

# warraber

Sustainable Land Use Plan

PART 2



# warraber

## SAGERWAZER

*Long ago, when the island of Waraber was much bigger than it is today and the people had their homes at Gibutal Pad, there lived a man named Sagerwazer. He was big and strong and possessed magical powers which he used whenever he had a mind to.*

*One morning, before sunrise, he decided to go for a walk to Kiaugud at the western end of the island. He told his friends where he was going and set off, but when he got there he could think of nothing to do.*

*Suddenly, the idea of cutting off his head and magically rejoining it to his body flashed into his mind. At once, he walked down to the beach and cut off his head. As his body dropped to the sand, his head fell into the sea and began to intone:*

*Sagerwazer wazer (o)  
Nganu uni ngana (o)  
Bauana (o) sikana (o)  
Gud malaika gud (o).*

*(Her I am, Sagerwazer,  
Wave foam fills my mouth,  
Sagerwazer-wazer. O.)*

*Then the head glided away from the shore.*

*When it reached the sandbank in front of the village, it skirted along it to the outer edge of the reef and swept east with the flowing tide. It passed lamul Kula, the rock where fish called iamul abound, and was well on the way to Dual Pad as the sun came up out of the sea. But beyond Dual Pad stretched the open sea and, afraid to abandon the protection of the reef that encircled Waraber, Sagerwazer's head regretfully turned back. As it rounded the tip of the sandbank and began gliding in to Kiaugud, it suddenly felt a frantic attraction exerted by the body on the beach striving to recapture it's head. Faster and faster, the head was drawn through the water, until it met its body with a thud.*

*Sagerwazer got to his feet and strode back to Gibutal Pad a new man. He swelled with pride, for to have cut off his head and successfully rejoined it to his body proved that his magical powers were extraordinarily great.*

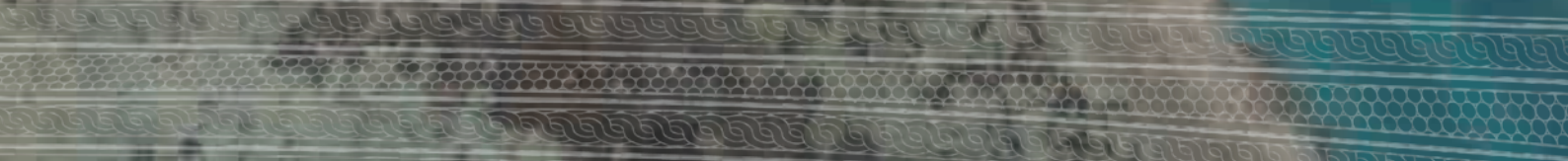
*The next morning he awoke before dawn and, while the village slept, he again set out for Kiaugud and again he cut off his head. As head fell into the water, it intoned the same tune as it had the day before, then drifted out to sea. It travelled faster than it has the previous day and before long it had left the sandbank, lamul Kula and Dual Pad behind and ventured out into the open sea.*

*Meanwhile, the villagers had noted Sagerwazer's absence, and as the morning wore on without any sign of him, his brother began to worry and set out in search of him. The brother soon found Sagerwazer's footprints and followed them west to the beach below Kiaugud. When he arrived at the beach, Sagerwazer's brother was utterly bewildered. There was nothing to indicate the presence of strangers at Waraber; there had been nothing unusual in the behaviour of any of the people at Gibutal Pad; the sand all around was clean and unmarked - yet there lay the headless body of Sagerwazer. He threw himself upon it and wept; then, raising it to his shoulders, he carried the body away and buried it.*

*All the while, Sagerwazer's head had continued to travel further and further from Waraber, and was now feeling sick and unhappy. When the waves smacked angrily at its face, it realised the tide had turned and was now taking it west instead of east as it had done earlier in the day. When the tide turned, the head raced home in a flurry of foam, but this time as it approached the beach at Kiaugud, it did not feel the intense pull to become one with its body. Small fish called daram began to nibble at the tissues inside the head and it could not dislodge them. It began to sink, water bubbling from its lips, and was swallowed by a big fish.*

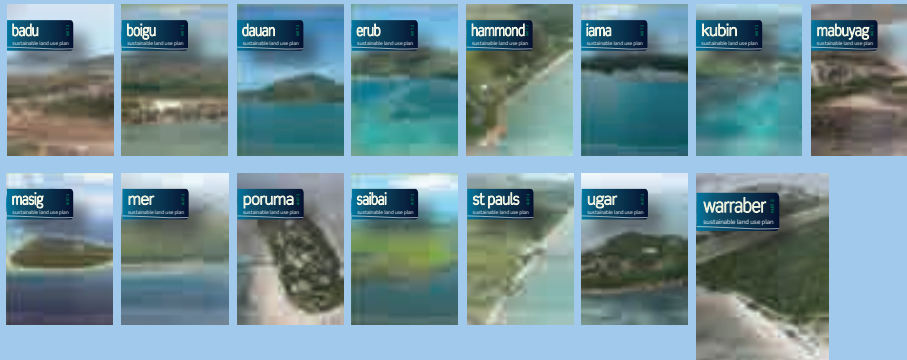
**Source:** *Myths and Legends of Torres Strait, M. Lawrie, 1970.*

# Land Use Plan Structure



**PART 1****Context & Background**

- Introduction, Background and Overview of the Torres Strait
- How to Use the Sustainable Land Use Plan

**PART 2****Island Overview****A separate section of each island will detail the following topics–**

- Island Overview
- Land Tenure & Native Title
- Natural Environment
  - plants, animals and birds
  - coastline
  - tides and storm surge
  - waterways and wetlands
  - land and soil
  - bushfire
- Cultural Heritage
- Community
  - population
  - housing
- sustainable community expansion
- community facilities and services
- Infrastructure
  - water
  - sewer
  - waste
  - electricity
  - telecommunications
  - roads
  - drainage
  - air access
  - sea access

Each topic includes best practice principles, an island overview, and an overview of the topic in the context of each island, land use strategies, land use projects, land use considerations, strategic outcomes and useful links.

**PART 3****Interim Planning Assessment Process**

A non-statutory framework for assessing development on the islands.

# Executive Summary



In past years, the establishment of new communities and the growth of existing communities has often proceeded in a manner perceived as being unplanned and ad-hoc. Such an uncoordinated approach in remote communities has led to land management problems such as inappropriate locations of housing and inefficient, costly and haphazard provision of services such as water supply, sewerage, power and roads.



The primary objective of reviewing land uses on Warraber is to provide a support decision making tool and guideline for the community to plan for and manage the impacts of future development and that such development is sustainable.

Warraber is an area of significant cultural heritage value to the Traditional Owners and the community. Many sites are not recorded and are only known to the Traditional Owners. Consultation and liaison with Traditional Owners, engagement of cultural heritage observers and preparation of cultural heritage investigations are recommended for all development proposals.

Warraber, commonly referred to as Sue Island, is located in the central group of islands in the Torres Strait approximately 72km north-east of Horn Island and 49km north-west of Mer (Murray Island).

Warraber is a low lying coral sand island approximately 1,400m long by 700m wide.

A short channel has been dredged through the reef to provide sea access to the community, which is located to the east of the 720m airstrip that bisects the island. Ground level on the island varies to up to 6m above sea level.

The vegetative landscape of Warraber is characterised by vine forests and dune grasslands.

There are no discernible watercourses on the coral cay of Warraber.

The village is located on the eastern side of the island, and is separated from the western side by a 720m airstrip which bisects the island. Land to the west of the airstrip is uninhabited and contains large vegetated areas, as well as the island's water storage area and waste depot.

The **key environmental assets** of Warraber are:

The notable ecological and habitat features of Warraber are the:

- Coastal habitat for rare sea birds and waders.
- Vine forest patches with high biodiversity and habitat characteristics.
- Coastal dune system with protective vegetation cover.
- Endangered Spitting Cucumber Vine (*Muellerargia timorensis*) – present along the edges of vine forest on the north-west corner of Warraber.

Notable rare and threatened fauna observed on Warraber include:

- Beach Stone Curlew - (*Esacus magnirostris*) – Vulnerable (NCA);
- Little tern (*Sternula albifrons*) – Endangered (NCA);
- Eastern curlew (*Numenius madagascariensis*) – Rare (NCA);
- Spectacled Flying Fox (*Pteropus conspicillatus*) – Vulnerable (EPBC);
- Sooty Oystercatcher (*Haematopus fuliginosus*) – Rare (NCA).

Identified **land issues** are:

- There are three priority areas for coastal erosion -
  - Area A ( The broken wall and tyres –northern end of Warraber)
  - Area B (The Resort Corner)
  - Area C (The Wongai Trees near the water storage lagoon)

- The high tides do not inundate any properties (apart from the resort) at the moment.
- Due to the poor and infrequent transport, there is no escape strategy to temporarily relocate the community during extreme events.
- The current highest predicted tides do not appear to inundate Warraber, with the exception of the low beach flats around the new resort area.
- There is a low area on the northern side of Warraber, between the health centre and the church which is partially protected by a seawall.
- There are also a few low areas located both sides of the eastern end of the airstrip, and at the resort area. These areas do not get inundated at the moment as the water cannot enter as they are protected by low sand ridges on the foreshore.
- The predicted high tide in the year 2100 will not inundate the village area as long as the coastal boeywadths (berms) are protected and not breached. The resort area is predicted to be inundated approximately 200mm on predicted high tides in the year 2100.
- Note that these levels are for high tides that occur on calm flat days and do not include wave runoff or low pressure situations.
- The Draft Queensland Coastal Plan areas of High Hazard (land with a inundation of water greater than 1 metre deep) occur around the Health Centre, Council offices, Church, community hall and child care centres as well as near residential houses on lots 59 to 63.
- The Draft Queensland Coastal Plan areas of Low Hazard (land with a inundation of water less than 1 metre deep) occur around almost all of the village except for lots 12-17 and the western end of Garnier Street towards the airstrip.
- For this reason, the designs for new houses or modifications to existing houses should incorporate mitigation measures that include a 'refuge area' designed to withstand possible storm surge and tidal inundation in extreme events. This can be easily incorporated into existing designs by

amending the walls of the existing ground floor toilet area from weatherboards to reinforced masonry/concrete walls that extend from the concrete slab to the upper ceiling of the first floor. These areas can contain toilet or laundry facilities downstairs and bathroom/toilet areas on the first floor. Ideally, access stairs should be located next to this core 'refuge' area.

- Erosion and inundation impacts in areas identified as high prone erosion areas, such as
  - the resort area on the northeastern shoreline;
  - along the northern side of the village in front of the health centre;
  - along the southern side of the village adjacent to the water storage lagoon;
- no discernible water courses;
- moderate to low bushfire hazard;
- the changing system of land tenure;

Identified **water infrastructure issues** are:

- Water on Warraber is sourced from:
  - rainwater collected from the covered area of the storage lagoons located to the south west of the island;
  - a mobile reverse osmosis desalination unit located near the barge ramp; and
  - rainwater collected in household and community building water tanks
- Collected rainwater is stored the lined and covered storage lagoons
- Water from the lagoons is treated via sand filtration and chlorination at the treatment plant located adjacent to the lagoons. After treatment, water is pumped to the 100 kL ground level reservoir tank located in the town area.
- Water from the portable desalination plant is pumped to the storage lagoons or directly to the ground level reservoir
- Potable water is delivered to the community from the ground level reservoir via pressurised underground mains. All facilities are connected to the mains via branch lines and all facilities are individually metered
- The water supply from the lagoons is considered marginal for the existing population and inadequate for future growth.
- For the past several years, the town water supply has been supplemented by the mobile desalination unit. The maximum capacity of the mobile unit is currently 40kL of potable water per day.
- The total existing treated water storage capacity is 100kL, which is approximately one days storage capacity.
- The estimated current population is about 292 people. The most recent water consumption data indicates an average water consumption of 150l/person/day. This consumption is considered good, however it is not clear if this low consumption is consistent throughout the year or whether the figure is low due to water rationing during the installation of the new lagoon covers
- A maximum consumption of 300 l/person/day should be the consistent average target
- Water supply at Warraber is currently at a level where the collected rainwater is insufficient to meet the current demand without the assistance of a supplementary desalination unit. Unless the island receives above average rainfall or implements stringent water restrictions, it is unlikely that the temporary desalination plant will be removed.
- Consequently, future expansion in the short term will depend on the spare capacity of the desalination plant and any significant population increase may require the consideration of an additional artificial catchment and storage lagoon or a larger or duplicate desalination plant.
- A target of 300 litres per person per day or less is maintained by using water efficiently and managing consumer behaviour and demand for water.
- On reaching a population of 300 persons and the target consumption of 300 litres per person per day or less is achieved on a regular basis, a permanent upgrade to the water plant capacity is to be considered.

Identified **sewer infrastructure** issues are:

- Sewer - The existing treatment plant built in 2009 has the capacity to treat effluent for population of 345 persons. Consequently, there is sufficient capacity to meet the sewerage treatment needs into the future.
- The sewerage design population of 345 persons is predicted to be reached
  - In approx. 2015 using a high population growth scenario
  - After 2019 using a low population growth scenario

Identified **waste infrastructure** issues are:

- Like many of the Torres Strait island communities, Warraber has limited space available for waste disposal.
- Warraber currently has a small solid waste depot located at the south-western side of the island, adjacent to the water storage compound. The waste depot is setback approximately 100 metres from the coastline.
- In 2009 the Warraber implemented a Waste Pilot project for the Torres Strait.
- The Warraber Waste Pilot Project diverts greater resources from landfill in the quest to conserve the extremely limited space available and improve environmental and social outcomes for the community, with the greatest diversion from landfill being achieved by recovering the organic components and producing a compost product on the Island.
- Each household is be provided with the following:
  - 240-litre bin for general waste
    - collected weekly
  - 240-litre bin for garden waste
    - collected weekly,
  - 20-litre food-waste bucket –
    - collected twice per week
  - 60-litre crate for the storage and presentation of recyclables
    - collected weekly.
- The proposed new waste management program involves the community separating its waste into a number of streams. These include:

- General waste - The general waste bin contents are be delivered to the landfill.
- Garden waste and Food waste - delivered to a part of the new landfill site, new composting program. The garden waste is chipped prior to being placed in the Biobin with food waste, paper and cardboard.
- The compost is made available for use on public areas and to community members for their own home gardens.
- The food waste buckets from each house are collected and emptied into wheelie bins located on a trailer, which also accommodates bins for the separation of recyclables into their respective products at the point of collection from the crates.
- The recyclables (Aluminium cans, PET, HDPE, steel cans, paper and cardboard) are delivered to the sorting shed located near the barge ramp and baled for later shipment to Cairns.

Identified **other infrastructure issues** are:

- There are no known issues regarding telecommunications on Warraber apart from a lack of mobile phone coverage.
- Many of the main internal roads on Warraber are paved with concrete pavers. The remaining internal roads are constructed from sandy soils at varying widths and are unsealed. The roads can generally be trafficked in all weather, except for short periods of localised flooding. There are no defined stormwater drainage systems on the island apart from minor culvert and above ground crossing of some roads.
- The main road connecting the airstrip to the Warraber community is a main thoroughfare and has been paved with concrete pavers for durability.
- The barge area is currently unsealed. This area supports a large amount of traffic being the primary access point for goods to the island from the ferry service. This area should be sealed to facilitate easy loading and unloading of goods during the wet season.
- The Council has expressed a desire to extend the existing concrete paving around

the township area and the barge area to reduce dust and water ponding.

- A total of 1900m of unsealed roads exist within the residential village area. This length excludes the unsealed roads around the airstrip, the water storage lagoons and the barge area.
- Note that all of the roads around the school (Ioane St, Yessie St and Dabus St) are unsealed. Sealing Phillemon ST, Aikuru St and Yessie St (a total of 900m) would provide a sealed access servicing most of the community, the school, the sports stadium/field and the Ergon depot.
- The aircraft facilities at Warraber comprise of a 720m sealed airstrip located on the central area of the Island. Other facilities include a helicopter landing area, paved apron and waiting building.
- Emergency access is available via medivac rescue helicopter (day and night) if required.
- Future development needs to include buffers to ensure that the airstrip is protected from urban encroachment, including noise sensitive development and any other development that may impact on current or future operations.
- Monitor each end of the airstrip for coastal erosion
- The marine facilities at Warraber consist of a concrete barge ramp located on the northern side of the island at the end of the airstrip and a timber finger pier adjacent to the ramp. The barge ramp and finger facilities are accessed from the deep water by a dredged channel.
- Warraber is serviced weekly by a barge service from Port Kennedy at Thursday Island.
- The finger pier is a narrow timber deck that is supported on timber piles. The structure is suitable for the mooring of small vessels, however it is understood that there is limited mooring space at certain periods.
- The barge channel through the reef needs to be dredged to remove the sand build up.
- Ideally, a specific set down area for the storage of goods being loaded/unloaded onto the barge would remove the short-term congestion around the barge ramp whenever the Barge

is at the island. However, limited space on Warraber makes this task difficult to achieve

Identified **population issues** are:

- The 2006 census population was 269 persons;
- Estimated population in 2009 was 292 persons
- In the decade from 1996-2006, population growth has increased at an average annual rate of 2.3%
- Population profile will change over the next 25 years, with a doubling of the 65 plus age group and a decrease of young people; and
- This Plan considers two growth scenarios based on a low growth rate of 1.0% and a high growth of 3.0 % for the next ten years.
  - a low growth rate of 1.0% which will generate an extra 31 persons over ten years; and an additional 6 houses over ten years;
  - a high growth rate of 3.0% which will generate an extra 101 persons over ten years; and an additional 20 houses over ten years;

Identified **housing issues** are:

- There are 55 houses on Warraber for approximately 290 persons ( 5.3 persons per house).
- Additionally there is a guesthouse located on Lot 21, with overflow accommodation at the airstrip terminal building.
- Contractor accommodation is in the house on lot 37, or more recently in the portable dongas setup on the sports field for the sewerage construction project in 2009.
- There are 19 vacant serviced lots within the village
  - 3 lots above the Draft Designated Storm Tide level (lots 120,121,124)
  - 13 lots within the low hazard inundation area (lots 20,28A,34,35,80,81,82,112,115,116,122,123,91A)
  - 3 lots within the high hazard tidal inundation area (lots 36,38 & 60)
- The 19 serviced vacant lots within the village have the capacity to accommodate

approximately 95 persons. This is the expected growth to 2019 using the high growth rate scenario.

- If the population on Warraber continues to increase, the existing 19 vacant lots in the village will need to be developed to provide houses for the growing population.
- All vacant lots are above the HAT 2100 making it possible for them to be developed in the immediate short term;
- Development on Lots 36 & 38 are most at risk from tidal inundation
- Lots 120 to 124 are vacant serviced lots along Garnier Street on the way to the airstrip. Development of these should be encouraged as these lots are fully serviced and are on the higher parts of Warraber.
- the vegetation on Garnier Street at the Warraber airstrip end should be maintained as an open space buffer as it is a beautiful welcoming entrance to Warraber.

Identified **growth issues** are:

- by adopting either, the low or high growth rates, growth pressure on Warraber will be generated;
- The current water infrastructure cannot provide enough water for the current population without additional supply from the mobile desalination plant.
- based on the existing sewer treatment plant capacity, Warraber will reach 'full house' in five to ten years unless the plant is upgraded
- options available to manage growth on Warraber are:
  - utilise existing serviced lots prior to encouraging development in the investigation area;
  - to increase residential density; and
  - expansion of the residential areas; and
- studies are required to determine whether the identified investigation area is suitable for development.



Together the identified assets and issues above provide the basis for land use strategies, questions to ask for any proposed development and key land use outcomes. In summary:

- vacant land will be consumed in ten years or more;
- Warraber's current infrastructure will limit Warraber population growth between 2010 and 2017;
- the community must decide how they are going to adjust development on Warraber for climate change. What strategies are they going to adopt?
- if further development is to occur it:
  - should not be permitted in any area:
    - identified as an environmental asset;
    - identified as water catchment or in a known water catchment area;
    - encompassing head waters of waterways and wetlands;
    - where it has detrimental impact on natural flow regimes and quality water systems;
    - in areas affected by tides and storm surges;
    - in areas of medium bushfire risk or part of areas identified as medium bushfire risk;
    - near major infrastructure such as the Telstra Tower, sewerage treatment plants and generators;
    - identified as affected by natural hazards such as tides, storm surges or acid sulfate soils;
    - adjacent to areas identified as subject to high prone erosion; and
    - west of the airstrip;
  - should be contained with the village and the identified investigation area which will require an increase in residential density;
  - must include diverse, affordable and sustainable housing to meet the needs of current and future residents and visitors. Two areas are to be investigated for potential development; and
  - must incorporate all processes, policies and decisions that protect and enhance the natural and made environments

including cultural values and beliefs.

Two potential areas for expanding the village have been identified.

#### **Investigation Area 1 – Garnier Street West**

This investigation area is located between Garnier Street and the Esplanade. A sewerage main constructed in 2009 is located along the western edge and can be used by some of the lots. The development of this area will need to address as a minimum the following:

- Preservation of appropriate buffer to the airstrip
- storm surge and predicted sea levels;
- bushfire risk;
- impact on cultural heritage; and
- impact on vegetation and habitat corridors.

