depending on seasonal climatic conditions, grazing pressure, the type of eucalypt community and whether there has been a grassy or denser shrub understory. Varying the season, intensity and area burnt will create a mosaic of habitats; whereas too frequent fire (annual or every second year) reduces understory and has serious impacts on soil health and long term sustainability.

A fire after 50mm or more of rain (or first storms) every 3 to 5 years (longer in dryer and/or steeper and/or heavily grazed country) will maintain a good balance of trees and grass. A dense shrub layer or thicker regrowth may increase with longer intervals.

For effective control of woody regrowth and dense shrub layer the undergrowth, fuel loads of at least 1,500 kg/ha are required. Trees and shrubs below approximately 2m high will be suppressed with a moderate intensity fire; however control of regrowth greater than 2m will be difficult as greater fuel loads are required and most eucalypts will re-sprout after fire.

Care must be taken to protect adjacent rainforest and creek edges from hot fires. Igniting along rainforest edges and allowing fire to burn downhill will reduce intensity and resulting damage to fine sensitive vegetation.

Country may need to be de-stocked prior to a burn to allow fuels to accumulate. Wet season spelling after fire will promote native grasses and diversity in ground cover.

Conservation
Planned burning in this landscape should aim to promote patchy fires to ensure a mosaic of different vegetation types and time since fire across the landscape. Rangelands are prone to widespread intense fires in the dry season which is a key threat to biodiversity.

Fire too regularly leads to a loss of vegetation cover and directly threatens yellow-bellied glider, rufous owl and glossy black cockatoo habitat and the mature-hollow bearing eucalypts they depend on. Rocky outcrops in the forest are essential habitat for the endangered northern quoll. Do not burn between mid-September and mid-December when juvenile quolls are most vulnerable to fire.

In potential or known quoll habitat, small scale patch burns of 17ha or less are best - burn with good soil moisture or just after the wet season when the ground, leaf litter & vegetation are still very wet. Burn around every 3-7 years and leave some areas unburnt for 7 years or longer, especially in years after a hot fire has occurred. Controlling weeds (especially lantana), woody regrowth and rainforest invasion is a major focus of planned burning in most areas. Dense areas of lantana may require well planned hotter fires to reduce infestations. Frost or herbicide spray before a burn can cure fuels and give better control.
Island and rocky headland landscapes

Grassy headlands to acacia and brushbox and ironbark forest-shrubland, blue gum and poplar gum woodlands (including hybrids), Moreton Bay ash and blue gum woodland with a dense understorey of vine forest species.
**Hazard Reduction**

Island woodlands and coastal headlands can be infested with introduced grasses and lantana which promote hotter fire are rapidly regrow after fire. In general, it is the more disturbed areas impacted by weeds. Disturbance can be from repeated fires in the past.

Control of weeds and exotic grasses by means other than fire may be preferred in areas surrounding campgrounds, island leases and picnic areas.

Where hazard reduction burning is required, fuel loads of 1500kg/ha are adequate to ensure fire intensity is low to moderate. Greater fuel loads will increase fire intensity and the chance of fire spreading.

On the mainland, four wheel drive tracks and other areas of high visitation are a conduit for introducing weeds which can pose a fire risk to surrounding areas.

**Conservation**

Some areas of open grassland are being invaded by woodland or vine forest pioneers whilst other areas remain as open grasslands. Research is needed to determine the role of fire in maintaining vegetation types to determine optimum fire regimes.

Dense thickets of swizzle bush (Tinomius timon) are replacing grasslands in some areas. Swizzle bush flowers and fruits between July & November, and could be set back if burnt at during this time. Hotter fires may be needed to reduce woody vegetation and maintain an open canopy, requiring fuel loads of 2000-3000 kg/ha.

Maintain extent and area of grasslands, where they remain by trialling burning every 2-3 years with a low-moderate intensity fire; retain at least 50% unburnt. Monitor vegetation and adapt management depending on response to fire regime.