#### **Investigation Area 2 – Garnier Street East**

This investigation area is located at the rear of Phillemon Street. Access is by proposed extensions of James Street and Dabus Street and possible connection to the road along the airstrip. A sewerage main constructed in 2009 is located along the back of the Phillemon Street houses can be used by some of the lots. The development of this area will need to address as a minimum the following:

- Preservation of appropriate buffer to the airstrip
- storm surge and predicted sea levels;
- bushfire risk;
- impact on cultural heritage; and
- impact on vegetation and habitat corridors.

# Table of Contents

<b>1</b>	<b>Island Overview</b>	<b>20</b>
<b>1.1</b>	<b>Location</b>	<b>21</b>
<b>1.2</b>	<b>Physical Characteristics</b>	<b>23</b>
1.2.1	Topography	23
1.2.2	Geology	23
1.2.3	Vegetation	23
1.2.4	Waterways, Wetlands and Coasts	25
<b>1.3</b>	<b>The Village</b>	<b>26</b>
<b>1.4</b>	<b>Population</b>	<b>26</b>
<b>2</b>	<b>Land Tenure &amp; Native Title</b>	<b>28</b>
<b>2.1</b>	<b>Land Tenure</b>	<b>29</b>
2.1.1	Best Practice	29
2.1.2	Overview of Current Situation	29
2.1.3	Issues Overview	29
2.1.4	Sustainable Land Tenure Outcomes	30
2.1.5	Useful Resources	30
<b>2.2</b>	<b>Native Title</b>	<b>31</b>
2.2.1	Best Practice	31
2.2.2	Overview of Current Situation	31
2.2.3	Issues Overview	33
2.2.4	Sustainable Native Title Outcomes	33
<b>2.3</b>	<b>Useful Resources</b>	<b>33</b>
<b>3</b>	<b>Natural Environment</b>	<b>34</b>
<b>3.1</b>	<b>Plants, Animals and Birds</b>	<b>36</b>
3.1.1	Best Practice	36
3.1.2	Overview of Current Situation	37
3.1.3	Issues Overview	40
3.1.4	Land Use Strategies	41
3.1.5	Land Use Considerations	42
3.1.6	Land Use Projects	42
3.1.7	Sustainable Plants, Animals and Bird Outcomes	43
3.1.8	Useful Resources	43
<b>3.2</b>	<b>Coastline</b>	<b>44</b>
3.2.1	Best Practice	44
3.2.2	Draft Queensland Coastal Plan	44
3.2.3	Overview of Current Situation	46
3.2.4	Issues Overview	48
3.2.5	Land Use Strategies	51
3.2.6	Land Use Considerations	54
3.2.7	Sustainable Coastline Outcomes	54
3.2.8	Useful Resources	55
<b>3.3</b>	<b>Tides &amp; Storm Surge</b>	<b>56</b>
3.3.1	Best Practice	56
3.3.2	Overview of Current Situation	56
3.3.3	Issues Overview	59
3.3.4	Land Use Strategies	62
3.3.5	Land Use Considerations	63
3.3.6	Land Use Projects	63

3.3.7	Sustainable Outcomes for Areas affected by Tides and Storm Surge	63
3.3.8	Useful Resources	64
<b>3.4</b>	<b>Waterways and Wetlands</b>	<b>65</b>
3.4.1	Best Practice	65
3.4.2	Overview of Current Situation	65
3.4.3	Issues Overview	65
3.4.4	Land Use Strategies	66
3.4.5	Land Use Considerations	66
3.4.6	Sustainable Waterways and Wetland Outcomes	67
3.4.7	Useful Resources	67
<b>3.5</b>	<b>Land and Soil</b>	<b>69</b>
3.5.1	Best Practice	69
3.5.2	Overview of Current Situation	69
3.5.3	Issues Overview	72
3.5.4	Land Use Strategies	72
3.5.5	Land Use Considerations	72
3.5.6	Sustainable Land and Soils Outcomes	73
3.5.7	Useful Resources	73
<b>3.6</b>	<b>Bushfire</b>	<b>74</b>
3.6.1	Best Practice	74
3.6.2	Overview of Current Situation	74
3.6.3	Issues Overview	75
3.6.4	Land Use Strategies	76
3.6.5	Land Use Considerations	76
3.6.6	Land Use Projects	77
3.6.7	Sustainable Bushfire Outcomes	77
3.6.8	Useful Resources	77
<b>4</b>	<b>Cultural Heritage</b>	<b>78</b>
<b>4.1</b>	<b>Best Practice</b>	<b>79</b>
<b>4.2</b>	<b>Overview of Current Situation</b>	<b>79</b>
<b>4.3</b>	<b>Issues Overview</b>	<b>80</b>
4.3.1	Queensland Legislation	82
4.3.2	Commonwealth Legislation	83
4.3.3	Previous Records of Cultural Heritage Sites	83
<b>4.4</b>	<b>Land Use Strategies</b>	<b>84</b>
<b>4.5</b>	<b>Land Use Considerations</b>	<b>85</b>
<b>4.6</b>	<b>Land Use Projects</b>	<b>85</b>
<b>4.7</b>	<b>Sustainable Indigenous Cultural and Heritage Outcomes</b>	<b>85</b>
<b>4.8</b>	<b>Useful Resources</b>	<b>86</b>
<b>5</b>	<b>The Community</b>	<b>88</b>
<b>5.1</b>	<b>Population</b>	<b>90</b>
5.1.1	Best Practice	90
5.1.2	Overview of Current Situation	90
5.1.3	Land Use Strategy	91
5.1.4	Sustainable Population Outcomes	91
5.1.5	Useful Resources	91
<b>5.2</b>	<b>Housing</b>	<b>92</b>
5.2.1	Best Practice	92
5.2.2	Overview of Current Situation	92

5.2.3	Issues Overview	94
5.2.4	Land Use Strategies	94
5.2.5	Land Use Considerations	94
5.2.6	Sustainable Housing Outcomes	95
5.2.7	Useful Resources	95
<b>5.3</b>	<b>Sustainable Community Expansion</b>	<b>96</b>
5.3.1	Current and Predicted Growth Overview	96
5.3.2	Issues Overview	97
5.3.3	Infrastructure Capacity	98
5.3.4	Land Use Strategies	98
<b>7</b>		<b>99</b>
5.3.5	Land Use Considerations	103
5.3.6	Land Use Projects	103
5.3.7	Sustainable Community Expansion Outcomes	103
<b>5.4</b>	<b>Community Facilities and Services</b>	<b>104</b>
5.4.1	Best Practice	104
5.4.2	Overview of Current Situation	104
5.4.3	Issues Overview	108
5.4.4	Land Use Considerations	109
5.4.5	Sustainable Community Facilities and Services Outcomes	110
5.4.6	Useful Resources	110
<b>6</b>	<b>Infrastructure</b>	<b>112</b>
<b>6.1</b>	<b>Water</b>	<b>114</b>
6.1.1	Best Practice	114
6.1.2	Overview of Current Situation	115
6.1.3	Issues Overview	117
6.1.4	Land Use Strategies	118
6.1.5	Land Use Considerations	119
6.1.6	Sustainable Water Infrastructure Outcomes	119
<b>6.2</b>	<b>Sewer</b>	<b>120</b>
6.2.1	Best Practice	120
6.2.2	Overview of Current Situation	120
6.2.3	Issues Overview	121
6.2.4	Land Use Strategies	122
6.2.5	Land Use Considerations	122
6.2.6	Land Use Projects	123
6.2.7	Sustainable Sewer Infrastructure Outcomes	123
6.2.8	Useful Resources	123
<b>6.3</b>	<b>Waste</b>	<b>124</b>
6.3.1	Best Practice	124
6.3.2	Overview of Current Situation	124
6.3.3	Issues Overview	125
6.3.4	Land Use Strategies	126
6.3.5	Land Use Considerations	126
6.3.6	Land Use Projects	127
6.3.7	Sustainable Waste Infrastructure Outcomes	127
<b>6.4</b>	<b>Electricity</b>	<b>128</b>
6.4.1	Best Practice	128
6.4.2	Overview of Current Situation	128
6.4.3	Issues Overview	129
6.4.4	Land Use Strategies	130

6.4.5	Land Use Considerations	130
6.4.6	Sustainable Electricity Infrastructure Outcomes	130
<b>6.5</b>	<b>Telecommunication Infrastructure</b>	<b>131</b>
6.5.1	Best Practice	131
6.5.2	Overview of Current Situation	131
6.5.3	Issues Overview	132
6.5.4	Land Use Strategies	132
6.5.5	Land Use Considerations	132
6.5.6	Sustainable Telecommunication Outcomes	132
<b>6.6</b>	<b>Roads</b>	<b>133</b>
6.6.1	Best Practice	133
6.6.2	Overview of Current Situation	133
6.6.3	Issues Overview	134
6.6.4	Land Use Strategies	134
6.6.5	Land Use Considerations	135
6.6.6	Sustainable Road Infrastructure Outcomes	135
<b>6.7</b>	<b>Drainage</b>	<b>137</b>
6.7.1	Best Practice	137
6.7.2	Overview of Current Situation	137
6.7.3	Issues Overview	137
6.7.4	Land Use Strategies	137
6.7.5	Land Use Considerations	138
6.7.6	Sustainable Drainage Infrastructure Outcomes	138
<b>6.8</b>	<b>Air Access</b>	<b>139</b>
6.8.1	Best Practice	139
6.8.2	Overview of Current Situation	139
6.8.3	Issues Overview	140
6.8.4	Land Use Strategies	140
6.8.5	Land Use Projects	140
6.8.6	Land Use Considerations	141
6.8.7	Sustainable Air Infrastructure Outcomes	141
<b>6.9</b>	<b>Sea Access</b>	<b>142</b>
6.9.1	Best Practice	142
6.9.2	Overview of Current Situation	142
6.9.3	Issues Overview	143
6.9.4	Land Use Strategies	143
6.9.5	Land Use Considerations	144
6.9.6	Sustainable Sea Access Outcomes	144

# Appendices

Appendix 1	Fauna & Habitat Assessment	RPS Environmental Consultants
Appendix 2	Vegetation Communities & Regional Ecosystem Assessment	3D Environmental
Appendix 3	Cultural Heritage Assessment	Arafura Consulting

## Maps

Map 1	Regional Location	21
Map 2	Satellite Image of Warrabe	22
Map 3	Satellite Image of Warraber Village	27
Map 4	Tenure Plan	32
Map 5	Vegetation	37
Map 6	Significant Watercourses & Habitats	39
Map 7	Coastal Management and Climate Change	58
Map 8	Potential Acid Sulfate Soils	70
Map 9	Bushfire Risk	75
Map 10	Traditional Place Names (Warraber)	81
Map 11	Land Use	100
Map 12	Village	101
Map 13	Village	102
Map 14	Water Infrastructure	116
Map 15	Sewer Infrastructure	121
Map 16	Electricity Infrastructure	129
Map 17	Telstra Infrastructure	132

# Tables

Table 1	Present and Predicted Tide Levels	57
Table 2	Population Growth	90
Table 3	Population Characteristics	90
Table 4	Estimated Population Growth and Housing Demand	96
Table 5	Employment Sectors	104
Table 6	Community Facilities	106
Table 7	Retail and Public Office Facilities and Services	106
Table 8	Recreational Facilities	107

# Figures

Figure 1	Vegetation Fragmentation	41
Figure 2	The Coastal Zone	47
Figure 3	Storm Surge Area	59
Figure 4	Climate Change and Sea Level Rise	59
Figure 5	Present and Predicted High Tide Occurrences	61
Figure 6	Waterway and Wetland Buffer	66
Figure 7	Coastal Erosion	70
Figure 8	Acid Sulfate Soils	71
Figure 9	Bushfire Risk	75
Figure 10	Infrastructure Capacity Relative to Population Growth	99
Figure 11	Water Scheme	117

# Island Overview

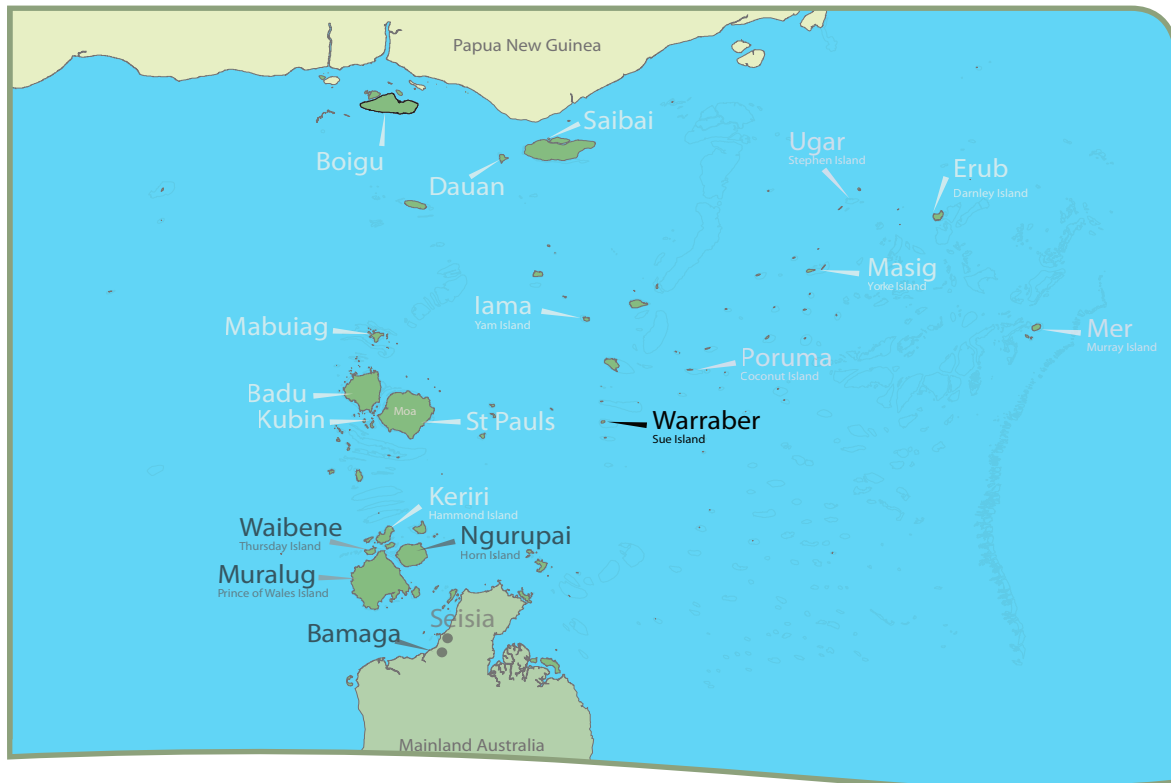


## 1.1 Location

Warraber, commonly referred to as Sue Island, is located in the central group of islands in the Torres Strait, approximately 72km north-east of Horn Island and 49km north-west of Mer (Murray Island).

Map 1 shows the location of Warraber in relation to the Torres Strait region.

Map 1 Regional Location



"approximately latitude 10013" south and longitude 142039" east."

Map 2 Satellite Image of Warrabe



Scale 1:4,000 (A3)

Satellite Imagery, Date of capture 5 Oct 2006.  
 © The State of Queensland (Department of Natural Resources, Mines and Water) 2006.  
 Based on or contains data provided by the State of Queensland (Department of Natural Resources, Mines and Water) 2006). In consideration of the State permitting use of the data you acknowledge and agree that the State gives no warranty in relation to the data (including accuracy, reliability, completeness, currency or suitability) and accepts no liability (including without limitation, for any use of the data). Data must not be used for direct marketing or be used in breach of the privacy laws.  
 Quickbird Copyright 2006 DigitalGlobe Incorporated



Torres Strait Sustainable Land Use Plans

**Warraber - Sue Island**

Satellite Image  
 9964-1200 1 of 1  
 30/03/10

For more detail, refer to Map No 9964-1200 contained in Maps.

## 1.2 Physical Characteristics

The following is an overview of the physical characteristics of Warraber.

### 1.2.1 Topography

Warraber is a low lying coral sand island approximately 1,400m long by 700m wide. It is located in the central group of islands of the Torres Strait.

A short channel has been dredged through the reef to provide sea access to the community, which is located to the east of the 720m airstrip that bisects the island. Ground level on the island varies to up to 6m above sea level.

Map 2 shows a satellite image of Warraber.

### 1.2.2 Geology

Warraber is a coral cay of very low topography. Substrates on the island are of low fertility and freely drained – composed of quartzose sand. Under vine forest, this substrate is enriched with organic matter generated from successive leaf fall events and the slow breakdown of woody matter.

Because of its small land area, the island is considerably affected on a fluctuating basis by ocean forces. Consequently, coastal erosion and loss or relocation of the beach in places is a dynamic process that can threaten, amongst other things, the permanency of coastal vegetation.

### 1.2.3 Vegetation

The vegetative landscape of Warraber is characterised by vine forests and dune grasslands.

The inland of the island supports vine forest as the dominant vegetation type. Historical land uses including village gardens, dwellings and clearing for an airstrip and the rubbish tip have resulted in a matrix of areas of forest – some of which are structurally intact and other patches at various stages of regrowth.

The vegetation report that accompanies the regional ecosystem mapping for the Torres Strait islands (Stanton, et al 2008) suggests that the vine forests on Warraber are heavily impacted.

Although this is the case in many locations, the largest patch of vine forest on the south-western



side of the airstrip supports numerous large trees of Wongai Plum and Bat's Wing Coral Tree. These canopy species are complemented by a relatively diverse understorey of shrubs and vines. Scattered throughout these patches are ubiquitous Coconut Palms (*Cocos nucifera*) that were probably planted deliberately in places.

The introduced ornamental tree Yellow Bells (*Tecoma stans*) is more or less widespread across the island and inhabits small clearings within vine forest, as well as being a popular garden addition in the town area. At first glance, this species appears to be a natural component of the vine forests; however, it is listed as a Class 3 declared weed under the Land Protection (Pest and Stock Route Management) Act 2002, and is said to pose a threat to biodiversity and is considered a potential environmental weed of Australia with a weed history overseas (Csurches & Edwards 1998).

Vine forests which cover the south-west half of Warraber, along with the coastal environment are identified as an important habitat types.

Currently, intact vegetation on Warraber with reasonable levels of structural integrity occurs as small areas within a larger disturbed mosaic on the south-west of the airstrip. Higher levels of disturbance have fragmented these vine forest communities on the north-east side of the airstrip – mostly associated with the town and the construction of sewerage line.

For the most part, even the small polygons of remnant vegetation (as shown on the recent regional ecosystem mapping (Stanton et al, 2008) are slowly being modified by edge effects and the infiltration of weeds such as *Leucaena* (*Leucaena leucophylla*) and the ornamental Yellow Bells tree (*Tecoma stans*). Under these conditions the undisturbed vegetation patches grade into disturbed areas in a state of regeneration to form larger tracts of vegetation and consequently, habitat for fauna.

Where this is the case, it is apparent that the disturbed patches support comparable fauna diversity to their contiguous undisturbed patches. Thus a 'node' of vegetation is created

where disturbed and undisturbed patches are of similar importance and combined, represent an important habitat resource.

The concentration of the town area on the north-east of the island has by default, constrained impacts to the immediate vegetation. These impacts are not considered to be severe, although the cumulative effect of low intensity impacts is difficult to quantify in the short-term.

The airstrip therefore, provides a useful buffer between the higher probabilities of impacts associated with the town area and the periodically disturbed sections of vine forest on the south-western portion of the island.



### 1.2.4 Waterways, Wetlands and Coasts

There are no discernible watercourses on the coral cay of Warraber.

The coastal habitat category contains low thickets of shrubby vegetation interspersed in the grassland provide habitat for birds such as the Varied Honeyeater (seen frequently), the Chestnut-breasted Mannikin, the Australian Pratincole and the Black-faced Cuckoo-shrike.

Sandy beaches and exposed reef flats, some areas with thin accumulations of marine silt, characterise the somewhat simple structural attributes of this broad habitat type, refer Plate 3. Because of the direct association of the foredune with the high beach, the habitat afforded by prostrate vegetation of creepers and hardy grasses is included in the coastal environment habitat category.

These environments, particularly where disturbance and pressures from the town (i.e. dogs, vehicles and human visitation) are low, provide good roosting and foraging sites for waders and oceanic birds, some of which are migratory species. Notable birds observed foraging along beaches and on exposed reef flats include whimbrels, beach stone curlews, sooty oystercatchers and many other habitat-specific species.

The high-beach at its junction with the foredune around the north-east of the island is a habitat zone worthy of conservation, as are other coastal sections of similar quality. This relatively intact habitat is frequented by Beach Stone Curlews – a bird of conservation significance and listed as vulnerable under Commonwealth legislation (Environment Protection and Biodiversity Conservation Act 1999).

This stretch of beach also provides a separation buffer between the proposed resort and the existing town area. Other coastal zones around the island afford the unique habitat feature necessary for wading birds.

Although relatively low in numbers, waders are generally regarded as transitory species that migrate to the northern hemisphere from April to November. The waders observed are likely to be those species that overwinter in the southern hemisphere.

As mentioned previously, coastal zones of Warraber hold special importance for a range of conservation significant birds such as the beach stone curlew. Also, this zone has the potential to support other significant species such as the Little Tern (*Sternula albifrons*) and Eastern curlew (*Numenius madagascariensis*).



### 1.3 The Village

The village is located on the eastern side of the island, and is separated from the western side by a 720m airstrip which bisects the island. Land to the west of the airstrip is uninhabited and contains large vegetated areas, as well as the island's water storage area and waste depot.

Map 3 shows a satellite image of Warraber Village.

### 1.4 Population

The 2006 Census shows the total population of Warraber as 269, an increase of (15.0%) from the 2001 Census (234).

The growth rate was 2.8% or 7 persons per year in the 5 years between 2001-2006.

The growth rate was 2.3% over the 10 years to 2006.

The estimated population of Warraber in 2009 is 292 persons.



Map 3 Satellite Image of Warraber Village



For more detail, refer to Map No. 9964-1105 contained in Maps.

# Land Tenure & Native Title



## 2.1 Land Tenure

### 2.1.1 Best Practice

- Recognise ownership of traditional lands.
- Understand land tenure systems, particularly customary systems, when development land.
- A co-operative approach between all parties to land tenure, native title, development and land-management issues..

### 2.1.2 Overview of Current Situation

The legal tenure of Warraber consists of a Deed of Grant in Trust (DOGIT) shown as Lot 4 on TS171, Parish of Adolphus, County of Torres in the state of Queensland.

As the land is held in DOGIT, the term 'lot', in this Plan refers typically to the land surrounding a house or a building.

Generally, the DOGIT covers most of the community including houses, council officers, shops and some roads and general infrastructure.

At the time of granting the DOGIT, some land was retained by the State of Queensland for specific purposes. Generally, these reservations were minor and may include land such as airstrips, some roads and community facilities such as schools. A search of the State government's land tenure system is required to determine the exact tenure of the land.

The airstrip Lot 8, School Lot 7, pre-school Lot 6, Lot 63 and the church are excluded from the DOGIT.

The Torres Strait Island Regional Council (TSIRC) is currently the trustee of the DOGIT, acting on behalf of the Torres Strait Islanders of the community. Council may issue leases over part of the DOGIT for various specific purposes including leases for infrastructure purposes (e.g. Telstra and Ergon Energy), Australian Customs

Service facilities, health centres and commercial purposes. The existence of these leases is disclosed by searching the State's tenure database.

### 2.1.3 Issues Overview

Discussion is required with Traditional Owners and the TSRIC with regard to approval for the provision of new development and infrastructure on the island. However, consideration also needs to be given to those members of the community who do not possess traditional land to ensure they and their families have the opportunity for housing.

The Aboriginal and Torres Strait Islander Land Amendment Act 2008 was passed by the State government on 13 May 2008. The amendments in the Act aim to:

- encourage home ownership and provide long term leases for housing;
- assist the transfer of land not required for village purposes (outside of townships) to Indigenous land trusts;
- encourage economic development in Indigenous communities; and
- facilitate the construction of public infrastructure by providing a compulsory acquisition process.

This Act will change the land tenure on Warraber and, once in effect must be monitored.



## 2.1.4 Sustainable Land Tenure Outcomes

- Consultation with the TSIRC, Native Title Prescribed Body Corporate, Land Trusts and Traditional Owners occurs on a regular basis with their knowledge and values respected.
- Communities are in the best position to identify and prioritise their needs and recommend how governments can best meet those needs.



## 2.1.5 Useful Resources

### Legislation

*Aborigines and Torres Strait Islanders (Land Holding) Act 1985 (Qld)* outlines the process for providing the grant of leases in perpetuity and other land to members of Torres Strait Island Communities.

[www.legislation.qld.gov.au](http://www.legislation.qld.gov.au)

*Land Act 1994 (Qld)* deals with the administration and management of non-freehold land and DOGIT and the creation of freehold land.

[www.legislation.qld.gov.au](http://www.legislation.qld.gov.au)

*The Aboriginal and Torres Strait Islander Land Amendment Bill 2008* amends the *Aboriginal Land Act 1991*, the *Torres Strait Islander Land Act 1991*, the *Land Act 1994*, the *Local Government (Aboriginal Lands) Act 1978* and the *Native Title (Queensland) Act 1993*.

[www.legislation.qld.gov.au](http://www.legislation.qld.gov.au)

*Torres Strait Islander Land Act 1991 (Qld)* provides for the grant and claim and grant, of land as Torres Strait Islander Land and for other purposes.

[www.legislation.qld.gov.au](http://www.legislation.qld.gov.au)

*Native Title Act 1993 (Cth)* provides for the recognition and protection of Native Title rights and interest and establishes mechanisms for how future development and actions affect Native Title.

[www.comlaw.gov.au](http://www.comlaw.gov.au)

### Policies, Guidelines and Fact Sheets

*A Guide to Land Tenure in Queensland* outlines the types of tenure used in Queensland, including DOGITs, their characteristics and the various provisions of legislation, which apply to each.

[www.nrw.qld.gov.au/land/state/publications](http://www.nrw.qld.gov.au/land/state/publications)

### Websites

Department of Environment and Resource Management

[www.derm.qld.gov.au](http://www.derm.qld.gov.au)

## 2.2 Native Title

### 2.2.1 Best Practice

- Native title should respect, protect and identify the community's cultural heritage for present and future generations.
- A co-operative approach between all parties to land tenure, native title, development and land-management issues.
- Establish communication prior to starting a project to ensure inclusion and participation
  - involve the community in genuine negotiation at every stage of a project.
- Be sensitive of issues of language, naming and expression.
- Examine assumptions carefully – ask first, do not assume.
- Be informed about appropriate times to undertaken consultation and negotiation
  - be respectful fully of deaths in communities and cultural events.

### 2.2.2 Overview of Current Situation

Native title rights are held by the Warraberalgal (Warraber People) as determined by a consent determination on 15 August 2005<sup>1</sup>. Native title rights exist in the entire determination area and is to be held in trust by the Warraberalgal (Torres Strait Islanders) Corporation.

A native title sea claim is yet to be determined.

As of October 2009, the National Native Title Tribunal records indicated the following Indigenous Land Use Agreements (ILUAs):

- Warraber Island Primary Health Care Centre ILUA (No. QI2007/029 - Access);
- Warraberalgal/Ergon Energy ILUA (No. QI01/71 – Access and Infrastructure); and
- Warraber/Telstra Island ILUA (No. QI01/12 – Infrastructure).

Additionally, some major projects have reached agreements with the Native Title Prescribed Body Corporate (PBC) for the development to proceed. As of June 2008, there was one Warraber native title agreement for the sewerage scheme. An agreement was reached with the Community/PBC for the recent dump and the rehabilitation of the old dump.

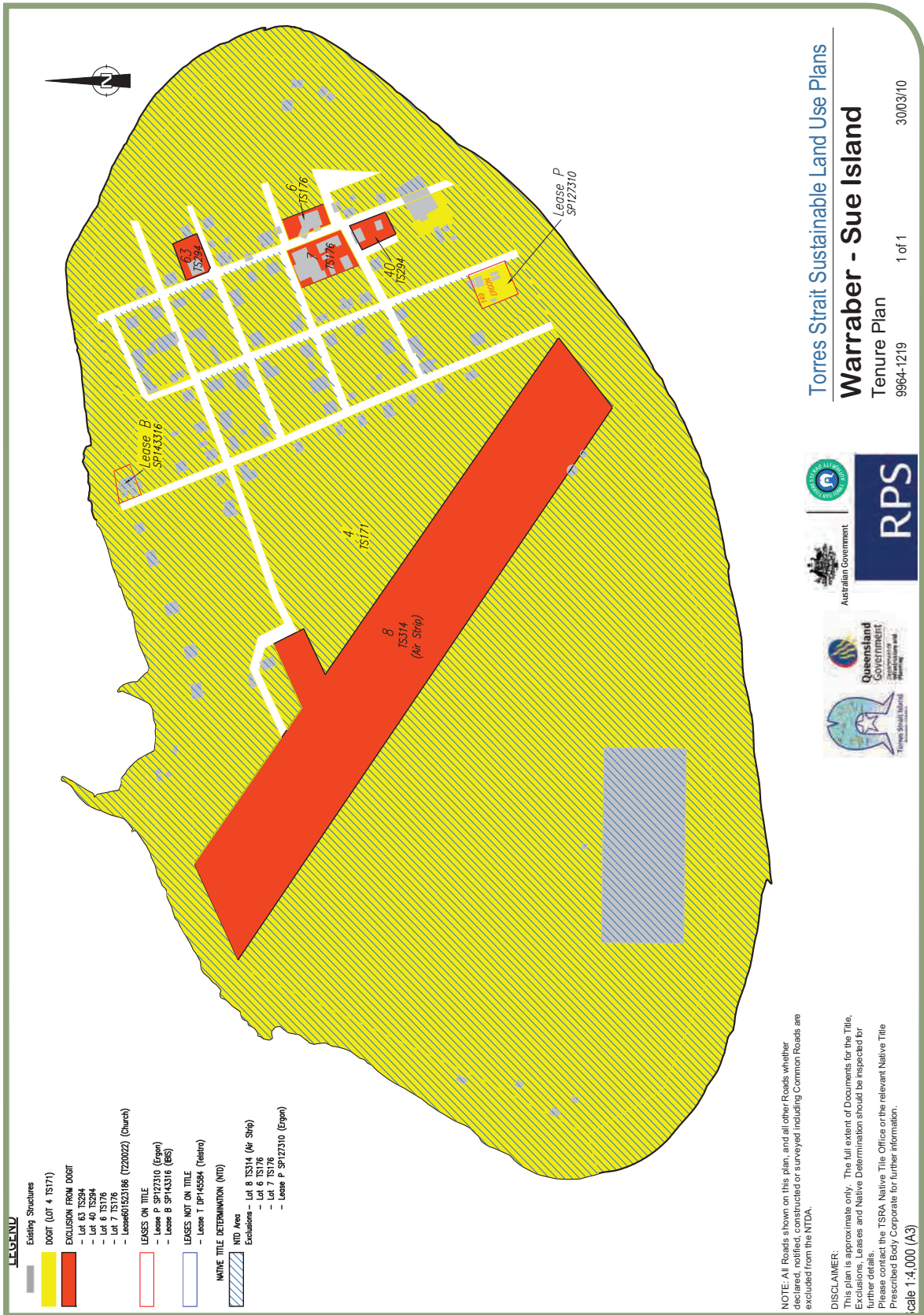
Communication with the relevant Native Title Prescribed Body Corporate (PBC) will assist developers to identify local areas and objects of significance and avoid or mitigate disturbance. The Torres Strait Regional Authority (TSRA) through its Land and Sea Management Unit (LSMU) and Native Title Office can assist in contacting the relevant PBCs. The TSIRC will also be able to help with identifying the correct PBC contacts.

Map 4 shows the tenure and native title interests over the community.



<sup>1</sup> Patrick Thaiday & Ors on behalf of the Warraber, Poruma and Iama Peoples v Queensland & Ors [2005] FCA 1116

Map 4 Tenure Plan



For more detail, refer to Map No. 9964-1219 contained in Maps.

### 2.2.3 Issues Overview

Final decisions over native title claims can take time and it is essential to continue the provision of infrastructure to communities whilst a native title claim is being determined.

The Native Title Act 1993 provides a system or process to facilitate dealings that may affect native title. Both during the claim process and after native title is recognised.

Native title claimants and those recognised as native title holders have the right to negotiate about some future acts, such as the proposal of a proposed development. As native title has been determined, a PBC has been established to represent native title interests. In many cases, an agreement is made between the PBC, the TSIRC and the proponent of the development to allow a development to proceed. Such developments have typically included the provision of major infrastructure such as reticulated sewerage schemes, or areas of land for subdivision expansion.

Enquiries should be made with the PBC, the TSIRC and or the TSRA's Native Title Office to determine if there are any existing agreements.

#### Indigenous Land Use Agreements

ILUAs are voluntary agreements about the use and management of land and or water made between a native title party and other people who have an interest in the land and or water covered by the claim such as pastoralists, farmers, resource explorers and producers, fishers, local government and State government officers. ILUAs are registered with the National Tribunal making them legally binding on the people who are parties to the agreement and all native titleholders for that area. ILUAs achieve certainty over access to and sustainable use of land, water and resources through negotiated recognition and just settlement leading to the resolution of native title claims.

### 2.2.4 Sustainable Native Title Outcomes

- Consultation with the Prescribed Body Corporate, Land Trusts and Traditional Owners occurs on a regular basis with their knowledge and values respected.
- ILUAs are encouraged, implemented and respected.
- Promotion of effective communication and transparent processes that are flexible to reflect particular circumstances of the community.

## 2.3 Useful Resources

### Legislation

*Native Title Act 1993 (Cth)* provides for the recognition and protection of Native Title rights and interest and establishes mechanisms for how future development and actions affect Native Title.

[www.comlaw.gov.au](http://www.comlaw.gov.au)

### Indigenous Land Use Agreements

*National Native Title Tribunal*

[www.nntt.gov.au](http://www.nntt.gov.au)

### Policies, Guidelines and Fact Sheets

*Guidelines for Negotiation of an Indigenous Land Use Agreement* provides information on negotiating and registering an ILUA including the different types of ILUAs, the steps for negotiating an ILUA and the process for registering an ILUA. It also includes a sample ILUA.

[www.nrw.qld.gov.au/publications/nativetitle](http://www.nrw.qld.gov.au/publications/nativetitle)

### Websites

*Department of Environment and Resource Management*

[www.derm.qld.gov.au](http://www.derm.qld.gov.au)

*National Native Title Tribunal*

[www.nntt.gov.au](http://www.nntt.gov.au)

# Natural Environment



**The natural environment, or the land and sea, is the core of Torres Strait communities' way of life, both now and in the future. Its existence, condition and health are essential to Community health. Their future, economy and way of life cannot be separated from how the land and sea is managed.**

Land and sea is so fundamental to Warraber Community that the impacts on land and sea must be part of all decisions and plans.

This Plan addresses the following with regard to the natural environment:

- plants, animals and birds;
- coastline;
- tides and storm surges;
- waterways and wetlands;
- land and soil; and
- bushfire.

A report by RPS Environmental Scientists was undertaken on Warraber over a five day visit in early 2009. This report provides a snapshot in time and a base line for future studies and identified key natural assets, habitats, watercourses and natural land use issues for the community. It is not intended to be a

complete scientific analysis of Warraber's natural environment. The report is written for the Warraber community, the TSIRC and the TSRA. The Fauna and Habitat Assessment of Warraber, prepared by RPS Environmental Scientists, is included as Appendix 1.

Mapping of the Torres Strait regions remnant vegetation was undertaken in 2007/08 by 3D Environmental. The study identified vegetation communities across all islands and was undertaken to provide data suitable for adoption under the old State remnant vegetation regime administered by the Department of Natural Resources and Water (NRW). By late 2008, the draft mapping being provided by NRW had been completed but not made available to the public. The Vegetation Communities and Regional Ecosystem Assessment, prepared by 3D Environmental, is included as Appendix 2.



## 3.1 Plants, Animals and Birds

### 3.1.1 Best Practice

- The present generation ensure the health, diversity and productivity of the plants, animals and birds is maintained or enhanced for the benefit of future generations through:
  - the protection and conservation of native plants, animals, birds, habitat and habitat corridors;
  - conservation efforts focus on those plants, animals and birds which are uncommon and at risk;
  - clearing of native vegetation, which results in the loss of uncommon, at risk or threatened plants or the animals and birds that live in those areas, is minimised;
  - using renewable natural resources sustainably and sensibly without significantly impacting other land uses;
  - managing animals, pests, weeds and disease so that their impact on the land and sea is minimised or avoided; and
  - integrating land and sea planning and management to ensure the negative impacts of human actions (e.g. development, vegetation clearing) on plants, animals and birds is minimised or prevented.
- The pattern of development on the community recognises the importance of plants, animals and birds, natural resources and their fundamental relationship to the quality of life and viability of the community and the wellbeing of its residents.
- Reduce the impacts of climate change on plants, animals and birds by:
  - recognising the importance of climate change on plants, animals and birds of the community;
  - avoiding decisions now that will make it more difficult to manage the impacts of climate change in the future; and
  - building understanding and knowledge of the community to address the impacts of climate change on the island's plants, animals and birds.



### 3.1.2 Overview of Current Situation

The land and sea of Warraber is the home or habitat of a range of plant and animal species. Apart from Traditional Owners' knowledge, there is very little recorded data on Warraber. The preliminary fieldwork undertaken by RPS Environmental Scientists is part of the ongoing process of recording and identifying significant habitat, plants, birds and animals on Warraber.

The notable ecological and habitat features of Warraber are the:

- Coastal habitat for rare sea birds and waders.
- Vine forest patches with high biodiversity and habitat characteristics.
- Coastal dune system with protective vegetation cover.
- Endangered Spitting Cucumber Vine (*Muellerargia timorensis*) – present along the edges of vine forest on the north-west corner of Warraber.

Notable rare and threatened fauna observed on Warraber include:

- Beach Stone Curlew - (*Esacus magnirostris*) – Vulnerable (NCA);
- Little tern (*Sternula albifrons*) – Endangered (NCA);
- Eastern curlew (*Numenius madagascariensis*) – Rare (NCA);
- Spectacled Flying Fox (*Pteropus conspicillatus*) – Vulnerable (EPBC);
- Sooty Oystercatcher (*Haematopus fuliginosus*) – Rare (NCA).

Further details on habitat and fauna are included as Appendix 1.

Map 5 shows the significant vegetation communities on Warraber.

#### Map 5 Vegetation



For more detail, refer to Map No. 9964-1205 contained in Maps.

**“Plants, animals and birds are essential to the well being of the community as they are frequently associated with cultural significant activities and events. So, significant plants, animals and birds and their habitat need to be protected as they are part of the history and the future for the next generation.”**

Several habitat types were identified on Warraber, including but not limited to:

#### **Vine Forests**

The inland of the island supports vine forest as the dominant vegetation type. Historical land uses including village gardens, dwellings and clearing for an airstrip and the rubbish tip have resulted in a matrix of areas of forest – some of which are structurally intact and other patches at various stages of regrowth.

The vegetation report that accompanies the regional ecosystem mapping for the Torres Strait islands (Stanton, et al 2008) suggests that the vine forests on Warraber are heavily impacted.

Although this is the case in many locations, the largest patch of vine forest on the south-western

side of the airstrip supports numerous large trees of Wongai Plum and Bat’s Wing Coral Tree. These canopy species are complemented by a relatively diverse understorey of shrubs and vines. Scattered throughout these patches are ubiquitous Coconut Palms (*Cocos nucifera*) that were probably planted deliberately in places.

Leaf litter production in the island’s vine forests is high at times of prolonged water stress (i.e. during the driest periods of the year) and significantly contributes to the ground layer diversity and utility to ground-dwelling fauna – notably reptiles such as the large Bar-lipped Sheen-skink (*Eugongylus rufescens*).



### Coastal Environments

Sandy beaches and exposed reef flats, some areas with thin accumulations of marine silt, characterise the somewhat simple structural attributes of this broad habitat type. Because of the direct association of the foredune with the high beach, the habitat afforded by prostrate vegetation of creepers and hardy grasses is included in the coastal environment habitat category.

These environments, particularly where disturbance and pressures from the town (i.e. dogs, vehicles and human visitation) are low, provide good roosting and foraging sites for waders and oceanic birds, some of which are migratory species. Notable birds observed foraging along beaches and on exposed reef flats include whimbrels, beach stone curlews, sooty oystercatchers and many other habitat-specific species.

Coastal zones of Warraber hold special importance for a range of conservation significant birds such as the beach stone curlew. Also, this zone has the potential to support other significant species such as the Little Tern (*Sternula albifrons*) and Eastern curlew (*Numenius madagascariensis*).

Map 6 shows the habitat areas on Warraber.



Map 6 Significant Watercourses & Habitats



For more detail, refer to Map No. 9964-1206 contained in Maps.

**“Habitat areas are the different places that plants, animals and birds live and grow. Habitat areas provide food, water and shelter for plants, animals and birds.”**

### 3.1.3 Issues Overview

The remaining and distinct vegetated character of Warraber relies on the retention of biodiversity and ecosystems. In addition, many of the fauna species identified on Warraber are habitat specific or specialist animals – often requiring particular resources to persist in a given environment. The presence of threatened birds highlights the regional significance of Warraber to provide high quality habitat and long-term safe refuge for species of conservation importance.

For these reasons, it is vital that land must be protected for conservation purposes. The forest habitat is the most widespread vegetation community on Warraber. It is likely that the vulnerable Flying-fox utilises this forest habitat for foraging of fleshy fruits such as the Wongi. The continued preservation of this habitat is considered essential for maintaining diversity of species on Warraber.

Vine forest habitats contain the highest diversity of plant species on Warraber.

Coastal habitats are integral to many birds that inhabit the littoral fringe of the island and the sand and mudflats that are exposed at low tide.

**“biodiversity (biological diversity) is the variety of all life forms, including the different plants, animals and micro-organisms, the genes they contain and the ecosystem of which they form a part of”**

The main risk to continued health and diversity of local species is from continued fragmentation and disturbance of the existing habitat and the introduction of weeds and pests.