Lantana can be managed by fire in the same way as other woody vegetation. Suitable fuel loads must be available, between 2000-3000 kg/ha, to reduce infestations. Slow burning moderate intensity fire can suppress lantana as it damages the root and lower stem zone.
Appendix 2: Regional Ecosystem (RE) descriptions as found on Council managed land within the coastal unit

**RE 8.1.1** is well established in the tidal flats of Yard Creek and dominates the northern section of Midge Point, including a vast distribution around the headland. This mangrove vegetation covers the largest area of remnant vegetation within the Midge Point area is exposed to inappropriate vehicle and boat access, marine debris, disturbance due to alteration of adjacent ecosystems (e.g. clearing up to the back of the mangroves at Herb Winton Park) and stormwater runoff. Recreation activities such as fishing/crabbing also influence the health of this ecosystem. While offshore vegetation is not within Council land tenure, it is important to consider the influence of onshore activities. Appropriate management of recreational access and improved stormwater management practices will assist in protecting these offshore ecosystems. Interpretive signage would assist in the prevention of illegal waste dumping experienced in the mangrove vegetation. Generally, this ecosystem is resilient to weed incurrence due to its saline growing conditions however lantana (*Lantana camara*) occasionally encroaches in less saline areas. Depending on their position in relation to tidal channels and the amount of freshwater received, the mangroves can form a variety of different compositional communities. The seaward edge **RE 8.1.1 Rhizophora** species dominate, whereas white mangrove (*Avicennia marina*), blind your eye mangrove (*Excoecaria agallocha*), puzzle nut mangrove (*Xylocarpus moluccensis*), black mangrove (*Lumnitzera racemosa*), yellow mangrove (*Ceriops species*), myrtle mangrove (*Osbornia octodonta*) and other predominant species (*Bruguiera* and *Rhizophora* species) are more likely to occur on the landward side. Mangrove communities are vital breeding grounds for a diverse range of species including invertebrates, crockodiles and reef fish species and are therefore both culturally and biotically significant ecosystems. Fire Management Guidelines for Regional Ecosystems within the Midge Point Coastal unit area can be found within the Clarke Connors Ranges Fire Management Guidelines (Reef Catchments 2014). Mangroves are highly fire sensitive and therefore can be put at risk when flammable vegetation such as woodlands and forests of *Melaleuca* spp. or areas with grassy weed infestations are present in adjacent areas.

**RE 8.1.2** describes samphire open forbland on salt pans and plains adjacent to mangroves and is characterized by succulent saline-adapted herbaceous species such as sea purslane (*Sesuvium portulacastrum*), glasswort species (*Tecticornia spp.*, and *Sarcocornia spp.*), seablite (*Suaeda australis*), marine couch (*Sporobolus virginicus*), and sedge species (*Cyperus spp.*, and *Fimbristylis spp.*) that inhabit intertidal mud flats. **RE 8.1.2** has co-colonised the mangrove system associated with Yard Creek and the large wetland to the west of Midge Point headland. Pockets of this vegetation occur throughout the plains adjacent to mangroves within the coastal unit, **RE 8.1.2** and (RE 8.1.1) occur on soils consisting of marine sediments. Soil salinity is a principal driver of zonation within estuarine systems. Salt accumulates at the soil surface as a result of evaporation, however is reclaimed during high tides or flooding events. Changes in surface topography as result of unofficial vehicle access can encourage accumulation of salts and increase soil salinity. Continued, this process can lead to very high soil salinities, which discourages establishment of salt marsh plants. The diminished health of RE 8.1.1 and can impact coastal fisheries production, through loss of habitat and food sources (Reef Catchments 2009). Appropriate management of recreational access will assist in protecting **RE 8.1.2** and its associated offshore ecosystems.

**RE 8.1.3** remnants only occur in a small isolated pocket in the tidal flats adjacent to the Bloomsbury Midge Point Road and Conder Parade intersection. **RE 8.1.3** can be distinguished from all other vegetation communities by the clear dominance of salt couch (*Sporobolus virginicus*) and is often only inundated by highest spring tides and dissected by small tidal channels. It occurs on narrow belts between mangroves and alluvial communities formed from Quaternary estuarine sediments. Although relatively resistant to weed invasion, some pests are able to establish, particularly couch (*Cynodon dactylon*), rat’s tail grass (*Sporobolus jacquemontii*), Guinea grass (*Megathyrsus maximus*), Caesar weed (*Urena lobata*), prickly pear (*Opuntia stricta*) and fleabane (*Conyza spp.*). Fires threaten habitat used by the mangrove mouse (*Xeromys myoides*), which utilises the grassy habitat as a refuge from predators such as owls and the tawny frogmouth (*Pogargus strigoides*). Fire can degrade habitat values including removal of food items for wader birds and other bird species (EPA 2004).
RE 8.2.1 describes Casuarina equisetfolia woodland and/or sparse herbland to open scrub on foredunes and beaches. It can be distinguished from all other regional ecosystems as it is predominantly distributed along the foredunes and typically comprise of species such as coastal sheoak (Casuarina equisetfolia) subsp. Incana) and ground cover species such as beach spinifex (Spinifex sericeus), beach bean (Canavalia rosea), goats foot (Ipomoea pes-caprae) and birds beak grass (Thuraea involuta). Common species in the canopy or lower tree and shrub layers include: tulip tree (Thespesia populnea), silver bean (Sophora tomentosa), beach pandan (Pandanus tectorius), beach hibiscus (Hibiscus tilicatus), soap tree (Alphitonia excelsa), flintwood (Geijera salicifolia) and gray nicker nut (Caesalpinia bonduc). Shrub layers often include: coastal vitex (Vitex trifolia), coastal lollybush (Clerodendrum inerme), tuckeroo (Clerodendrum anacardioides), forest indigo (Indigofera pratensis), beach berry bush (Colubrina asiatica), and octopus bush (Argusia argentea). Vegetation within this community is usually zoned according to tidal inundation/exposure with the herbaceous communities closest to the sea and the open forest to woodland communities furthest landward. RE 8.2.1 is located along the eastern beach of Midge Point’s headland, where it co-colonises the area with RE 8.2.2 (critically endangered beach scrub). Disturbance caused by nearby developments (including unoffcicial vehicle access) has caused erosion and invasion by weed species, particularly Seaforth burr (Cenchrus echinatus), red natal grass (Melinis repens), lantana (Lantana camara), tridax daisy (Tridax procumbens), prickly starwort (Salsola australis), Guinea grass (Megathyrsus maximus), pink periwinkle (Catharanthus roseus), common prickly pear (Opuntia stricta), drooping prickly pear (Opuntia monacantha), corky passionflower (Passiflora suberosa), buffel grass (Cenchrus ciliaris) and snakeweed (Stachytarpheta jamaicensis). Species within this RE are fire sensitive and the removal of ground layer vegetation often results in infestation of pest species such as Guinea grass (Megathyrsus maximus), red natal grass (Melinis repens) and other weed species, intensify fire risk.

RE 8.2.2 describes a semi-evergreen microphyll vine thicket to vine forest on coastal dunes. This vegetation community is known to stabilise sand dunes and can protect coastal communities and inland vegetation from storm surges. Approximately 15.5ha of this critical endangered beach scrub exists within the coastal unit and is fragmented from surrounding beach scrub occurrences. A small isolated cluster occurs south of the Herb Winton Park on the northern esplanade of Midge Point and is threatened by the encroachment (i.e. mowing) and weed infestations. The height of the canopy varies between 1-2.5m and is dependent on the level of exposure to external factors such as salt laden winds. RE 8.2.2 canopy consists primarily of rainforest species on coastal dunes with trees such as red conodo (Mimusops elengi), tuckeroo (Cupaniopsis anacardioides), and in some places, brown tulip oak (Argyrodontrion polyandrum), scaly ebony (Diospyros geminata), yellow tulipwood (Drypetes deplanchei), droopy leaf (Aglaia elaeagnoides), canary beechn (Polyalthia nitidissima), scaly ash (Ganopphilum falcatum), yellow boxwood (Planchonella pohlimaniana), tuckeroo (Cupaniopsis anacardioides), mango (Sersalisia sericea) and peanut tree (Sterculia quadrifida). A low tree or shrub layer and the ground layer is present but sparse. Vines such as burney vine (Trophis scandens), native jasmine (Jasminum didymum) and smooth water vine (Cissus oblonga) are common and epiphytes such as the golden orchid (Dendrobium discolour) are also found within the tree branches. Many plants found within this ecosystem will return after fire (i.e. rainforest pioneers), however the ecosystem is highly fire sensitive and should not be burned. Weeds alter the structure of the ecosystem and add to the fuel load, which translates to a greater risk of additional fire and high intensity fire. Disturbance by fire promotes weed infestation including by Guinea grass (Megathyrsus maximus). Reconsideration of tenures of freehold land that includes this critically endangered ecosystem to ensure adequate protection is recommended.