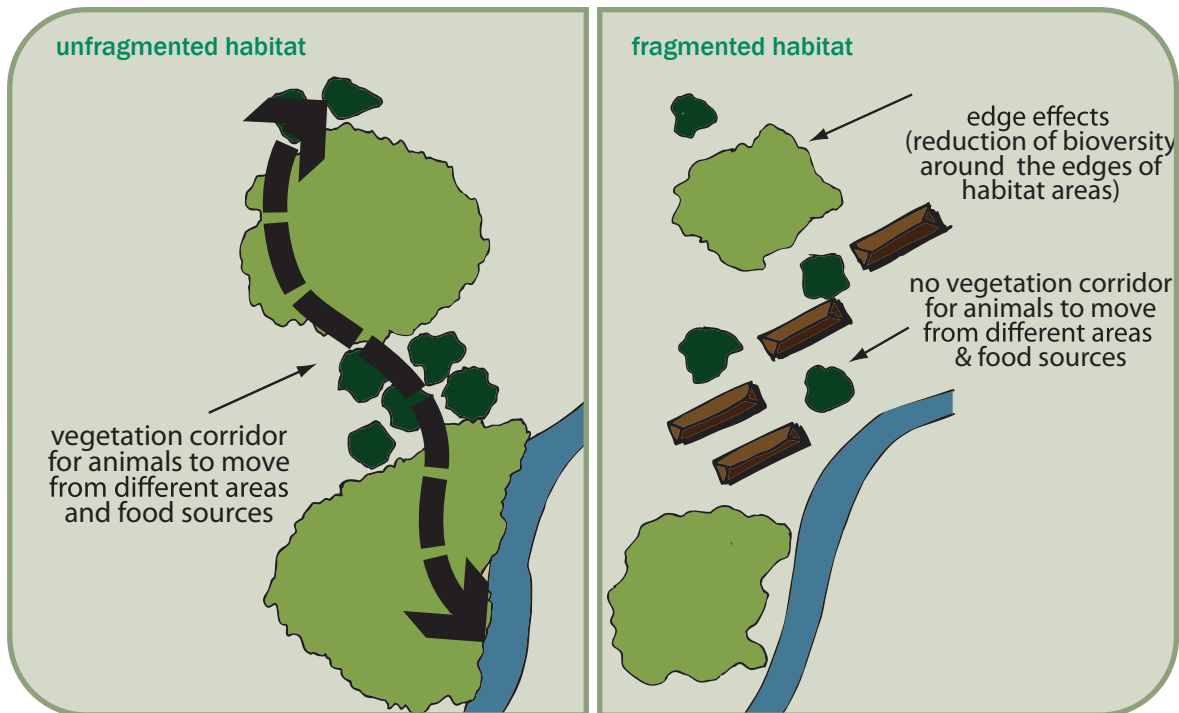
Figure 1 shows the effects of fragmentation on vegetation

Dogs are present in small numbers on the eastern half of the island, with a concentration of animals roaming free along a short section of the north-eastern shoreline adjacent to the town area. These dogs pose a threat to seabirds, particularly the Beach Stone Curlew, which was sighted in this area. Although problem dogs are euthanized on a periodic basis, their numbers should be monitored and regulated management is recommended to offset risks to public and environmental health, and resident fauna.



“fragmentation is caused when vegetation and habitat areas are cleared resulting in these areas being divided into smaller, isolated patches”

Figure 1 Vegetation Fragmentation



### 3.1.4 Land Use Strategies

To minimise the impact of existing and future development on Warraber’s plants, animals and birds, the following strategy is recommended:

- Those areas that are of critical environmental significance, host rare and endangered species, are in pristine condition and corridors that provide for the safe movement and successful breeding of wildlife should be protected:
  - from development
  - with a buffer of peripheral plantings of dense tree species to minimise encroachment into adjacent areas.
- A summary of the general conclusions and environmental principles that should be adopted is provided to assist with planning actions. The prominent environmental values and activities or considerations include:
- Coastal environments provide complex habitat values that are of high environmental significance as ecological habitat and for maintaining marine and terrestrial biodiversity.
- Habitat for the conservation significant birds (the Beach Stone Curlew and the Sooty Oystercatcher) is currently in good condition (albeit subject to the dynamic changes caused by tidal and coastal forces). These habitat areas are unlikely to be affected by development, but should be afforded a buffer separation from any proposed new developments.
- Development is located in a constrained area in the current town location. Opportunities exist for controlled development between Phillemon Street and the airstrip in the vicinity of the sewer line.
- Grassland communities occurring on hind dunes provide important coastal protection and reduce sand-stripping from the dune system, and therefore reduce coastal erosion. Future development should consider the importance of this particular land zone, and any construction

work in these areas should aim at no net loss or alteration of vegetation covers.

- Dogs (and cats) should be monitored to assess the level of becoming problematic, and their numbers should be controlled and regulated through destruction of stray animals and the implementation of a requirement for reduced domestic pet numbers.
- A monitoring program for introduced animals from shipping activities to prevent pest introduction (such as introduced rats or cane toads that also have an economic impact with respect to their control);

### 3.1.5 Land Use Considerations

In assessing the impacts of future development on Warraber, the following key questions are to be raised. If the answer to any of the questions is 'NO', the proposal must, a) justify the inconsistency, b) be amended, or c) not be accepted.

- Is the development in accordance with the Plants, Animals and Birds Best Practice, Land Use Strategy and Sustainable Outcomes?
- Has the development addressed its impact on the natural environment of Warraber?
- Has a minimum of 10 metres but up to 40 metres buffer been provided between the development and wading bird habitats and coastal vegetation (the buffer areas should consist of be coastal vegetation)?
- Is the development outside of areas identified for conservation particularly in areas such as forests in the western area of Warraber, along the southern and eastern tip of the island and the area south of the water storage area?



- Where new corridors are being created as part of a revegetation program do they:
  - have a minimum width of 50 metres
  - link remnant areas of bushland habitat
  - provide landscape connectivity
  - propose to revegetate using seed collected from plants that are indigenous to the Island
  - use plants grown from the area being revegetated
  - introduce inappropriate non-indigenous plants into the natural areas
  - propose to control weed growth and remove areas of infestation?
- If development is being proposed in the village, or around existing infrastructure or in proposed investigation areas:
  - are buffers, a minimum of 50 metres wide being provided between the development and the area requiring protection
  - does the proposed landscaping use plants native to Warraber
  - will it introduce inappropriate plants into the natural areas
  - does it propose to control weed growth and eradicate areas of festation

### 3.1.6 Land Use Projects

To minimise existing and future impact to Warraber plants, animals and birds, the following projects are recommended:

- Revegetate and restore the vegetation along the sewer outfall line, including the establishment of other habitat corridors and linkages where opportunities exist
- Revegetate around the perimeters of existing development, landfill and infrastructure, with densely landscaped peripheral plantings of native plants be planted to minimise human encroachment into natural areas
- Implement a cat and dog management plan
- Commence a community environmental awareness program of the dangers of vehicular use of the beach and sand flat areas to the wader bird habitats

### 3.1.7 Sustainable Plants, Animals and Bird Outcomes

- The unique environmental values of the community are maintained and enhanced for current and future generations.
- The ecologically significant systems, sensitive coastal systems, areas identified as rare, endangered or vulnerable or environmental value are preserved and protected for nature conservation, landscape/scenic quality, biodiversity and habitat values, to ensure the integrity of natural processes.
- Sustainable development practices minimise the effects of development on plants, animals and birds.
- Areas that have rare, endangered or vulnerable plants, animals and bird habitats should be protected from development.
- Intensification of land uses and new development sites should not reduce the community's plants, animals and birds.
- Encourage community participation in planning, restoring and protecting the community's natural environment.

### 3.1.8 Useful Resources

#### Legislation

*Environmental Protection and Biodiversity Conservation Act 1999 (Cth) provides for the protection of the environment, particularly those areas of national significances, promotes the conservation of biodiversity and promotes a co-operative approach to the protection and management of the environment with Torres Strait Islanders.*

**[www.comlaw.gov.au](http://www.comlaw.gov.au)**

*Nature Conservation Act 1992 (Qld) provides a process to protect significant habitat areas and identify plants, animals and birds, which are rare, threatened or endangered and mechanisms to protect and conserve them.*

**[www.legislation.qld.gov.au](http://www.legislation.qld.gov.au)**

*Vegetation Management Act 1999 (Qld) deals with the management and conservation of*

*remnant vegetation.*

**[www.legislation.qld.gov.au](http://www.legislation.qld.gov.au)**

#### Policies, Guidelines and Fact Sheets

*Biodiversity – on our agenda provides an overview of what is biodiversity and why it is important to conserve our plants, animals and birds*

**<http://www.nrm.gov.au/publications/factsheets>**

*National Strategy for the Conservation of Australia's Biodiversity outlines the processes and systems implemented by the federal government to protect biological diversity and maintain ecological processes.*

**[www.environment.gov.au/biodiversity/publications/strategy](http://www.environment.gov.au/biodiversity/publications/strategy)**

*Queensland Biodiversity Policy Framework: sustaining our national wealth outlines the state government's approach to nature conservation, environmental protection and responsible land use planning to secure favourable environmental, economic and social outcomes.*

**[www.derm.qld.gov.au/services\\_resources/index.php](http://www.derm.qld.gov.au/services_resources/index.php)**

#### Websites

*Caring for our Country*

**[www.nrm.gov.au](http://www.nrm.gov.au)**

*Department of Environment and Resource Management*

**[www.derm.qld.gov.au](http://www.derm.qld.gov.au)**



## 3.2 Coastline

### 3.2.1 Best Practice

- The natural dynamic processes that shape the coast and beaches are respected.
- Maintain and enhance connectivity between marine and coastal habitat to ensure the healthy function of the coastal zone and marine environments.
- Coastal resources are used sustainably and sensibly.
- The community's dependence on coastal resources for hunting and fishing is respected and integrated into the planning and management of the coastal zone.
- The ecological and cultural importance of the coastal zone is not compromised by inappropriate development and activities.
- Development within the coastal zone is managed in accordance with the principles of ecologically sustainable development and does not compromise access to the coastal zone.
- Reduce impacts of climate change on the coastline by:
  - recognising the importance of climate change on the coast;
  - avoiding quick decisions now that will make it more difficult to manage climate change risks in the future; and
  - building understanding and capacity of the community to deal with the impacts of climate change on the island's coastline

### 3.2.2 Draft Queensland Coastal Plan

The Draft Queensland Coastal Plan was released for comment in late 2009.

Extracts from the Draft policy appear below...

The Draft Queensland Coastal Plan—which includes a Draft State Planning Policy Coastal Protection—makes a significant shift from the previous approach to ensure that coastal protection policies remain effective. The Draft Queensland Coastal Plan addresses planning for future urban development in and near coastal locations and—using the most up-to-date projections from climate change science—incorporates actions on the risks that climate change impacts pose to Queenslanders and our coastal resources.

The coastal zone is under significant and ongoing pressure—managing increasing demands to accommodate rapidly growing urban populations, maritime development, recreation and tourism facilities and long-term land

management practices in coastal catchments. These demands have accelerated the loss of coastal resources—such as biodiversity—along developed sections of the coast.

Modifications to the coast by various structures have also interfered with coastal processes such as the natural movement of sand and sediment. As a result, sand from beaches has been lost, foreshore vegetation lost, and the capacity of natural systems to adjust to the impacts of likely coastal hazards has been reduced.

The trend to establish development very close to the coast or in low-lying areas is placing many communities at risk from coastal hazards. These hazards include coastal erosion, storm tide inundation and permanent inundation as a result of sea level rise. The impacts of climate change—particularly accelerated sea level rise and cyclone and storm intensity—are increasing the coast's exposure to hazards within a relatively short timeframe.

The Draft Queensland Coastal Plan, which includes the Draft State Planning Policy Coastal Protection, aims to:

- maintain physical coastal processes
- conserve and protect coastal resources
- continue public awareness and appreciation of coastal resources
- retain and enhance public access to the coast
- protect life and property from coastal hazards (such as coastal erosion and storm tide inundation)
- identify opportunities for suitably located maritime development
- ensure ecologically sustainable development of the coastal zone.

The coastal zone encompasses Queensland's coastal waters and islands, ...and the area landward to five kilometres from the coast or to where the land is below 10 metres Australian Height Datum, whichever is further from the coast. The coastal zone extends beyond the foreshore to the coastal plains and hinterland where activities can also have a flow-on effect to the coast if not carefully managed.

Coastal management districts (CMD) are areas requiring particular development controls and management practices. The Department of Environment and Resource Management (DERM) has an assessment role as a concurrence agency, or as the assessment manager, under the Integrated Planning Act 1997 (IPA) within CMDs.

The Draft Queensland Coastal Plan proposes to adopt

- Coastal Zones – including all islands
- Coastal Management Districts - - appears to include all islands
- Sea level rise of 0.8m for climate change over the next 100 years
- Defined Storm Tide Event (default is HAT + 2.0m)
- High Hazard Inundation Area (areas with greater than 1m of inundation)
- Low Hazard Inundation Area (areas with less than 1m of inundation)

Some types of development within the Coastal Management Districts would require assessment by the Department of Environment and Resource Management (DERM).

Some types of development within the Coastal Zone and outside of the Coastal management districts would require assessment by the Torres Strait Island Regional Council (TSIRC).

Further details will be available if and when the Draft Queensland Coastal Plan is adopted.

The coastal mapping of the islands has been undertaken to show the extent of the proposed QCP zones although it is only approximate.

Further information is available at:

**[www.derm.qld.gov.au/coastalplan/index.html](http://www.derm.qld.gov.au/coastalplan/index.html)**



### 3.2.3 Overview of Current Situation

The coastline has largely been undeveloped and is in relatively pristine condition, apart from around the village and the airstrip. The Warraber village has a strong coastal focus, with the village extending between the northern and southern coasts.

The planning and management of the coastal and marine environment of Warraber is shared between the Commonwealth and state government and its agencies, the TSIRC and Traditional Owners. The Commonwealth government is responsible for waters beyond three nautical miles from low water mark of Warraber coastline.

Inside the three nautical mile limit and for coastal land, the State government exercises control of activities including licensing of waste disposal, protection of rare and endangered flora and fauna, oil pollution, mineral exploration and exploitation, water quality, marine navigation and provision of boating facilities.

The TSIRC is responsible for land above low tide watermark.

The primary consideration for Warraber coastline is the conservation and protection of its coastal environments, which are subjected to urban pressure, increasing weeds and pest infestation, recreational use and the expansion of the village along the coast. The coastal expansion of the

village could have a harmful impact on the existing landscape character of Warraber. The protection of the pristine natural environment along the coastline should be addressed in all planning documents and processes relating to Warraber.

New development or changes to existing structures along the coast must be assessed for the long-term suitability of the site and the vulnerability to natural coastal processes (coastal erosion, storm events and projected sea level rises). When constructing, upgrading or maintaining coastal infrastructure, there must be an increasing focus on the principles of ecologically sustainable development to ensure that the values and the attributes of the coastline are not compromised by inappropriate use and development of the environment.

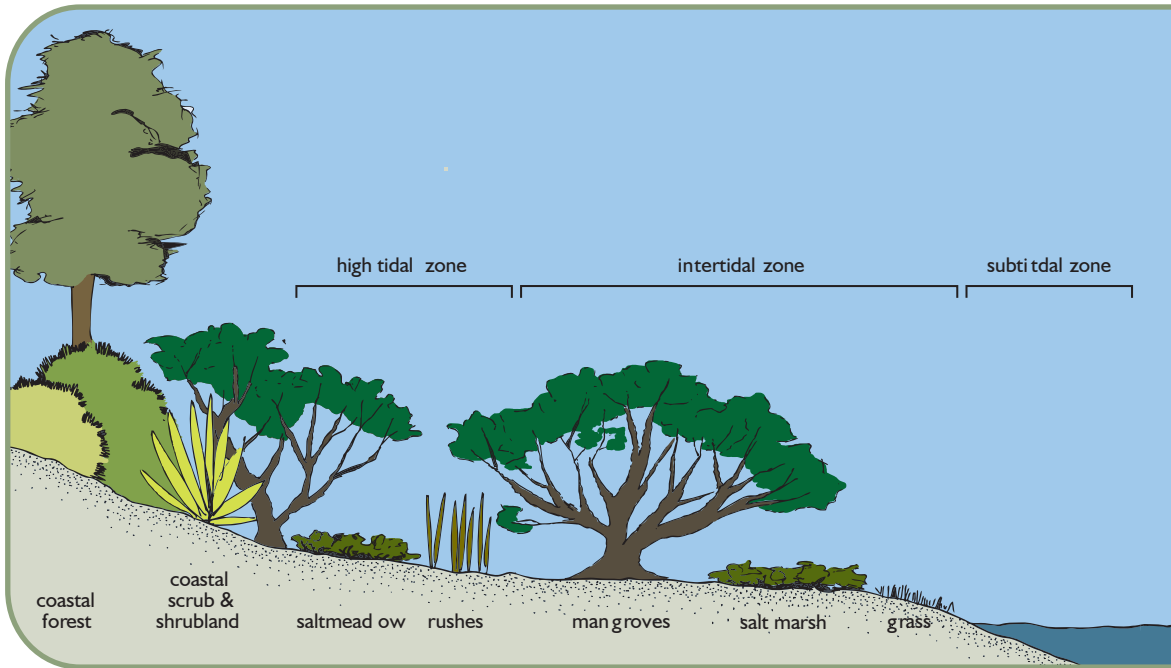
Land use planning can only make good decisions if the best information is available and is understood and supported by the community. The involvement of the community in the decision making process is essential for the successful implementation of any land use strategy.

Figure 2 shows all the different areas of the coastline, which form the 'coastal zone'.

**“Beaches are often referred to as the sandy area that separates the sea from the land. However, this area is only part of the beach system which beings in the sand dunes above the high water mark and stretches out to the sea past where the waves break.**

**In areas where beaches occur, vegetation sand dunes provide coastal protection. Sand dunes absorb the erosive energy of waves generated by cyclones and storms. Dunes also hold reservoirs of sand to replenish the beach during periods of wave erosion. Vegetation on the dunes trap and hold sand blown from the beach aiding dune build up and stopping sand from being blown inland and lost from the active beach and dune system”**

Figure 2 The Coastal Zone



There are three priority areas for coastal erosion (further described in the next section) -

- Area A ( The broken wall and tyres –northern end of Warraber)
- Area B (The Resort Corner)
- Area C (The Wongai Trees near the water storage lagoon)

The high tides do not inundate any properties (apart from the resort) at the moment.



### 3.2.4 Issues Overview

Following community concerns with coastal erosion on Warraber, the Torres Strait Regional Authority initiated the Coastal Erosion Project in 2007. This was undertaken by James Cook University (JCU) and involved field analysis of the seabed and fore dunes and the possible impacts of tides upon the Warraber coastline.

The assessment put forward by the JCU coastal erosion team (in italics below) are that there are three problem areas, namely:

#### Area A ( The broken wall and tyres –northern end of Warraber)

This area is located from in front of the new health centre to the east in front of the church. There is a seawall along this section made of various materials.

- The problem
  - The wall is in bad repair
  - There has been some erosion
  - The area is low and gets flooded
  - There is some erosion around the corner from the tyres
- Things to consider
  - The wall is built on sand (unlike the wall to the east)
  - The tyres are doing a good job holding the corner
  - It is one of the lowest points on the island
  - The area gets big NW waves. A build up of sand is unlikely
  - A new church is planned at the site of the old church
- Options and consequences
  - Do nothing and monitor
    - Changes will continue, but a trigger point for action should be identified
  - Renourishment
    - Need to find a source
    - It will probably not stay in place for long due to NW winds
    - Repair and maintain the present wall, and keep the tyres (or erect another low structure) to hold the corner in place
- Flooding will continue to be a problem. The church site would not be appropriate to build on
- Build a new wall to a higher level and extend it around the corner
  - Some protection for the church site
  - There is a problem with anchoring the wall at the eastern end
  - There could be some further erosion around from the end of the wall towards the resort
  - The sand beach in front of the wall would be lost
  - Expensive
- In relation to Area A the community wishes to further consider two possibilities:
  - Repair and maintain the present seawall, repair and maintain the present tyres (which are currently doing a good job at holding the corner), or build another similar low structure to do the same job. The consequence of this option is continued erosion around the corner towards the east, and continued infrequent flooding of the low area where there is a proposal to build a new church. The beach would be retained much as it is at present.
  - Build a new higher wall extending from the end of the permanent wall on the beachrock, around the corner past the tyres, anchoring the wall by taking it inland at the end. In combination with berm maintenance to the east, this would provide protection from flooding. However, it would mean the beach would degrade, and it is likely that there would be little or no dry sand between the wall and the reef flat. Erosion may accelerate, for a period of time, to the east of the end of the wall.



### Area B (The Resort Corner)

This area is located on the north-east corner of Warraber and has a newly constructed resort upon the lower foreshore. The resort had not commenced operation in 2009.

- The problem
  - The area is very low and flooding could become a problem
- Things to consider
  - Where the resort is, was on the reef flat only 20 years ago
  - There is no erosion problem at the moment
- Options and consequences
  - It is very low and flooding may be a problem
  - Do nothing and monitor.
    - Flooding due to sea level rise could threaten the resort infrastructure
  - Maintain an intact berm by managing tracks and vegetation. Sand could be added if it is available
    - None
  - Plans for further development in this area should consider future shoreline change and inundation.



### Area C (The Wongai Trees near the water storage lagoon)

This area is located on the southwest of Warraber near the water storage lagoons, and newly completed sewerage effluent outflow pipeline.