RE 8.2.6a describes Corymbia tessellaris open forest to low woodland and dominates Midge Point Reserve, together with a minor presence of RE 8.2.2. It is also distributed in an isolated patch within the wetland system around the western margin of Midge Point headland. RE 8.2.6a is recognisable as a very sparse to mid-dense sub-canopy tree layer, with species typically comprising of northern coast wattle (Acacia leptocarpa), coastal banksia (Banksia integrifolia subsp. Compar), cocky apple (Planchonia careya) and screwpine (Pandanus tectorius). RE 8.2.6a acts as a buffer between the beach and residential properties and supports the dune system. A large proportion of this vegetation is in moderate to poor condition due to susceptibility to erosion and weed invasion. Processes such as clearing for coastal development and disturbance by recreational users have reduced the quality of this ecosystem. The fire management strategy discourages deliberate burning of beach ridge communities that have a component of littoral vine forest. Instead adjacent burns to fire adapted ecosystems under conditions where fire will not penetrate beach ridge communities is recommended. Infestations of exotic grass such as Guinea grass (Megathyrsus maximus) need to be addressed immediately as they increase fire risk. Weed control at Midge Point will reduce weed competition and reduce and fuel loads in the area. Problematic weeds include lantana (Lantana camara), tridax daisy (Tridax procumbens), Guinea grass (Megathyrsus maximus), corky passionflower (Passiflora suberosa), Chinese burr (Triumfetta rhomboidea), blue couch (Digitaria didactyla) and stylo (Stylosanthes humilis).
APPENDIX 2: Regional Ecosystem (RE) descriptions as found on Council managed land within the coastal unit

RE 8.3.1a can be found on riverine wetland or fringing riverine wetlands. At Midge Point RE 8.3.1a fringes the watercourse of the creek at the northern end of Midge Point Reserve parallel to Repulse Drive. Close proximity to Midge Point’s residential area not only increases the chance of pesticide run-off from nearby gardens and lawns but also makes the community susceptible to weed invasion. Significant weeds include mango (Mangifera indica), guava (Psidium guajava) and cats claw (Macfadyena unguis-cati). Others include pigeon berry (Rivina humilis), corky passionflower (Passiflora suberosa) and lantana (Lantana camara). This vine forest ecosystem is also threatened by fire however evidence suggests that low intensity fire directly adjacent to this forest will encourage germination of rainforest pioneers. Overall, RE 8.3.1a is distinguished from most other rainforest regional ecosystems and vegetation communities by its occurrence on Quaternary alluvium, closely associated with creeks.

RE 8.3.2 is an endangered ecosystem that occurs on the northern flood plains of Midge Point (Zone A) and in an isolated cluster well upstream of Yard Creek. It is described as a low extent Melaleuca viridisflora var. viridisflora open forest to woodland. Wetter sites are frequently dominated by Ischaemum australe and/or Ischaemum fragile which have historically been extensively cleared for sugar cane. Most remnants are south of Sarina however these too are also subject to clearing for coastal development and expansion of sugar. Weeds that threaten this RE include American rats tail grass (Sporobolus jacquemontii), giant rat’s tail grass (S. fertilis, S. pyramidalis), snakeweed (Stachytarpheta jamaicensis) and scrubby stylo (Stylosanthes scabra). RE 8.3.2 is usually only inundated for a few days to up to a few weeks at a time. Seasonal inundation can result in high litter decomposition rates and consequent low rates of fuel accumulation and is considered to be a major functional component of this ecosystem.

RE 8.12.2a describes Eucalyptus platyphylla and/or Eucalyptus drepanophylla woodland to open forest. RE 8.12.20a occurs on low gently undulating landscapes, such as the landward regions of Midge Point. This vegetation is often in a poor to moderate condition. Problem weeds include lantana (Lantana camara), sensitive weed (Mimosa pudica), American rats tail grass (Sporobolus jacquemontii) (and other introduced Sporobolus spp.), Chinese berr (Triumfetta rhomboidea), snakeweed (Stachytarpheta jamaicensis), corky passionflower (Passiflora suberosa), grader grass (Themeda quadrivalvis) and many others. Weed invasion, grazing by horses and cattle further diminish the health of this ecosystem. At least 30% of this RE should remain unburnt in any given area and emphasis should be placed on the general principles of mosaic burning and diversity of fire types.
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.