- The problem
  - The corner by the Wongai trees is eroding. This is an area that used to be used for picnics etc
  - The erosion may eventually threaten the dam
- Things to consider
  - This erosion seems to be natural, and is the result of the island “twisting” clockwise.
  - The shoreline is still a considerable distance from the dam, and at current rates of erosion would not be threatened for many years.
  - Some old concrete and other rubble is dumped at the site.
  - This is where the new sewage outlet is proposed to go
- Options and consequences
  - Do nothing
    - There may be some further erosion
  - Do nothing, but monitor the erosion and maintain a trigger line in the event that erosion threatens the dam
    - Action may be needed in the future
  - Continue to dump old building materials.
    - There is no evidence that this helps the problem in the long term, and makes it look bad
  - Renourishment
    - Need to find a source
    - Our data show that sand will be quickly removed by waves
  - Protect with a seawall
    - Expensive, and may not be successful as there is no obvious tie off point
  - Protect with a groyne
    - Would not work with reversing winds and currents, and would make the problem worse.



Warraber's coastal ecosystems and fringe landforms – among them, coastal flood plains, forests, dunes, berms serve as natural shock absorbers for protecting coastal infrastructure and land uses against tropical storms; they also provide critical storage capacities for storm surges and floodwaters. When the functioning of these coastal and fringe systems is threatened and damaged, Warraber's coastal and urban areas are vulnerable. Action needs to be taken to conserve and enhance the ecological and human resilience to the sea level rise and storm surges through effective land use planning. However, there are no land-use planning and design guidelines in the Torres Strait to provide incentives for developers and their architects to recognise or accommodate vulnerability to climate variability and change.

For Warraber, this includes a combination of strategies that are addressed in the next section.



### 3.2.5 Land Use Strategies

The Coastal Planning for Adaptation to Global Climate Change identified physical impacts that include:

- submergence of low-lying wetland and dry land areas;
- erosion of soft shores by increasing offshore loss of sediment (e.g. beaches);
- increased salinity of estuaries and aquifers;
- rising coastal water tables; and
- increased and more severe coastal flooding and storm damage.

#### Warraber Coastal Management Plan 2009

The Warraber community has indicated a wish to continue living on the island. They adopted the following Coastal Management Plan in 2009:

##### *Warraber Coastal Management Plan 2009*

*1. The people of Warraber reaffirm that they wish to continue to live on Warraber into the future.*

*2. The people of Warraber understand that much of the island (and in particular, around the village) is low, and that flooding events may become more regular and more significant in the future due to climate change. However, it is also understood that flooding will only happen occasionally, on the highest tides and when weather conditions are unfavourable, at least for the foreseeable future.*

*3. The people of Warraber are prepared to participate in a process of adaptation to environmental and climate change which may include things such as:*

*a. As houses or other infrastructure reaches the end of its usable life, not rebuilding in the same place if that place may be subjected to erosion or inundation due to rising sea levels*

*b. Not building new infrastructure in hazardous locations unless absolutely essential.*

*c. Over time, moving the focus of the island village towards higher parts of the island*

*d. Managing berms with the intention of building them higher and wider, and managing access*

tracks through them to ensure that water cannot enter the island interior. Managing the high dune by protecting vegetation and managing access tracks.

e. Allowing some parts of the island to erode, where that erosion is not causing harm to people, infrastructure or important cultural sites, while monitoring the situation.

4. The Warraber community recognises that adaptation will raise issues that must be addressed within the community, such as land ownership and traditional rights, and the community is willing to work through these issues.

5. The community wants to further explore the possibility of dredging off-reef sand to renourish the island beaches.

6. The community is willing to be involved in the testing of new solutions to coastal erosion, where appropriate.

7. The community agrees with the assessment put forward by the JCU coastal erosion team, that there are 3 problem areas as listed below.

8. In relation to Area A (The north-western corner) the community wishes to build a new higher wall extending from the end of the permanent wall on the beachrock, (at about the height of the wall to the west) around the corner past the tyres, anchoring the wall by taking it inland at the end. In combination with berm maintenance to the east, this would provide protection from flooding. However, it would mean the beach would degrade, and it is likely that there would be little or no dry sand between the wall and the reef flat. Erosion may accelerate, for a period of time, to the east of the end of the wall.



9. In relation to Area B (the resort corner) the community

a. Understands the problem relates to inundation (flooding) rather than erosion, and that the beach in front of the resort is building out at present.

b. Wishes to protect the resort area as much as possible by building and maintaining the berm.

c. Plan any further development in this area, recognising that the area is very low and subject to occasional flooding.

10. In relation to Area C (South-western corner/Wongai trees) the community

a. Notes that this was an area used by the community in the past for picnics etc, and notes that erosion at this site is accompanied by build up of sand to the west, as the island "twists" in a clockwise direction.

b. Notes that the erosion could eventually cause problems for the dam (water facility) but that this is not likely in the near future.

c. Is willing not to consider a seawall at this time, but wants to establish trigger lines for urgent future action.

d. Wish to continue to use this area to dump clean fill (concrete, soil, trees etc), as the community believe this is helping to slow the erosion.

e. Note that this is the location of the proposed sewage outfall, and want to ensure that its construction does not make the problem any worse.

11. The community will do the important things that they can, such as implementing management plans for the berms, dune and coastal vegetation.

12. The community is willing to work with government at all levels, researchers and infrastructure providers to make a case to obtain funds to progress these measures, and to make decisions when options are put before the community

To minimise existing and future impact on the coastline of Warraber and the impacts of natural hazards, the following strategies are recommended:

- Not permit urban development and infrastructure along the northern, eastern (apart from the resort) and southern coasts of Warraber.
- New development is contained with the village, identified residential expansion areas and the investigation area.
- All development proposals must:
  - include landscaping and/or revegetation plans that are in accordance with the Best Practice, Land Use Strategies and Sustainable Outcomes in Section 3.1 Animals, Plants and Birds;
  - be developed in an ecologically sustainable manner;
  - maintain or improve the values of coastal wetland, estuaries, inlets, riverine corridors, dunes, shorelines, high scenic qualities and retain visual continuity; and
  - address the proposals vulnerability to natural coastal processes (coastal recession, storm events and projected sea level rises);
  - progressively move away from the coast utilising existing vacant lots above HAT 2100; and
  - protect the berm by not encouraging breaches or breaks.

### Adaptation

- Plan for the future, starting now
- Not doing things that may make the problem worse in the future
- Slowly changing our ways
- Berms and dunes need to be managed carefully
  - Berms are the high rims around the islands.
  - Berms are built up by wave overtopping.
  - More frequent wave overtopping can build up the berms as long as there is lots of sand on the reef.
  - Berms can be breached by tracks onto the beach.
  - Vegetation can trap sand, particularly

wind blown sand, but is unlikely to resist erosive waves for long.

- Berms and dunes can be harmed by tracks onto the beach and that can let water through
- Buildings
  - Do not build any new building (including a replacement for an old building) in any area that may be flooded with a sea level rise of up to 1 metre.
  - Plan for at least a 1 metre sea level rise for any new infrastructure
  - Plan in accordance with the Draft Queensland Coastal Plan recommendations
  - Plan all new development on the higher end of the island (towards the airstrip). Begin discussions regarding land ownership and any other issues that may make this difficult immediately.
- Some examples
  - if there is a building that is getting old, when the time comes, think about whether it is a good idea to rebuild it in the same place, or move somewhere else
  - don't build something new in a place that is vulnerable (and we can help identify these places)
  - Use seawalls etc wisely, and some will be needed, but acknowledge that the cost is high.

The community recognises that mitigation and adaptation will raise issues that must be addressed within the community, such as land ownership and traditional rights. The community has indicated a willingness to work through these issues.



### 3.2.6 Land Use Considerations

In assessing the impacts of future development on Warraber, the following key questions are to be raised. If the answer to any of the questions is 'NO', the proposal must, a) justify the inconsistency, b) be amended, or c) not be accepted.

- Is the development in accordance with the Coastline Best Practice, Land Use Strategies and Sustainable Outcomes?
- Is the development in the village? If so, does it
  - complement existing and multiple-use of suitable sites
  - reflect and enhance the coastal character of the village and surrounding areas
  - incorporate ecologically sustainable design
  - maintain or improve the values of the coastline, the high scenic qualities and visual continuity
  - address the proposal's vulnerability to natural coastal processes (coastal recession, storm events and projected sea level rises)
  - address the impact of the proposal on water resources, environmental and social needs, infrastructure and population capacity
  - identify and protect important coastal assets of ecological, visual and cultural significance?
- Does the development affect the priority erosion areas of
  - Area A ( The broken wall and tyres –northern end of Warraber)
  - Area B (The Resort Corner)
  - Area C (The Wongai Trees near the water storage lagoon)
- Will the development affect the boeywadths (coastal berms) that protect the village from inundation?

### 3.2.7 Sustainable Coastline Outcomes

- Protect and maintain the community's coast, including the foreshore, coastal wetlands, dunes, marine ecosystems, coastal marine waters and areas of geological and geomorphological, cultural and historic significance.
- Coordinate the management and use of natural marine resources to enhance community, economic and environmental values.
- Land adjoining coasts and beaches are for community purposes.
- An integrated approach and application of best practice to catchment and coastal management, waterways and wetlands is utilised to provide for environmental flow and the highest quality of water within the community's inland waters, estuaries and the sea.
- The community is involved in the protection and management of the coastline to ensure the protection of their cultural heritage.



### 3.2.8 Useful Resources

#### Legislation

*Coastal Protection and Management Act 1995 (Qld) provides for the protection, conservation, rehabilitation and management of the coast including resources and biological diversity.*

**[www.legislation.qld.gov.au](http://www.legislation.qld.gov.au)**

#### Policies, Guidelines and Fact Sheets

*Marine Debris Factsheet outlines the cause and potential aims of marine based pollution and debris.*

**[www.amcs.org.au](http://www.amcs.org.au)**

*Marine Pollution Factsheet outlines the causes and potential aims of marine based pollution and debris.*

**[www.amcs.org.au](http://www.amcs.org.au)**

*State Coastal Management Plan: Queensland's coastal policy outlines the state government*

*policies for the protection and management of Queensland coastal resources.*

**[www.derm.qld.gov.au/environmental\\_management/coast\\_and\\_oceans/index.html](http://www.derm.qld.gov.au/environmental_management/coast_and_oceans/index.html)**

#### Websites

Department of Environment and Resource Management

**[www.derm.qld.gov.au](http://www.derm.qld.gov.au)**

Australian Maritime Conservation Society

**[www.amcs.org.au](http://www.amcs.org.au)**

CoastCare

**[www.coastcare.com.au](http://www.coastcare.com.au)**

OzCoasts

**[www.ozcoasts.org.au](http://www.ozcoasts.org.au)**



## 3.3 Tides & Storm Surge

### 3.3.1 Best Practice

- Natural dynamic processes that shape the coastline are respected.
- Reduce community risk, exposure and damage to the adverse impacts of natural hazards such as tides and storm surges by planning coastal use and development to ensure that significant adverse effects of tides and storm surges are avoided, mitigated or remedied.
- The impacts of tide inundation and storm surge are reduced by limiting development along the coast.
- Where development cannot be avoided in areas identified as affected by tides and storm surges, it is to be undertaken in a manner that minimises impacts.
- Reduce the vulnerability of the community to the impacts of climate change by:
  - recognising the importance of climate change on the sea and land environments of the community;
  - avoiding quick decisions now that will make it more difficult to manage climate change risks in the future; and
  - building understanding and capacity of the community to deal with the impacts of climate change on the tide and storm surge levels

### 3.3.2 Overview of Current Situation

Due to the geographic location of the Torres Strait as the interface between the Coral Sea and the Arafura Sea, together with the regions shallow bathymetry, tides are extremely complicated varying widely particularly from east to west but can even vary significantly over a few kilometres. The tide range is up to around 5 metres, with the highest tides occurring over the summer months (January - March). This period coincides with the period of greatest likelihood of cyclone occurrence and storm surge adding to the potential for adverse inundation events. Other factors also affect water levels throughout the region including regional wind driven gradients (these slope across Torres Strait and reverse seasonally), water density, as well as the El Niño southern oscillation etc.

The low-lying nature of many islands means the region is particularly vulnerable to tropical cyclones and storms, as well as the potential impacts of climate change. The tropical cyclone and storm impacts on communities are exacerbated by poorly developed coastal infrastructure, inappropriate development along coastlines, lack of scientific research

and housing design. Due to the poor and infrequent transport, there is no escape strategy to temporarily relocate the community during extreme events.

The current highest predicted tides do not appear to inundate Warraber, with the exception of the low beach flats around the new resort area. However the effects of winds and waves over and above these levels indicate that the effect of a king tide appears more severe than the mapping.



There is a low area on the northern side of Warraber, between the health centre and the church which is partially protected by a seawall.

There are also a few low areas located both sides of the eastern end of the airstrip, and at the resort area. These areas do not get inundated at the moment as the water cannot enter as they are protected by low sand ridges on the foreshore.

The Predicted High tide level is approximately :

- 0.4m below the top of the barge ramp,
- 0.6m below the ground level at the resort
- 1.1m below the road level at the new health centre, and the sports stadium
- 2.1m below the land around the Airstrip terminal.
- 3.6m below the top of the eastern sand ridges which is the highest area on Warraber.

Table 1 shows the Present and Predicted tide levels.

**Table 1 Present and Predicted Tide Levels**

Description	Torres Strait Tidal Analysis MSQ2009 - LAT2008	Ausgoid AHD 2008	MSL2008	Schlenker Island Mapping c1998
Defined Storm Tide Event Draft DSTE	6.18	4.63	4.16	5.92
High Hazard Zone	5.18	3.63	3.16	4.92
Highest Astronomical Tide (HAT2100)	4.98	3.43	2.96	4.72
Top of Barge Ramp (approx)	4.56			4.29
<b>Highest Astronomical Tide (HAT2008)</b>	<b>4.18</b>	<b>2.63</b>	<b>2.16</b>	<b>3.92</b>
MHHW	3.08	1.53	1.06	2.82
MLHW	2.19	0.64	0.17	1.93
Mean Sea Level MSL	2.02	0.47	0.00	1.76
MHLW	1.85	0.30	-0.17	1.59
MLLW	0.96	-0.59	-1.06	0.69
LAT	4.56			4.29

Source: Torres Strait Tidal Survey MSQ 2009; Schlenker 1998

Map 7 shows the impact of coastal inundation and sea level rise.



For more detail, refer to Map No. 9964-1202 contained in Maps.

### 3.3.3 Issues Overview

The Intergovernmental Panel on Climate Change (2007) has projected sea levels to rise by the end of the twenty first century by up to 0.8 metres. This projection allows for sea level rise due to ice melt and thermal expansion for various greenhouse gas emission scenarios and includes an allowance for accelerated ice melt, relative to 1990. The IPCC note higher rises cannot be ruled out owing to uncertainty

about the potential for additional ice melt, with recent scientific papers also suggesting higher levels may be possible. Current consensus also indicates ongoing rise beyond 2100 is likely for many centuries, independent of actions to stabilised greenhouse gases.

Figure 3 shows how storm surges impact on the village.

Figure 4 shows how with rising sea levels, storm surges will further impact on the village

Figure 3 Storm Surge Area

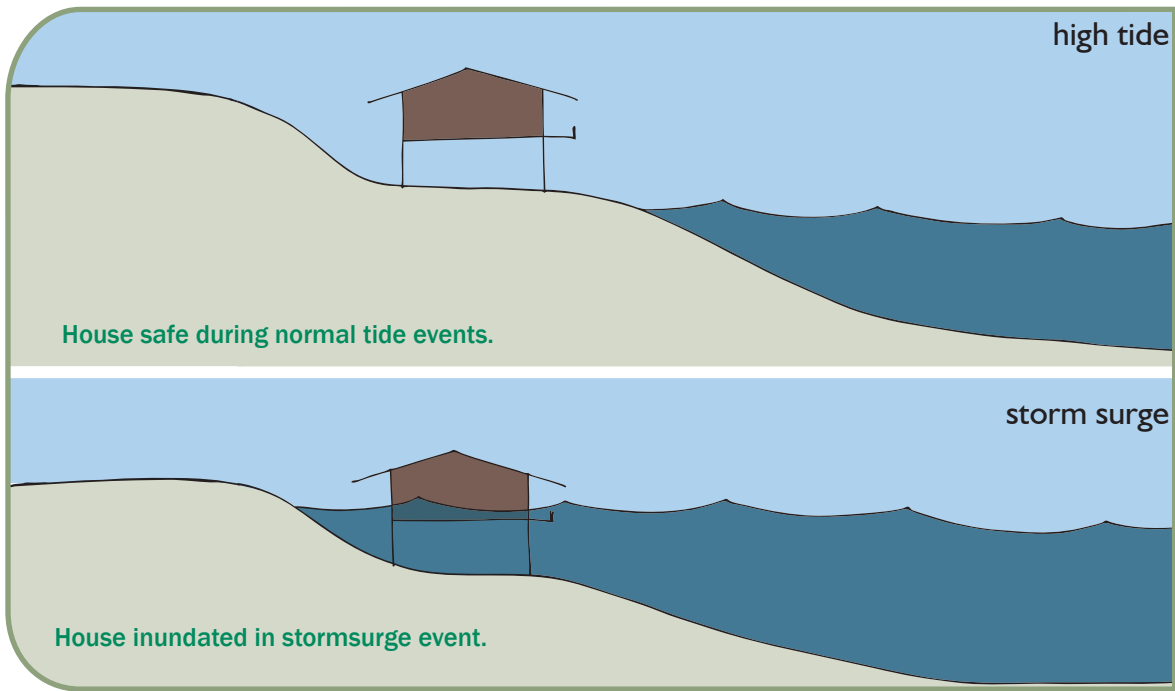
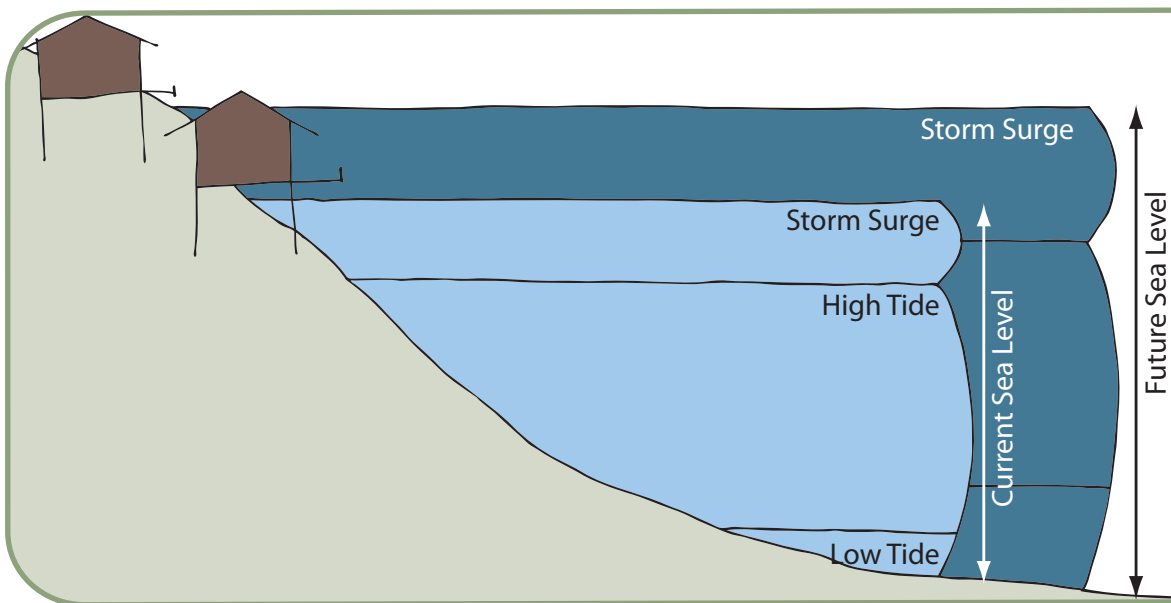


Figure 4 Climate Change and Sea Level Rise



Tidal information for Warraber is available from the predictions in the Seafarer Tide Charts published by the Australian Hydrographic Service 2009. The current island mapping is based on Lowest Astronomical Tide (LATOoriginal).

The Seafarer Tidal Predictions were analysed to see how many times the predicted high tide occurred each year.

It should be noted however that the existing data and tidal predictions are known to be of questionable accuracy, thus the exact level of risk to the community is unknown. In addition, no assessment has been undertaken of storm surge, to assess the potential likelihood of inundation above mapped HAT values.

The current adopted amount for sea level rise over the next 100 years of 0.8 metres was then added to each high tide.

The sea level rise relates to a global worldwide average sea level rise and has been used, as there are no actual sea level predictions specifically for the Torres Strait. For this reason, this Plan has adopted a possible increase in sea level of 0.8 metres by 2100.

The adopted 0.8 metres should be revised at regular intervals to consider the current scientific consensus on sea level rise, as the impacts of sea level rising has a dramatic effect on Torres Strait communities. This is particularly important for the design and construction of infrastructure on the islands (such as sea walls, house slabs and desalination plants).

The predicted high tide in the year 2100 will not inundate the village area as long as the coastal boeywadths (berms) are protected and not breached. The resort area is predicted to be inundated approximately 200mm on predicted high tides in the year 2100.

Note that these levels are for high tides that occur on calm flat days and do not include wave runoff or low pressure situations.

Figure 5 shows the present and predicted high tide occurrences.

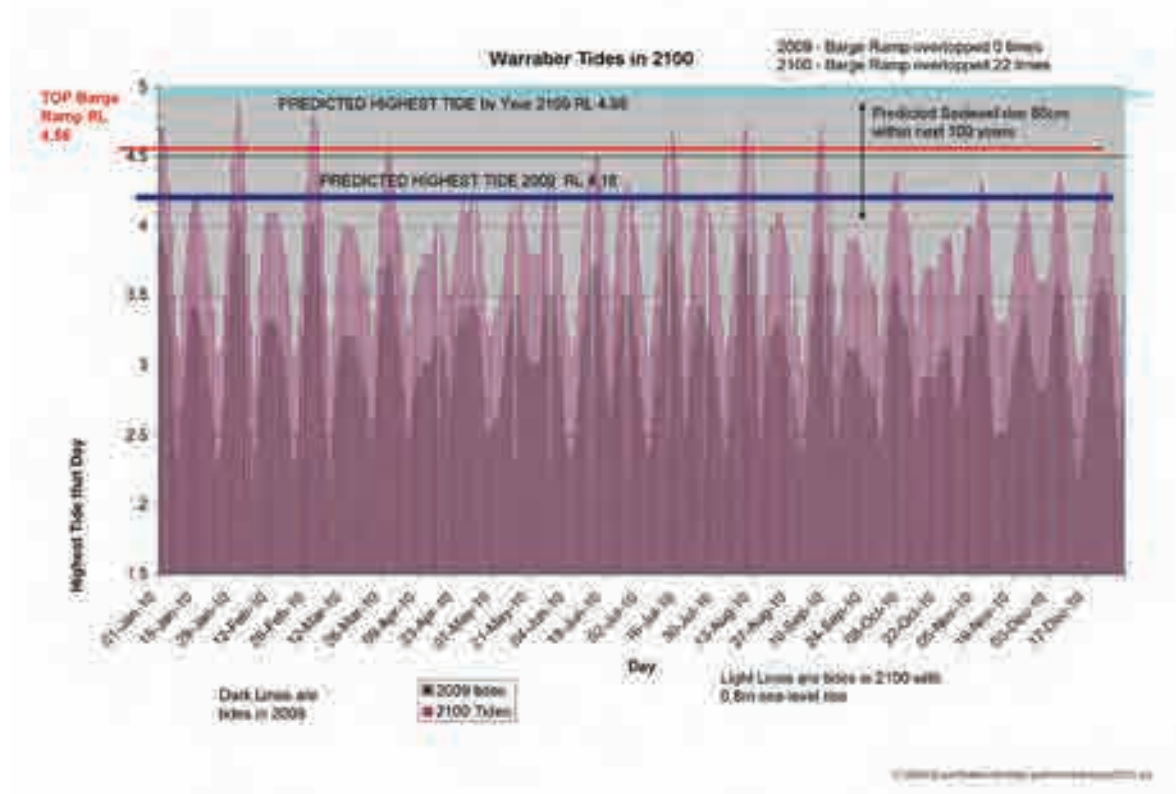
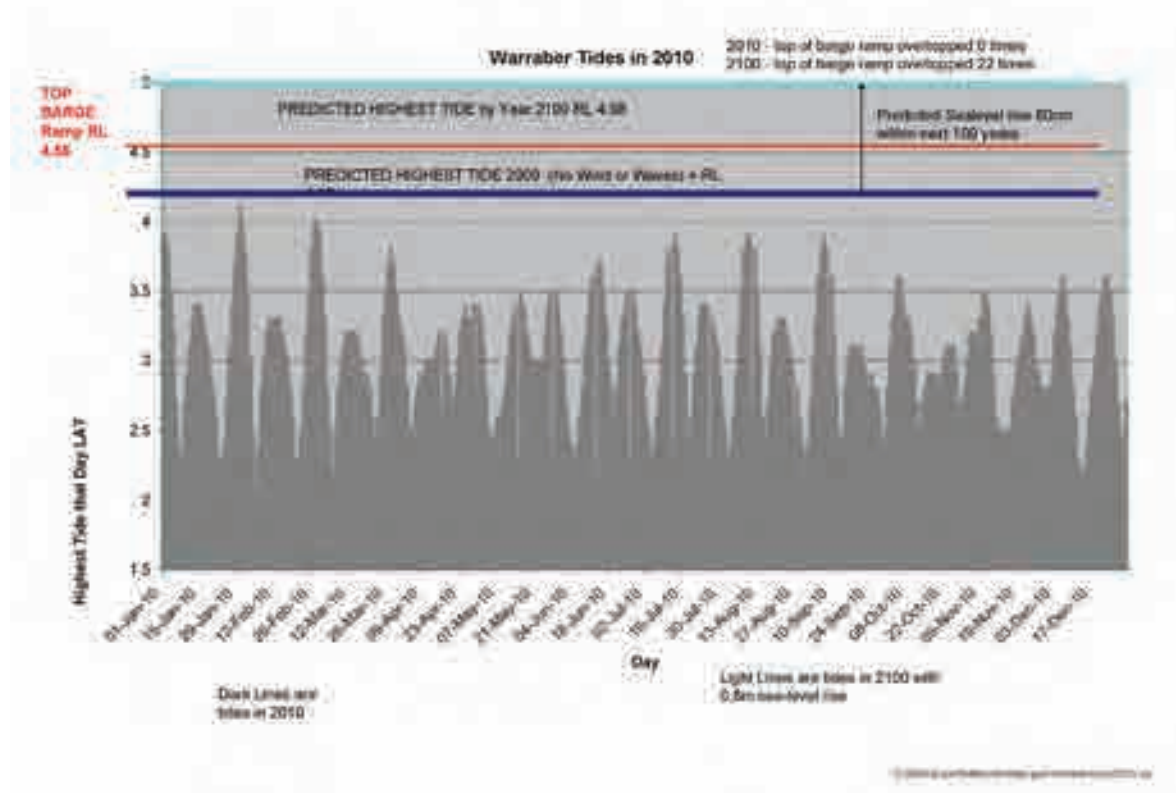
The Draft Queensland Coastal Plan areas of High Hazard (land with a inundation of water greater than 1 metre deep) occur around the Health Centre, Council offices, Church, community hall and child care centres as well as near residential houses on lots 59 to 63.

The Draft Queensland Coastal Plan areas of Low Hazard (land with a inundation of water less than 1 metre deep) occur around almost all of the village except for lots 12-17 and the western end of Garnier Street towards the airstrip.

For this reason, the designs for new houses or modifications to existing houses should incorporate mitigation measures that include a 'refuge area' designed to withstand possible storm surge and tidal inundation in extreme events. This can be easily incorporated into existing designs by amending the walls of the existing ground floor toilet area from weatherboards to reinforced masonry/concrete walls that extend from the concrete slab to the upper ceiling of the first floor. These areas can contain toilet or laundry facilities downstairs and bathroom/toilet areas on the first floor. Ideally, access stairs should be located next to this core 'refuge' area.



Figure 5 Present and Predicted High Tide Occurrences



### 3.3.4 Land Use Strategies

The first strategy is to encourage the community to move from the low-lying coastal floodplains and high hazard areas to land beyond a 40-metre setback from the top of the beach, as stipulated by state government coastal planning requirements. Over time, land within the setback area would be used for general community purposes. This strategy would result in a buffer between the shoreline and the village, to minimise the impacts of tide inundation and storm surge to development and infrastructure beyond the 40-metre setback.

In some Torres Strait communities, development anywhere on the island may impact on the coastal environment. In such cases, the entire island should be designated as a 'Coastal Management District'.

At Warraber, a shortage of land suitable for development means moving away from sea level rises and storm surges may not be an all-inclusive option. A multi-faceted approach is therefore required, which may include but is not limited to the following strategies:

- Discouraging:
  - temporary buildings such as converted sheds;
  - structures used for the manufacture or storage of hazardous materials;
  - community infrastructure development such as shops or halls;
  - an increase in the number of people living, working or congregating on the island; and/or
  - an intensification of uses or works that are likely to increase the adverse impacts of tides and storm surges.
- Encouraging development to consider the physical coastal processes, in particular seeking to minimise:
  - erosion of adjacent coastal areas;
  - interference with the flow of water;
  - alteration of existing water flows; and
  - damage to existing coastal vegetation.

- The management and reduction of greenhouse gas emissions through improved community awareness, knowledge and behavioural changes.
- New house design and modifications to existing houses should incorporate mitigation measures, including:
  - provision of a 'refuge area' which is built on a concrete slab and includes reinforced masonry/concrete walls from the ground to the upper ceiling;
  - a 'strong area' that is generally a bathroom/toilet or laundry/toilet;
  - an upper floor living area;
  - habitable floor levels of a minimum 6.18 metres MSL2008 ( or 5.92 Schlenker) (which is equivalent to the current HAT plus 2m for storm surge or where possible the equivalent allowance in 2100)

Or alternatively: adopt 100 year ARI level from inundation study when finalised( or where possible a the equivalent allowance in 2100)

- Mechanical and electrical works (e.g. pump stations) are to be above predicted 2100 HAT, plus 2m storm surge; and

Or alternatively: about 500 year ARI level from inundation study when finalised ( or where possible a the equivalent allowance in 2100)

- Regular review of sea levels to take into account the most current predictions.
- Sea level monitoring to improve accuracy of data, tidal predictions, knowledge of storm surge and sea level rise.
- Immediate development of emergency response plans for storm surge and cyclone occurrence to manage risk to life and property.
- Considering the development of long-term relocation plans should sea level rises exceed 0.5m.

### 3.3.5 Land Use Considerations

In assessing the impacts of future development on Warraber, the following key questions are to be raised. If the answer to any of the questions is 'NO', the proposal must, a) justify the inconsistency, b) be amended, or c) not be accepted.

- Is the development in accordance with the Tides and Storm Surge Best Practice, Land Use Strategies and Sustainable Outcomes?
- Is the development consistent with local and regional climate change response strategies?
- Where the development is proposed in an area identified as affected by tides and storm surges, is it:
  - accompanied by a detailed hydraulic study;
  - designed to resist water forces as a result of inundation;
  - designed to incorporate any recent sea level rise research that changes the current predicted sea level rise of 0.59 metres; and
  - designed to prevent the intrusion of floodwaters as a result of inundation?
- Does the development affect counter disaster operations?

### 3.3.6 Land Use Projects

To protect the environments on Warraber, a regular review of scientific data on predicted sea level rises is required. It is recommended an investigation be undertaken specifically for the Torres Strait region into predicted sea level rises due to climate change. This investigation would provide information that is more relevant than the global value of 0.59 metres which is currently adopted

### 3.3.7 Sustainable Outcomes for Areas affected by Tides and Storm Surge

- Coastal use and development is planned and managed to ensure that significant adverse effects of tidal inundation and storm surges on the natural and man made environments are avoided, mitigated or remedied.
- Development and use of the coast is to maintain and, where possible, enhance the quality of life for residents and visitors by avoiding areas identified as being adversely affected by tidal inundation and storm surges.
- The level of storm tide risk is determined by the community



### 3.3.8 Useful Resources

#### Legislation

*Coastal Protection and Management Act 1995 (Qld) provides for the protection, conservation, rehabilitation and management of the coast including resources and biological diversity.*

**[www.legislation.qld.gov.au](http://www.legislation.qld.gov.au)**

*Queensland Coastal Plan: Draft 2009: The Draft Queensland Coastal Plan has been developed to help manage and protect Queensland's coastline. The plan gives greater certainty about dealing with coastal hazards such as erosion and sea-level rise and managing the pressures of population and development.*

**[www.derm.qld.gov.au/coastalplan](http://www.derm.qld.gov.au/coastalplan)**

#### Policies, Guidelines and Fact Sheets

*Mitigating the Adverse Impacts of Storm Tide Inundation provides advice and information on the interpretation and implementation of the Coastal Hazard Policy of the State Coastal Management Policy.*

**[www.derm.qld.gov.au/register/p01698aa.pdf](http://www.derm.qld.gov.au/register/p01698aa.pdf)**

*2006 King Tides in the Torres Strait Factsheet gives an overview of king tides in the Torres Strait 2006 and how the (Environmental Protection Agency) EPA uses this information is king tide predictions for the rest of the state.*

**[www.derm.qld.gov.au/register/p01864aa.pdf](http://www.derm.qld.gov.au/register/p01864aa.pdf)**

*Queensland Storm Tide Information Resource Factsheet provides an overview of the Queensland Storm Tide Information Resource, which seeks to compile and consolidate all available storm tide information in Queensland into a single, stand-alone and portable resource.*

**[www.derm.qld.gov.au/register/p02295aa.pdf](http://www.derm.qld.gov.au/register/p02295aa.pdf)**

*Preparation of a Shoreline Erosion Management Plan Guideline provide advice to local governments in preparation a Shoreline Erosion Management Plan to proactively plan for erosion management in erosion hotspot areas.*

**[www.derm.qld.gov.au/environmental\\_management/coast\\_and\\_oceans/index.html](http://www.derm.qld.gov.au/environmental_management/coast_and_oceans/index.html)**

#### Websites

*Department of Environment and Resource Management*

**[www.derm.qld.gov.au](http://www.derm.qld.gov.au)**

*National Tidal Centre*

**[www.bom.gov.au](http://www.bom.gov.au)**

*OzCoasts*

**[www.ozcoasts.org.au](http://www.ozcoasts.org.au)**



## 3.4 Waterways and Wetlands

### 3.4.1 Best Practice

- Natural waterways, wetlands, catchments and associated natural dynamic processes that shape them are respected, managed to protect the ecological processes, enhance the water quality, conserve riparian ecological values and landscape quality, while acknowledging nature based recreation opportunities.
- The quality of all water sources are protected and wherever possible, enhanced.
- The ecological and cultural importance of waterways and wetlands and their sources are not compromised by inappropriate development and activities.
- Maintain and enhance riparian corridors and buffers to ensure the healthy function of the riparian zone of waterways and wetlands.
- Reduce the vulnerability of the community to the impacts of climate change by:
  - recognising the importance of climate change on the waterways and wetlands environments of the community;
  - avoiding quick decisions now that will make it more difficult to manage climate change risks in the future; and
  - building understanding and capacity of the community to deal with the impacts of climate change on the community's waterways and wetlands.

### 3.4.2 Overview of Current Situation

On Warraber, there are no discernible watercourses or wetlands evident, probably due to the sandy, highly porous soils.

Map 6 shows the identified significant watercourses and habitats

### 3.4.3 Issues Overview

Waterways, associated floodplains and riparian areas support a range of natural and economic functions, including habitat for land and sea wildlife, nursery grounds for creek and bay fisheries, potable water supplies, stormwater conveyance, provision of sand for building materials, ecological linkages, scenic amenity and recreational opportunities.

A lack of a continuous water supply and the inefficient water use are a problem on Warraber due to the transient nature of the waterways. Any new or intensification of existing land uses

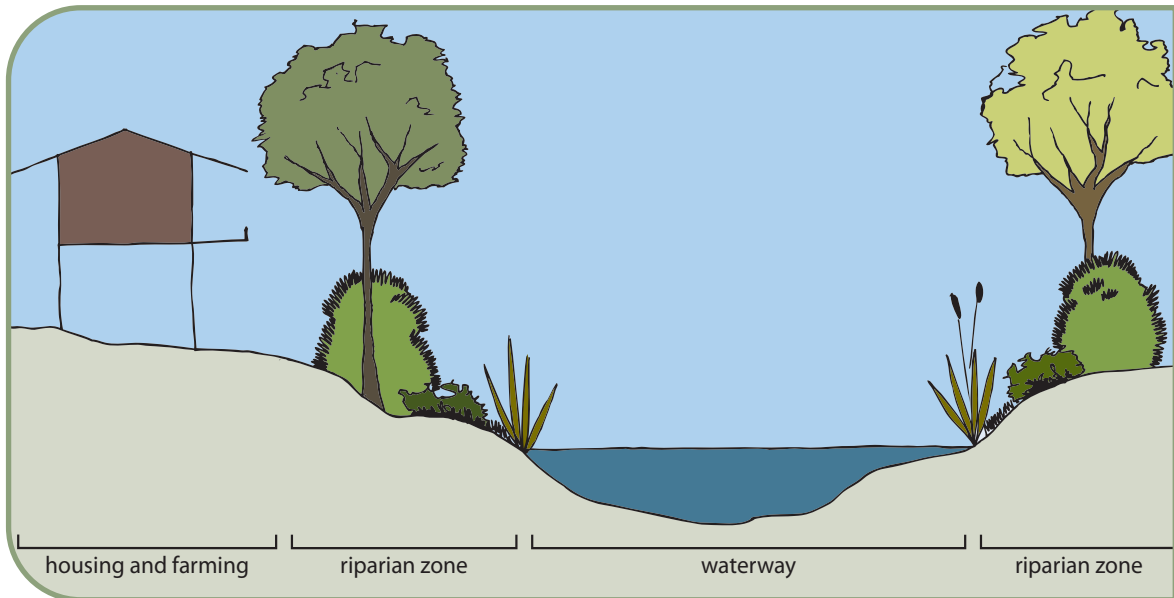
on Warraber should not utilise groundwater resources. The impact of Warraber's water problem is discussed in 6.1 'Water' of the Plan.

Figure 6 shows how if buffer areas are left between waterways and wetlands, it provides protection to the waterways and wetlands from the impacts of development.



“A waterway can be a creek, brook, river or stream and include a lake, estuary or inlet at its base. Waterways also include floodplains and wetland systems that overflow into rivers, as well as any lakes or swamps that are filled by streams rather than shallow groundwater”

Figure 6 Waterway and Wetland Buffer



“Wetlands are predominately areas that are permanently, seasonally or intermittently waterlogged or inundated with water that may be fresh, saline, flowing or static. Seasonal wetlands, particularly seasonal waterlogged wetlands, often have a higher plant and animal species richness than permanent wetlands”

#### 3.4.4 Land Use Strategies

To minimise existing and future development impacts on Warraber’s waterways and wetlands the following strategies are recommended:

- Not applicable as there are no waterways or wetlands on Warraber

#### 3.4.5 Land Use Considerations

In assessing the impacts of future development on Warraber, the following key questions are to be raised. If the answer to any of the questions is ‘NO’, the proposal must, a) justify the inconsistency, b) be amended, or c) not be accepted.

- Not applicable as there are no waterways or wetlands on Warraber

“A catchment area or basin is land which is bounded by natural features such as hills or mountains from which all runoff water flows to a low point. This low point will be a dam, a location in a river or the mouth of a river where the water enters the ocean.”

### 3.4.6 Sustainable Waterways and Wetland Outcomes

- Protect and where possible, restore catchments, waterways, water bodies, groundwater, water quality and dependent ecosystems such as marine environments while maintaining the economic and social values derived from water use.
- Development should not diminish the quality or quantity of water in groundwater systems, watercourses, nor should it diminish the volume of water flows in watercourses or wetlands.
- Water on the community is managed in a sustainable and integrated manner to provide adequate supplies for human and environmental uses.

### 3.4.7 Useful Resources

#### Policies, Guidelines and Fact Sheets

*Catchment and Water Quality* provides an overview of the link between the health of a water catchment and water quality.

**[www.derm.qld.gov.au/factsheets/pdf/catchments/c2.pdf](http://www.derm.qld.gov.au/factsheets/pdf/catchments/c2.pdf)**

*Gully Erosion* gives an overview of what is gully erosion and what we can do to minimise its impacts.

**[www.derm.qld.gov.au/factsheets/pdf/land/l81.pdf](http://www.derm.qld.gov.au/factsheets/pdf/land/l81.pdf)**

*How Healthy is your Waterway? Assessing stream bank vegetation* describes how to find out if your waterways are healthy by ensuring a well vegetated riparian zone in order to minimise the impacts of erosion on water quality

**[www.derm.qld.gov.au/factsheets/pdf/river/r34.pdf](http://www.derm.qld.gov.au/factsheets/pdf/river/r34.pdf)**

*Overland Flow Water* provides an overview of what is overland flow water and why it is important to manage overland flow.

**[www.derm.qld.gov.au/water/management/overland\\_flow/index.html](http://www.derm.qld.gov.au/water/management/overland_flow/index.html)**

*Strategic Plan for the Conservation and Management of Queensland's Wetlands* sets out the state government's intent for the conservation, values and functions of wetlands.

**[www.derm.qld.gov.au/wetlandinfo/site/PPL/QldWetlandProgramme.html](http://www.derm.qld.gov.au/wetlandinfo/site/PPL/QldWetlandProgramme.html)**

*Streambank Planting Guidelines and Hints* describes what type of vegetation you should plant in riparian zones and where to plant it.

**[www.derm.qld.gov.au/factsheets/pdf/river/r31.pdf](http://www.derm.qld.gov.au/factsheets/pdf/river/r31.pdf)**

*Streambank Vegetation is Valuable* provides an overview of why we need vegetation riparian zones along our watercourses.

**[www.derm.qld.gov.au/factsheets/pdf/river/r30.pdf](http://www.derm.qld.gov.au/factsheets/pdf/river/r30.pdf)**

*The Value of Wetlands* talks about the role of wetlands in nature conservation.