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 (8.1.1 8.1.2, 8.2.1, 8.2.2, 8.2.6a and 8.2.9a), 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 preclearing Regional Ecosystem mapping, and site-specific conditions (such as aspect, topography, existing vegetation, soil condition, availability of appropriate plants, etc).

Figure 1: Coastal dune planting guide
### APPENDIX 4: Native plant list

<table>
<thead>
<tr>
<th>Species name</th>
<th>Common name</th>
<th>Habit</th>
<th>Regional Ecosystem</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acacia leptocarpa</td>
<td>north coast wattle, slender fruited wattle</td>
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<td>Acacia oraria</td>
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<td>Argusia argentea</td>
<td>octopus bush</td>
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### View sensitive native plant list

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</tr>
<tr>
<td>Hibbertia scandens</td>
<td>golden Guinea flower, snake vine</td>
<td>Climber/groundcover</td>
<td>8.2.1</td>
</tr>
</tbody>
</table>
### APPENDIX 4: Native plant list

<table>
<thead>
<tr>
<th>Species name</th>
<th>Common name</th>
<th>Habit</th>
<th>Regional Ecosystem</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Imperata cylindrica</em></td>
<td>blady grass</td>
<td>Grass</td>
<td>8.2.6; 8.2.9</td>
</tr>
<tr>
<td><em>Ipomoea pes-caprae</em></td>
<td>goats foot convolvulus</td>
<td>Groundcover</td>
<td>8.2.1</td>
</tr>
<tr>
<td><em>Jasminum didymium</em></td>
<td>native jasmine</td>
<td>Climber/shrub</td>
<td>8.2.2; 8.2.6</td>
</tr>
<tr>
<td><em>Lomandra longifolia</em></td>
<td>spiny-headed mat-rush</td>
<td>Herb</td>
<td>8.2.6</td>
</tr>
<tr>
<td><em>Scaevola taccada</em></td>
<td>sea lettuce</td>
<td>Shrub</td>
<td>8.2.1</td>
</tr>
<tr>
<td><em>Sophora tomentosa</em></td>
<td>silver bean</td>
<td>Shrub</td>
<td>8.2.1</td>
</tr>
<tr>
<td><em>Spinifex sericeus</em></td>
<td>beach spinifex</td>
<td>Grass</td>
<td>8.2.1</td>
</tr>
<tr>
<td><em>Sporobolus virginicus</em></td>
<td>marine couch</td>
<td>Groundcover</td>
<td>8.2.1</td>
</tr>
<tr>
<td><em>Stephania japonica</em></td>
<td>tape vine</td>
<td>Climber/groundcover</td>
<td>8.2.1; 8.2.2; 8.2.6</td>
</tr>
<tr>
<td><em>Themeda triandra</em></td>
<td>kangaroo grass</td>
<td>Grass</td>
<td>8.2.6; 8.2.9</td>
</tr>
<tr>
<td><em>Thuarea involuta</em></td>
<td>birds beak grass</td>
<td>Grass</td>
<td>8.2.1</td>
</tr>
<tr>
<td><em>Vigna marina</em></td>
<td>vigne</td>
<td>Groundcover</td>
<td>8.2.1</td>
</tr>
<tr>
<td><em>Vitex rotundifolia</em></td>
<td>creeping vitex, beach vitex</td>
<td>Groundcover</td>
<td>8.2.1</td>
</tr>
<tr>
<td><em>Vitex trifolia</em></td>
<td>coastal vitex, common blue vitex</td>
<td>Shrub</td>
<td>8.2.1</td>
</tr>
<tr>
<td><em>Xerochrysum bracteatum</em></td>
<td>golden everlasting daisy</td>
<td>Herb</td>
<td>8.2.9</td>
</tr>
</tbody>
</table>
## APPENDIX 5: Weed control principles