**[www.wetlandcare.com.au/fact\\_sheets.asp](http://www.wetlandcare.com.au/fact_sheets.asp)**

*What, Why and How Wetlands Works* provides an introduction to the important role that wetlands play and why we should protect them.

[www.wetlandcare.com.au/fact\\_sheets.asp](http://www.wetlandcare.com.au/fact_sheets.asp)

*What is Bank Erosion* talks about what is bank erosion and how it is caused.

**[www.derm.qld.gov.au/factsheets/pdf/river/r2.pdf](http://www.derm.qld.gov.au/factsheets/pdf/river/r2.pdf)**

#### Websites

Department of Environment and Resource Management

**[www.derm.qld.gov.au](http://www.derm.qld.gov.au)**

WetlandCare Australia

**[www.wetlandcare.com.au](http://www.wetlandcare.com.au)**



## 3.5 Land and Soil

### 3.5.1 Best Practice

- Minimise the impact of salinity and rising water tables on land uses, buildings and infrastructure by minimising land and soil disturbance.
- The management of the land and soil will be designed to work with nature rather than against nature and integrated with sea planning and management to ensure the negative impacts of human actions (e.g. development, vegetation clearing) on plants, animals and birds is minimised or avoided.
- Reduce the vulnerability of the community to the impacts of climate change by:
  - recognising the importance of climate change on the community's land, soil and slopes;
  - avoiding quick decisions now that will make it more difficult to manage climate change risks in the future; and
  - building understanding and capacity of the community to deal with the impacts of climate change on the community's land, soils and slopes.

### 3.5.2 Overview of Current Situation

Warraber is primarily a flat island. The extensive vegetation cover over parts of Warraber has meant that land erosion is not a major issue. However, if the vegetation is cleared for development or garden plots, then the potential for land erosion to occur is increased significantly.

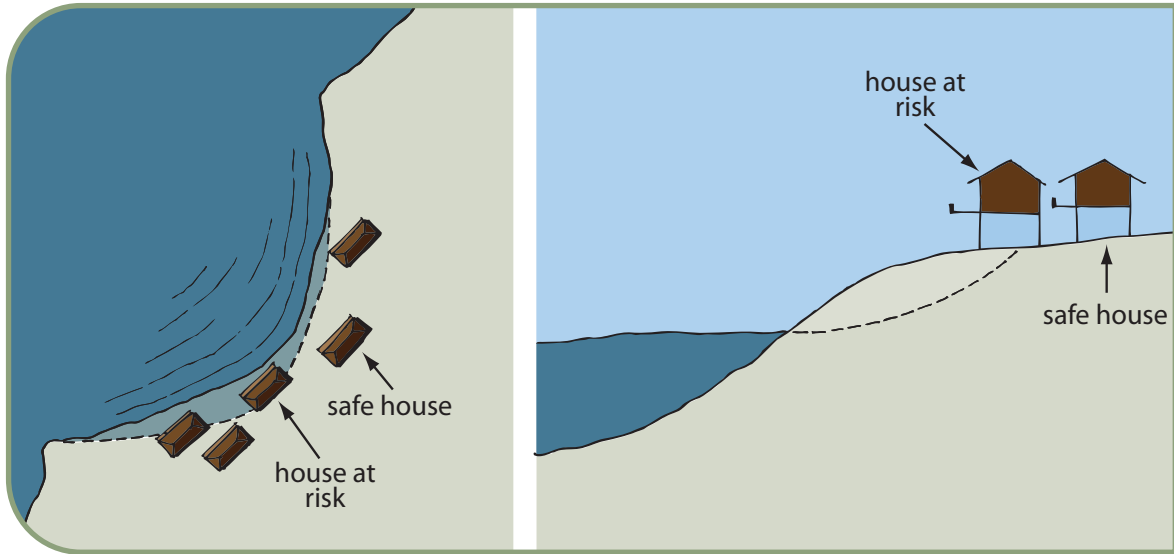
The flat coastal fringes are subject to coastal erosion due to natural forces, development and

increasing tide levels. Generally, these areas provide a buffer between the inland areas and the coast, which allows for the natural variations of the coast to occur without the need for intervention to protect human life and property, however the proximity of the village to the eastern coastline is a cause for concern in this respect.

Figure 7 shows where the 'coastal erosion zone' can occur when there is no seawall.



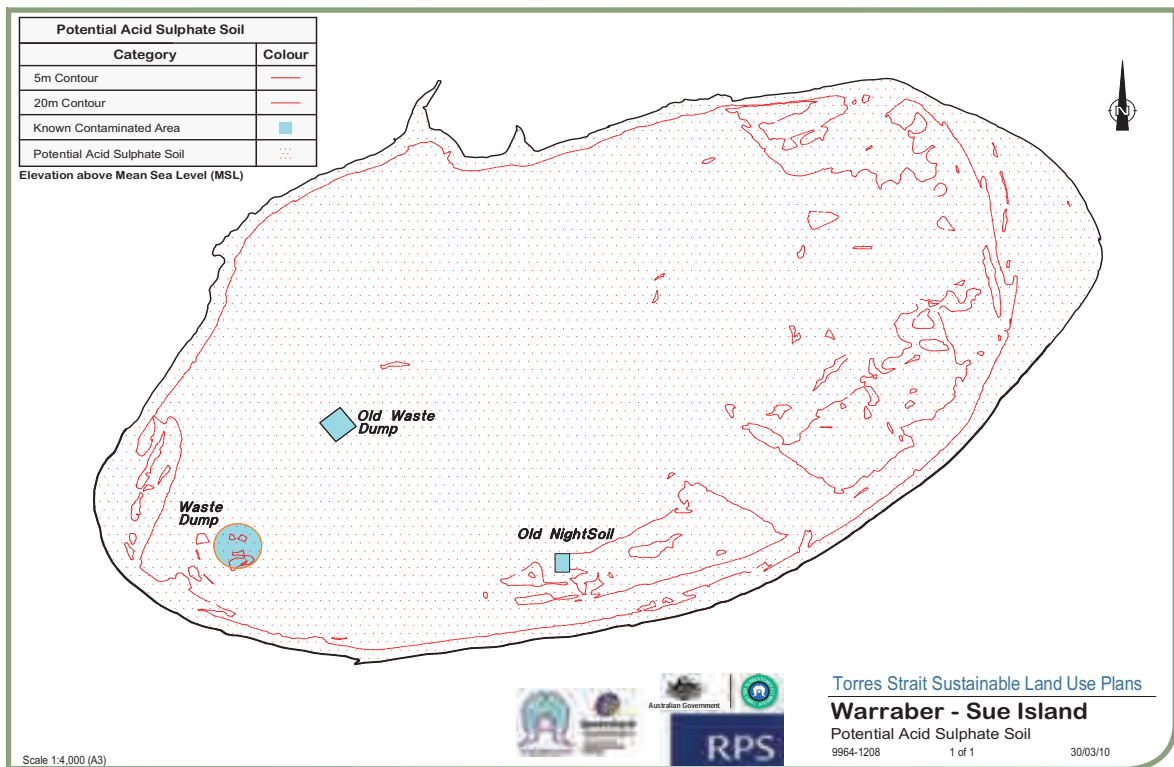
Figure 7 Coastal Erosion



There is a lack of data available on soil types on Warraber. However, as parts of Warraber are below 5 metres AHD, there is the potential for acid sulfate soils to be present.

Map 8 shows the potential location of acid sulfate soils.

Map 8 Potential Acid Sulfate Soils



For more detail, refer to Map No. 9964-1208 contained in Maps.

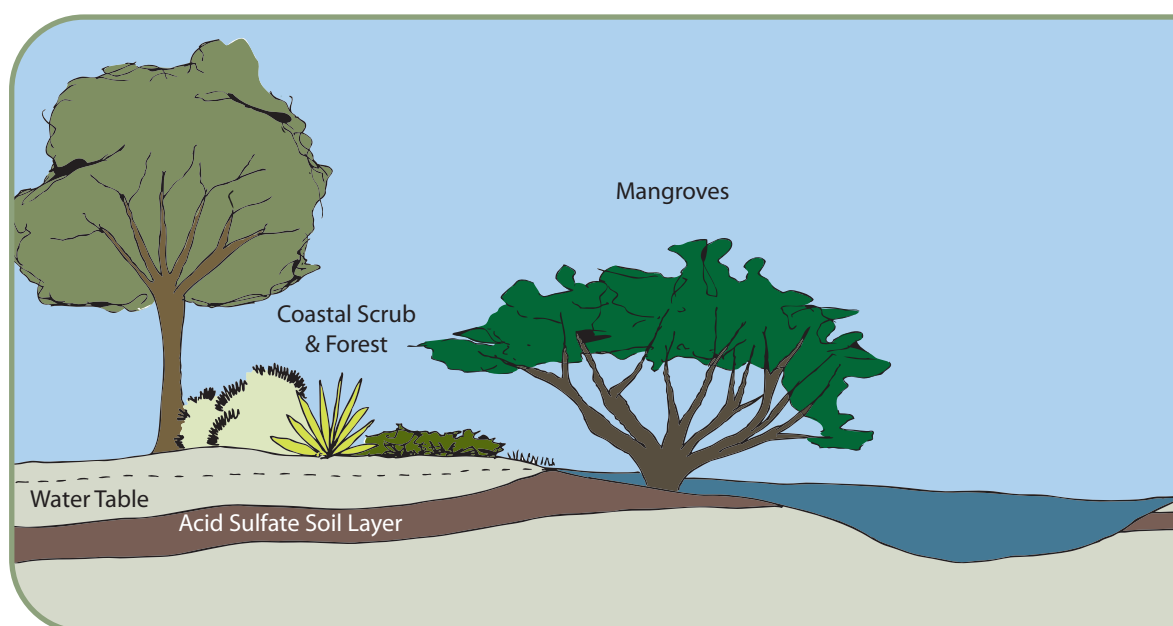
“Acid sulfate soils are naturally occurring soils and sediment containing iron sulfides, most commonly pyrite. When acid sulfate soils are exposed to air, the iron sulfides in the soil react with oxygen and water to produce a variety of iron compounds and sulphuric acid. Initially a chemical reaction, the process is accelerated by soil bacteria. The resulting acid sulfate soils can release other substances, including heavy metals, from the soil and into the surrounding environment.”

“Acid sulfate soils can result in the corrosion of concrete, steel and some aluminium alloys used in buildings, drainage systems and roads. The use of acid sulfate soil material as site fill material or in embankments can affect plant growth and block pipe drainage systems due to the formation of iron oxides. Acid waters entering estuarine, coastal or riverine environments can kill fish and crustaceans and affect aquatic plants through direct acid exposure.

The presence of acid sulfate soil material produces an offensive odour, which smells like rotten eggs”

Figure 8 shows where acid sulfate soils are located within the soil layers.

Figure 8 Acid Sulfate Soils



### 3.5.3 Issues Overview

Warraber's flat landform does not constrain any significant expansion of the existing urban area however, the predicted sea levels and the retention of existing natural habitats limit expansion of the village.

Some high erosion prone areas have been identified on the island, which may be affected by three possible pressures.

1. Erosion problems on Warraber may occur where buildings have been erected on or near a sandy beach system that are subject to natural phases of erosion and linked to the longer-term changes in climate. Also, modifications to the beach line such as rock walls, boat ramps and retaining walls have disrupted the natural sediment pathway and therefore the existing beach areas are being denied sand deposition.
2. The second impact on the erosion measures is climate change related to global warming. An increase in the frequency of major coastal storms or a rise in sea level can accelerate beach erosion.
3. The third impact on the high erosion prone areas is the loss of protective vegetation from fires, vehicle tracks (four-wheel drives) and pedestrian traffic.

Land erosion usually occurs where vegetation has been cleared. Native vegetation protects against erosion and pollution caused by subsequent runoff. To minimise these adverse impacts on the natural environment, new development near the vegetated areas must be effectively managed or where possible, avoided.

### 3.5.4 Land Use Strategies

To minimise existing and future development on Warraber land and soil, the following strategies are recommended:

- All development should include landscaping and/or revegetation plans that are in accordance with the Best Practice, Land Use Strategies and Sustainable Outcomes of Section 3.5.
- New development along the coast particularly in those areas adjacent to the areas identified as 'high erosion prone' should be discouraged.
- The use of vehicles on the beach or sandy flats as any form of thoroughfare should be discouraged.
- Adequate services and access must be provided where development is located on steep slopes.
- For development proposed in areas at or below 5 metres AHD, an acid sulfate soil investigation is to be undertaken and where necessary, an environmental management plan prepared.
- Highly erodible or unstable soils are to be left in their natural condition to prevent erosion, sedimentation and water quality degradation problems.
- During construction of a development, soil erosion and sedimentation control measures must be in place prior to and during construction and maintenance.

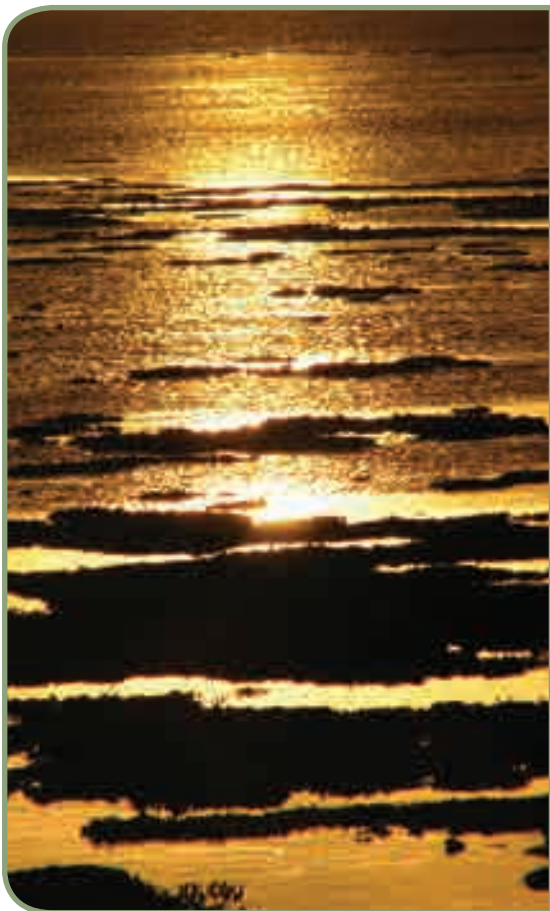
### 3.5.5 Land Use Considerations

In assessing the impacts of future development on Warraber, the following key questions are to be raised. If the answer to any of the questions is 'NO', the proposal must, a) justify the inconsistency, b) be amended, or c) not be accepted.

- Is the development in accordance with the Land and Soil Best Practice, Land Use Strategies and Sustainable Outcomes?
- If the development is adjacent to the areas identified as 'high erosion prone', does it address its impact on the identified area?
- Where development occurs on land below 5 metres AHD are the acid sulfate soils disturbed when excavating or otherwise removing soil or sediment, extracting groundwater or filling land? If so, is the development proposal accompanied by a report on an:
  - acid sulfate soil investigation;
  - environmental management plan; and
  - ongoing management program for treating disturbed acid sulfate soils and drainage waters?

### 3.5.6 Sustainable Land and Soils Outcomes

- Development and use of the coast is to maintain and, where possible, enhance the quality of life for residents and visitors by avoiding areas identified as being adversely affected by acid sulphate soils, steep slopes, erosion and landslides.
- Drainage activities should avoid or minimise land degradation, including soil erosion, compaction, land instability, contamination, acidity, water logging, decline of native vegetation or, where appropriate, salinity and, where possible, land should be rehabilitated.
- Development involving acid sulfate soils should be planned and managed to avoid potential adverse effects on the natural and built environment (including infrastructure) and human health.



### 3.5.7 Useful Resources

*State Planning Policy 2/02 – Planning and Managing Development Involving Acid Sulfate Soils* sets out the state interest concerning development involving acid sulphate soils in coastal areas.

[www.dip.qld.gov.au/policies/index.php](http://www.dip.qld.gov.au/policies/index.php)

*What is Bank Erosion* talks about what is bank erosion and how it is caused.

[www.derm.qld.gov.au/factsheets/pdf/river/r2.pdf](http://www.derm.qld.gov.au/factsheets/pdf/river/r2.pdf)

*Gully Erosion* gives an overview of what is gully erosion and what we can do to minimise its impacts.

[www.derm.qld.gov.au/factsheets/pdf/land/l81.pdf](http://www.derm.qld.gov.au/factsheets/pdf/land/l81.pdf)

*Acid Sulfate Soils in Queensland* explains what acid sulfate soils are, how they are formed, where they occur and what happens when they are disturbed.

[www.derm.qld.gov.au/land/ass/index.html](http://www.derm.qld.gov.au/land/ass/index.html)

*Identifying Acid Sulfate Soils* describes the scientific process for identifying acid sulfate soils in the soil.

[www.derm.qld.gov.au/land/ass/identifying\\_ass.html](http://www.derm.qld.gov.au/land/ass/identifying_ass.html)

*Managing Acid Sulfate Soils* provides an overview of the techniques that can be used to manage acid sulfate soils if they are disturbed.

[www.derm.qld.gov.au/factsheets/pdf/land/l62.pdf](http://www.derm.qld.gov.au/factsheets/pdf/land/l62.pdf)

#### Websites

Department of Environment and Resource Management

[www.derm.qld.gov.au](http://www.derm.qld.gov.au)

OzCoasts

[www.ozcoasts.org.au](http://www.ozcoasts.org.au)

## 3.6 Bushfire

### 3.6.1 Best Practice

- The management of areas prone to bushfire is to work with nature rather than against nature.
- The location and design of development is undertaken in a manner that:
  - does not alter natural fire regimes;
  - significantly increase the risk to human life, property and infrastructure from bush fire; and
  - minimises the potential risk to the safety and health of the community as a result of bushfire.
- Reduce the vulnerability of the community to the impacts of climate change by:
  - recognising the importance of climate change on the community's bushfire environment;
  - avoiding quick decisions now that will make it more difficult to manage climate change risks in the future; and
  - building understanding and capacity of the community to deal with the impacts of climate change the community's bushfire environment.

### 3.6.2 Overview of Current Situation

Warraber is extensively covered with natural vegetation. These areas are subject to bushfire. The presence of human occupation raises the likelihood and frequency of fire, which may significantly alter the ecological characteristics of Warraber. Inappropriate burning of the forests could cause the margins of this vegetation type to contract, effectively reducing its area and function as habitat.

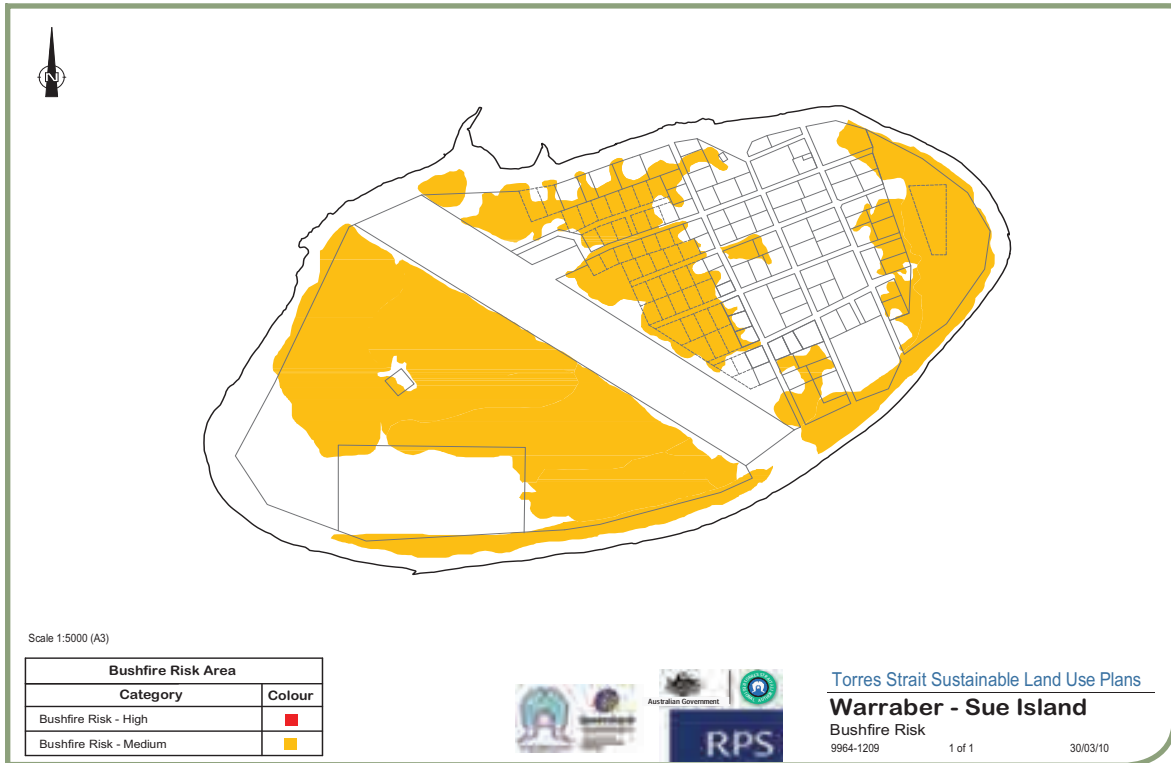
Using the State Planning Policy 1/03 "Mitigating the Adverse Impacts of Flood, Bushfire and Landslide" methodology, areas of Warraber are identified as low and medium bushfire risk.