<table>
<thead>
<tr>
<th>Principles</th>
<th>Comments</th>
</tr>
</thead>
</table>
| **Staged weed removal**       | • Weed removal should be carried out in a staged approach.  
• Work outwards from intact remnants of coastal vegetation as a priority.  
• Particularly important in removal of non-native vegetation along the dune scarp.  
• 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. |
| **Physical weed removal**     | • Physical weed removal, including hand pulling, chipping or cutting weeds is effective in small infestations in environmentally sensitive areas.                                                                                                                                                                                               |
| **Mechanical weed removal**   | • Mowing or brush cutting will suppress weed growth, discourage seeding and spread.  
• This method should be used particularly in areas bordering large infestations.  
• 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.                                                                                   |
| **Herbicide weed removal**    | • The application of herbicides includes foliage or basal spraying, cut/paste and stem injection where applicable.  
• 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.  
• Roundup Bi-active® is recommended due to its low toxicity to wildlife and humans.                                                                                                                                  |
| **Timing**                    | • Weed control on foredunes to occur between April and October only, to avoid turtle nesting season (November to March).  
• 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. |
| **Consideration of fire risk**| • 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.  
• 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. |
| **Preventing re-infestations**| • Keep maintenance vehicles on the existing tracks where possible to reduce disturbance.  
• Clean maintenance vehicles before and after access to the site to prevent weed spread or introduction.  
• 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. |

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**Note:** Midge Point Local Coastal Plan 2018
## APPENDIX 6: Main weed species found in coastal areas in the Mackay region

<table>
<thead>
<tr>
<th>Species name</th>
<th>Common name</th>
<th>Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agave sp.</td>
<td>sisal hemp</td>
<td>Succulent</td>
</tr>
<tr>
<td>Alternanthera brasiliana</td>
<td>red-leaved alternanthera</td>
<td>Herb</td>
</tr>
<tr>
<td>Antigonon leptopus</td>
<td>coral vine</td>
<td>Climber</td>
</tr>
<tr>
<td>Aster subulatus</td>
<td>wild aster, bushy starwort</td>
<td>Herb</td>
</tr>
<tr>
<td>Bidens alba var. radiata</td>
<td>cobbler's peg</td>
<td>Herb</td>
</tr>
<tr>
<td>Bougainvillea sp</td>
<td>bougainvillea</td>
<td>Vine</td>
</tr>
<tr>
<td>Bryophyllum sp.</td>
<td>mother-of-millions</td>
<td>Shrub</td>
</tr>
<tr>
<td>Bryophyllum delagonenses</td>
<td>mother-of-millions hybrid</td>
<td>Shrub</td>
</tr>
<tr>
<td>Callisia fragrans</td>
<td>callisia</td>
<td>Herb</td>
</tr>
<tr>
<td>Catharanthus roseus</td>
<td>pink periwinkle</td>
<td>Herb</td>
</tr>
<tr>
<td>Cenchrus echinatus</td>
<td>Seaforth burr</td>
<td>Grass</td>
</tr>
<tr>
<td>Coccus nucifera</td>
<td>coconut palm</td>
<td>Tree</td>
</tr>
<tr>
<td>Corymbia torelliana</td>
<td>cadagi</td>
<td>Ree</td>
</tr>
<tr>
<td>Crocogalium pallida</td>
<td>rattlepod</td>
<td>Herb</td>
</tr>
<tr>
<td>Dactyloctenium sp.</td>
<td>button grass</td>
<td>Grass</td>
</tr>
<tr>
<td>Delonix regia</td>
<td>poinciana</td>
<td>Tree</td>
</tr>
<tr>
<td>Dichantium annulatum</td>
<td>sheda grass</td>
<td>Grass</td>
</tr>
<tr>
<td>Digitaria didactyla</td>
<td>blue couch</td>
<td>Grass</td>
</tr>
<tr>
<td>Duranta erecta</td>
<td>duranta</td>
<td>Shrub</td>
</tr>
<tr>
<td>Eleusine indica</td>
<td>crowsfoot grass</td>
<td>Grass</td>
</tr>
<tr>
<td>Emilia sonchifolia</td>
<td>emelia</td>
<td>Herb</td>
</tr>
<tr>
<td>Euphorbia cyathophora</td>
<td>painted spurge</td>
<td>Herb</td>
</tr>
<tr>
<td>Hyparrhenia rufa</td>
<td>thatch grass</td>
<td>Grass</td>
</tr>
<tr>
<td>Ipomoea indica</td>
<td>coastal morning glory</td>
<td>Herb</td>
</tr>
<tr>
<td>Lantana camara</td>
<td>lantana</td>
<td>Shrub or branched climber</td>
</tr>
<tr>
<td>Leucaena leucocephala</td>
<td>leucaena</td>
<td>Small tree</td>
</tr>
<tr>
<td>Macroptilium atropurpureum</td>
<td>siratro</td>
<td>Vine</td>
</tr>
<tr>
<td>Megathyrsus maxim</td>
<td>Guinea grass</td>
<td>Grass</td>
</tr>
<tr>
<td>Melinus repens</td>
<td>red natal grass</td>
<td>Grass</td>
</tr>
<tr>
<td>Melinis minutiflora</td>
<td>molasses grass</td>
<td>Grass</td>
</tr>
<tr>
<td>Mimosa pudica</td>
<td>sensitive weed</td>
<td>Herb</td>
</tr>
<tr>
<td>Momordica charantia</td>
<td>balsam pear</td>
<td>Vine</td>
</tr>
<tr>
<td>Oenothera drummondii subsp. drummondii</td>
<td>beach primrose</td>
<td>Herb</td>
</tr>
<tr>
<td>Opuntia stricta</td>
<td>common prickly pear</td>
<td>Succulent</td>
</tr>
<tr>
<td>Opuntia mononantha</td>
<td>dropping prickly pear</td>
<td>Succulent</td>
</tr>
<tr>
<td>Passiflora foetida</td>
<td>stinking passionfruit</td>
<td>Climber</td>
</tr>
<tr>
<td>Passiflora suberosa</td>
<td>corky passionfruit</td>
<td>Climber</td>
</tr>
<tr>
<td>Persicaria perfoliata</td>
<td>mile-a-minute</td>
<td>Vine</td>
</tr>
<tr>
<td>Psidium guajava</td>
<td>guava</td>
<td>Small tree</td>
</tr>
<tr>
<td>Ricinus communis</td>
<td>castor oil plant</td>
<td>Sub-shrub</td>
</tr>
<tr>
<td>Salsola australis</td>
<td>prickly starwort</td>
<td>Succulent shrub</td>
</tr>
<tr>
<td>Sansevieria trifasciata</td>
<td>mother-in-laws tounge</td>
<td>Herb</td>
</tr>
</tbody>
</table>
## APPENDIX 6: Main weed species found in coastal areas in the Mackay region

<table>
<thead>
<tr>
<th>Species name</th>
<th>Common name</th>
<th>Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>Senna pendula var. glabrata</td>
<td>Easter cassia</td>
<td>Shrub or branched climber</td>
</tr>
<tr>
<td>Sida cordifolia</td>
<td>sida</td>
<td>Sub shrub</td>
</tr>
<tr>
<td>Solanum chrysotrichum</td>
<td>devil’s fig</td>
<td>Sub shrub</td>
</tr>
<tr>
<td>Solanum nigrum</td>
<td>black night shade</td>
<td>Herb</td>
</tr>
<tr>
<td>Solanum seaforthianum</td>
<td>Brazilian nightshade</td>
<td>Climber</td>
</tr>
<tr>
<td>Sphagneticola trilobata</td>
<td>Singapore daisy</td>
<td>Groundcover</td>
</tr>
<tr>
<td>Stachytopheta jamaicensis</td>
<td>snake weed</td>
<td>Herb or sub shrub</td>
</tr>
<tr>
<td>Stylosanthes humilis</td>
<td>stylo</td>
<td>Herb</td>
</tr>
<tr>
<td>Themeda quadrivalvis</td>
<td>grader grass</td>
<td>Grass</td>
</tr>
<tr>
<td>Tradescantia spathacea</td>
<td>Moses-in-a-cradle</td>
<td>Herb</td>
</tr>
<tr>
<td>Tridax procumbens</td>
<td>tridax daisy</td>
<td>Herb</td>
</tr>
<tr>
<td>Triumfetta rhomboidea</td>
<td>Chinese burr</td>
<td>Sub-shrub</td>
</tr>
<tr>
<td>Urochloa decumbens</td>
<td>signal grass</td>
<td>Grass</td>
</tr>
<tr>
<td>Yucca aloifolia</td>
<td>yucca</td>
<td>Succulent</td>
</tr>
</tbody>
</table>
Local Coastal Plan

Midge Point 2018

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Mirani
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Sarina
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