Note however that Warraber is a small island, only 1400m by 700m in dimensions. Any design for new subdivision works should take into consideration the State policy.

Map 9 shows the location of bushfire hazard areas.



Map 9 Bushfire Risk



For more detail, refer to Map No. 9964-1209 contained in Maps.

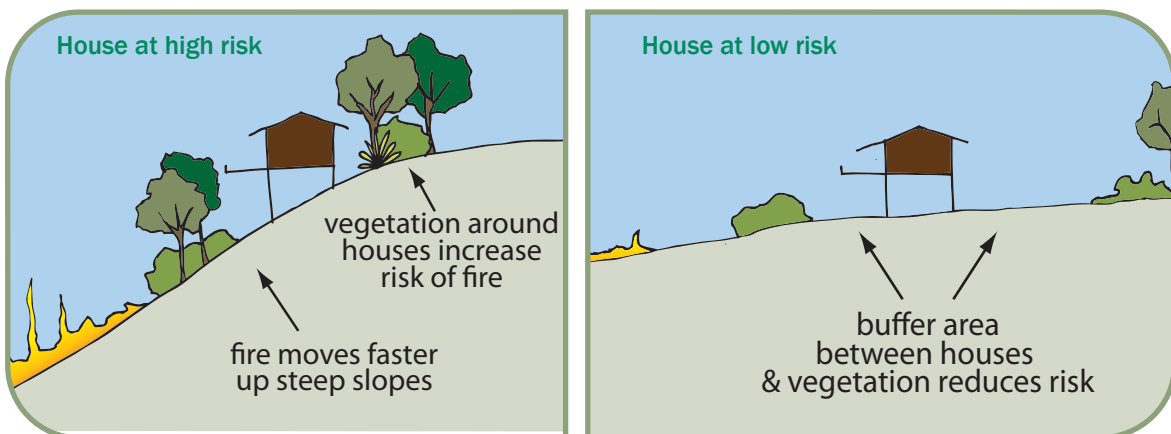
3.6.3 Issues Overview

Bushfires represent an ever present risk to life, property and the environment. While the obvious answer would be to avoid development near bushfire hazards or to prevent bushfires from occurring, neither are realistic options due to the growing demands for residential land and the growing understanding of the ecological processes dependent upon bushfire.

One of the ways of managing risks to life, land, property and the environment from bushfire is through appropriate land use planning strategies. Identifying bushfire prone areas across Warraber will inform future generations and guide where development should or should not occur at the beginning of the planning process.

Figure 9 shows how providing a firebreak between dwellings and bushfire hazard areas assists in reducing the threat of bushfire.

Figure 9 Bushfire Risk



### 3.6.4 Land Use Strategies

To minimise the impacts of bushfire on existing and future development, the following strategies are recommended:

- Development is not permitted in areas of medium bushfire risk otherwise; development must be compatible with the natural hazard where there is no other site suitable and reasonably available.
- New development must have access to and is accessible by sealed roads or high quality unsealed roads to facilitate emergency vehicle access.
- All development adjacent to or within an identified bushfire risk area must:
  - have setbacks as a firebreak which is maintained on an ongoing basis;
  - have access to adequate water supply;
  - not increase bushfire hazard or public safety risk;
  - maintain the health, safety and wellbeing of the community; and
  - minimise the impacts from bushfire on existing development.

### 3.6.5 Land Use Considerations

In assessing the impacts of future development on Warraber, the following key questions are to be raised. If the answer to any of the questions is 'NO', the proposal must, a) justify the inconsistency, b) be amended, or c) not be accepted.

- Is the development in accordance with the Bushfire Best Practice, Land Use Strategies and Sustainable Outcomes?
- Does the development consider:
  - alternative sites where it is in an area of medium bushfire risk; and
  - the risk to people and property?
- Is the development constructed of appropriate materials?
- Are appropriate firebreak setbacks provided between buildings and structures, including houses and infrastructure and bushfire risk areas?
- Is there adequate water supply and pressure and other appropriate infrastructure to protect a building or infrastructure from a fire?
- Does the development have a bushfire management plan, which includes the type of fire regime required to manage the ecological processes within the natural environments.



### 3.6.6 Land Use Projects

To protect Warraber's existing development and infrastructure and to assist in further studies of the Investigation Areas, the following projects are recommended:

- Implement a bushfire management plan that covers at a minimum:
  - the establishment of firebreaks or control lines around grassland areas and long-term dry vegetation types in areas adjacent to human settlements;
  - controlled burning outside of the driest periods when slow, low-intensity fires can be managed;
  - mosaic burning (e.g. small patches of controlled burning to reduce excess fuel load accumulation so that there is always habitat connectivity provided); and
  - fuel load maintenance; and
  - the need for fire trails and the potential impact on pristine natural environments.
- undertake community capacity building on:
  - sustainable fire management; and
  - property preparedness including planning for and maintenance requirements.



### 3.6.7 Sustainable Bushfire Outcomes

Development is planned and managed to ensure that significant adverse effects of bushfire on the natural and man made environments are avoided, mitigated or remedied.

### 3.6.8 Useful Resources

#### Policies, Guidelines and Fact Sheets

*State Planning Policy 1/03 – Mitigating the Adverse Impacts of Flood, Bushfire and Landslide* sets out the State government's interest in ensuring the natural hazards of flood, bushfire and landslide are adequately considered when making decisions about development.

**[www.dip.qld.gov.au/policies/index.php](http://www.dip.qld.gov.au/policies/index.php)**

*Your Bushfire Action Checklist provides a list of tasks individuals and the community should do both during the bushfire season and out of season to ensure that if a bushfire occurs, minimum damage is done to property.*

**<http://www.fire.qld.gov.au>**

#### Websites

Queensland Fire & Rescue Service

**[www.fire.qld.gov.au](http://www.fire.qld.gov.au)**

WARRTHAI



## 4.1 Best Practice

- Places of cultural heritage significance are identified, protected and retained for the benefit of present and future generations.
- Traditional Owners:
  - are the primary source of information on the value of their heritage and how this is best conserved;
  - must have an active role in any heritage planning process;
  - own intellectual property and other information relating to their culture and heritage; and
  - are the key stakeholders in land use planning through their relationship with land and sea management and resources.
- Reduce the impacts of climate change on the community's cultural heritage by:
  - recognising the importance of climate change to the community's cultural heritage;
  - avoiding quick decisions now that will make it more difficult to manage climate change risks in the future; and
  - building understanding and capacity of the community to deal with the impacts of climate change on the Island's cultural heritage.

## 4.2 Overview of Current Situation

The entire island of Warraber is an area of significant cultural heritage value to the Traditional Owners and the people of Warraber, the Warraberalgal.

While many significant and sacred sites are only known to Traditional Owners, a number of sites have been made known to the general public including:

- middens;
- wells;
- coconut and bamboo groves;
- story places; and
- zogo sites.

To protect the cultural significance of these sites, the locations of these sites have not been disclosed.

Known Places of cultural interest are

- the Zogo site on lot 23, corner of James and Phillemon Streets

- A memorial in front of the Community Hall

The community has erected signposts displaying the traditional names for several localities around Warraber.

Further details on Warraber's culturally significant places and sites is include in Appendix 3.



**“In the Torres Strait, cultural heritage includes all traces of human activity in the physical environment. These are irreplaceable sources of information on people’s lives and activities and on the historical development of crafts, techniques and art. Because monuments, site and culturally significant environments are non-renewable resources, their management must have a long-term focus. Cultural monuments and significant sites are a source of emotional and aesthetic experiences for many people and today Island Communities can benefit from the preservation and active use of its cultural heritage”**

### 4.3 Issues Overview

Cultural heritage is about places of significance to people and to help us understand the past and enrich the present. In the Torres Strait there are areas of particular significance to people because of island custom (Ailan Kastom) and history, including contemporary history. They may be meeting places, monuments and landscapes. Areas of cultural significance may not be physically evident. With regard to Torres Strait Islander tradition, given the sacred nature of areas of significance, many sites have not been recorded on official heritage inventories and registers that are accessible to the public. Hence, without consultation and liaison with Traditional Owners, engagement of cultural heritage observers and preparation of cultural heritage investigations, areas of significance may be inadvertently damaged or destroyed.

On Warraber, there are numerous areas and objects of significant cultural, historical and archaeological significance. It is likely that the location of many of these have not been recorded. The Torres Strait Islander Cultural Heritage Act 2003 provides blanket protection for Torres Strait Islander cultural heritage and its “Duty of Care” provisions require those conducting activities to take all reasonable and practicable measures to avoid harming it. Communication with the relevant PBC will assist developers to identify local areas and objects of significance and avoid or mitigate disturbance. The TSRA, through its LSMU and Native Title Office can assist in contacting the relevant PBC.

Given the nature of major development projects in the Torres Strait, the reality is that development often proceeds without undertaking appropriate studies, consultation or engagement of observers. As such, it is vital that any applicant of a development undertake their duty of care obligations and engage with Warraber’s Traditional Owners in order to manage and protect their unique areas of cultural significance.

Engagement and partnerships with the community provides opportunities for information sharing and effective management of cultural values and heritage. Information about places of cultural heritage significance must be managed in a way that satisfies the custodians of the area and ensuring that there is access to sufficient data to ensure proper management and protection of Warraber’s cultural heritage.

Not only are areas of significance at risk from development but also from impacts from storm surge, inundation and erosion, particular sites which are located close to the coastline. The intensification of environmental impacts associated with climate change may result in some areas of significance being submerged or eroded.

Map 10 shows the traditional place names for Warraber.

Map 10 Traditional Place Names (Warraber)



For more detail, refer to Map No. 9964-1207 contained in Maps.

### 4.3.1 Queensland Legislation

#### Torres Strait Islander Cultural Heritage Act 2003

Heritage associated solely with Indigenous places in the Torres Strait is administered by the Department of Environment and Resource Management (DERM), under the Torres Strait Islander Cultural Heritage Act 2003.

The Act recognises that Torres Strait Islander people are the primary guardians, keepers and knowledge holders of their cultural heritage. This enables Indigenous ownership of human remains and artefacts.

Importantly, the Acts recognise that a significant area does not necessarily have markings or other physical evidence indicating occupation or denoting its significance – the area may be associated with local tradition and history. For example, geographical places of importance to local people, such as a site that is part of a myth or legend (commonly referred to as 'storyplaces'), are significant areas under the Act. The Act provides blanket protection for all cultural heritage sites, known or unknown. The Act also recognises Ailan Kastom (Island Custom), which is defined as:

the body of customs, traditions, observances and beliefs of Torres Strait Islanders generally or of a particular community or group of Torres Strait Islanders, and includes any such customs, traditions, observances and beliefs relating to particular persons, areas, objects or relationships.

The recognition of Ailan Kastom distinguishes this Act from the Aboriginal Cultural Heritage Act, and also takes into account variation between the island communities.

A key part of the Act is the Duty of Care provisions that require those conducting activities in areas of significance to take all reasonable and practicable measures to avoid harming cultural heritage. Penalties apply where cultural heritage is damaged or destroyed.

The Act also provides for the registration of Torres Strait Islander Cultural Heritage Bodies. Organisations such as Prescribed Bodies

Corporate (PBCs) can apply for this status, the role of which is to identify the correct Torres Strait Islander party or family who can speak for a particular area and to provide certainty about how cultural heritage is managed on their traditional lands. Registration also enables access to funding under DERM's Cultural Heritage Bodies Grant Program.

#### Queensland Heritage Act 1992

Historical cultural heritage includes artefacts, places and buildings that are not Indigenous in origin, but commonly of European origin. Queensland's historic heritage places are protected under the Queensland Heritage Act 1992,

At this time, none of the nine communities have places on the Queensland Heritage Register.



### 4.3.2 Commonwealth Legislation

The Australian Heritage Council (formerly the Australian Heritage Commission) has compiled the Register of the National Estate since 1976, which comprises more than 12,000 places of natural, historic and indigenous significance. They come from all parts of Australia and are owned variously by Commonwealth, State and local governments, businesses, voluntary and other organizations and private individuals. All places entered in the Register are strictly assessed against publicly available criteria outlining national estate values.

None of the nine communities have places listed on the Register of the National Estate. All Saints Church, Erub, is the only place on the outer Torres Strait Islands that is currently listed on the Register (ID Number 9128).

### 4.3.3 Previous Records of Cultural Heritage Sites

DERM is the agency responsible for the Torres Strait Islander Cultural Heritage Database, which holds information on recorded cultural heritage sites and places in the Torres Strait region.

The majority of Torres Strait sites on the Database do not have accurate location information

That there are many more sites on the islands than those in the DERM Site Database is evident from a 1999 report by Fitzpatrick et al. (1998), which sought to identify all known cultural heritage sites in Torres Strait through a review of government records and available literature (Table 1). This project was commissioned by the then Island Coordinating Council (ICC) .<sup>2</sup>

Torres Strait Islanders also recognise the existence of numerous culture sites in places where there is no archaeological evidence or even any very specific physical boundaries or definitions... Nonetheless, these are named, identifiable and known places and invariably have important stories associated with them. They are [a] significant category of culture sites (Fitzpatrick et al. 1998:4).

Consequently, many more sites would occur on the islands than those listed above, not to mention other 'archaeological' sites which would no doubt be revealed in the course of systematic surveys.

<sup>2</sup> Now the Torres Strait Islander Regional Council (TSIRC).



## 4.4 Land Use Strategies

To protect Warraber's cultural heritage from proposed development, the following strategies are recommended:

- All proposed developments must be discussed with the PBC on the potential impacts of the development on cultural heritage.
- A written agreement (e.g. cultural heritage management plan) be prepared as part of the development proposal which addresses:
  - genuine consultation with the community to determine how they wish to safeguard and control their culture and/or heritage;
  - how the development will protect the culture and heritage item or place;
  - the requirement for a cultural heritage survey prior to development proceeding;
  - the role of the PBC and Traditional Owners as observers during construction to monitor the impact on the culture and heritage items;
  - methods such as temporary markers that identify a buffer zone around the heritage item or place that must be removed after the building has been completed;
  - a remediation plan which outlines how and when a cultural heritage item or place will be reinstated if removed or damaged during construction; and
- a 'sign off' process after construction is completed. This sign off must ensure that all parties are satisfied with the condition of the cultural heritage item or place is left in after construction is completed.
- All proposed developments must:
  - include the written agreement such as a cultural heritage management plan; and
  - undertake a site inventory including a search of NRW and the PBC's records.
- The community must identify, conserve and manage places of significant cultural heritage particularly those affected by natural hazards and determine which information is readily or not available for general public knowledge.
- The precautionary principle should be adopted where there is uncertainty about the cultural significance of an area or a site.
- All processes, policies and decisions that protect and enhance the natural and man made environments must incorporate cultural values and beliefs and the role of Traditional Owners in Warraber's cultural heritage
  - a remediation plan which outlines how



## 4.5 Land Use Considerations

In assessing the impacts of future development on Warraber, the following key questions are to be raised. If the answer to any of the questions is 'NO', the proposal must, a) justify the inconsistency, b) be amended, or c) not be accepted.

- Is the development in accordance with the Cultural Heritage Best Practice, Land Use Strategies and Sustainable Outcomes?
- Warraber is a significant area of cultural heritage to the community, so have all appropriate persons and State agencies been consulted?
- Does the development have an agreed cultural heritage management plan for the affected area and/or site?
- Where the development threatens a cultural heritage item, does it have a disaster mitigation plan? If it does, does it address where disturbance is unavoidable, the temporary relocation of the implement to a safe place?
- Does the development threaten the integrity and setting of heritage items through water run off, soil erosion or soil movement?



## 4.6 Land Use Projects

To protect Warraber's cultural heritage, the following projects are recommended to be undertaken.

- A systematic, island focused cultural heritage survey. This survey should:
  - identify the nature and location of major cultural heritage sites and their likelihood of being affected by changes in land use; and
  - consider the confidentiality of such information (should it remain confidential solely for the use of the PBC, or be made publicly available).
- Facilitate opportunities for young people to build understanding and capacity about Warraber's areas of cultural significance.

## 4.7 Sustainable Indigenous Cultural and Heritage Outcomes

- Development is planned and managed to ensure impact on the culture and heritage of the community is avoided, mitigated or remedied.
- The impact of climate change on the community's cultural heritage is managed in a sustainable and integrated way to provide appropriate solutions.
- Ensure the community is involved in ongoing consultation to support the protection and healing of country and culture for future generations.

## 4.8 Useful Resources

### Legislation

*Torres Strait Island Cultural Heritage Act 2003 (Qld) provides for the effective recognition, protection and conservation of Torres Strait Island cultural heritage.*

**[www.legislation.qld.gov.au](http://www.legislation.qld.gov.au)**

*Queensland Heritage Act 1992 (Qld) provides for the conservation of historical (non-indigenous) cultural heritage*

**[www.legislation.qld.gov.au](http://www.legislation.qld.gov.au)**

*Policies, Guidelines and Fact Sheets*

*Duty of Care and Management Plan Guidelines – Aboriginal Cultural Heritage Act 2003 sets out reasonable and practical measures for meeting the duty of care obligations established in the Aboriginal Cultural Heritage Act 2003.*

**[www.derm.qld.gov.au/cultural\\_heritage/legislation/duty\\_of\\_care.html](http://www.derm.qld.gov.au/cultural_heritage/legislation/duty_of_care.html)**

*Cultural Heritage – Your Duty of Care explains the duty of care provisions under the Aboriginal Cultural Heritage Act 2003.*

**[www.derm.qld.gov.au/factsheets/pdf/cultural\\_heritage/ch16.pdf](http://www.derm.qld.gov.au/factsheets/pdf/cultural_heritage/ch16.pdf)**

*Cultural Heritage provides an overview of the Torres Strait Islander Cultural Heritage Act 2003.*

**[www.derm.qld.gov.au/cultural\\_heritage](http://www.derm.qld.gov.au/cultural_heritage)**

*Aboriginal and Torres Strait Islander Cultural Heritage Places introduces the different types of cultural heritage places and sites e.g. middens, grinding groves etc.*

**[www.derm.qld.gov.au/cultural\\_heritage/significant\\_places/records\\_management.html](http://www.derm.qld.gov.au/cultural_heritage/significant_places/records_management.html)**

*Cultural Heritage Management Plan explains what a cultural heritage management plan is and when one is required.*

**[www.derm.qld.gov.au/cultural\\_heritage/legislation/cultural\\_heritage\\_management\\_plans.html](http://www.derm.qld.gov.au/cultural_heritage/legislation/cultural_heritage_management_plans.html)**

*Cultural Heritage Database and Register explains what the cultural heritage database and register is and how entries are processed.*

**[www.derm.qld.gov.au/factsheets/pdf/cultural\\_heritage/ch5.pdf](http://www.derm.qld.gov.au/factsheets/pdf/cultural_heritage/ch5.pdf)**

*Cultural Heritage Studies provides an overview of why it is important to include sites of cultural significance on the cultural heritage register.*

**[www.derm.qld.gov.au/factsheets/pdf/cultural\\_heritage/ch6.pdf](http://www.derm.qld.gov.au/factsheets/pdf/cultural_heritage/ch6.pdf)**

*Ask First: a guide to respecting Indigenous heritage places and values is a guide to providing effective recognition, protection and conservation of Indigenous cultural heritage.*

**[www.environment.gov.au/heritage/ahc/publications](http://www.environment.gov.au/heritage/ahc/publications)**

### Publications

*Lawrie, M. (1970). Myths and Legends of Torres Strait. St. Lucia: University of Queensland Press.*

*McNiven, I.J. and Quinnell, M. (eds) (2004). Torres Strait Archaeology and Material Culture. Memoirs of the Queensland Museum (Cultural Heritage Series) 3(1).*

*Teske, T. (1991). Island of Torres Strait: Central Islands: Coconut-Warraber-Yorke. Qld: Far Northern Schools Development Unit.*

### Websites

*Department of Environment and Resource Management*

**[www.derm.qld.gov.au](http://www.derm.qld.gov.au)**

*National Native Title Tribunal*

**[www.nntt.gov.au](http://www.nntt.gov.au)**

*Australian Heritage Council*

**[www.environment.gov.au/heritage/ahc](http://www.environment.gov.au/heritage/ahc)**



# The Community



**Demographic trends and changes have significant influence on future development needs, the provision of community services and infrastructure. For example, if the population is ageing, then planning must ensure that the housing choice reflects the needs of an ageing population as well as ensuring the right community services, facilities and infrastructure is in place to support the ageing**

Other topics such as community belonging, crime and safety, disability, food security and health are not addressed in this Plan as it is outside the scope of the project. It is recommended that a community wellbeing report be developed through a comprehensive community engagement process, as it would highlight the needs, concerns and aspirations of the community that will influence future development.

This Plan addresses the following with regards to the community:

- population;
- housing;
- sustainable community expansion; and
- community facilities and services.



## 5.1 Population

### 5.1.1 Best Practice

- Population and development are dealt with in a unified and comprehensive way with each community developing its own solutions to population trends that reflect their values and cultural heritage.
- Land use development aligns with population profiles and trends.

As confirmed by the figures in Table 2, in the last decade (1996-2006), Warraber's population increased by around 20%, being 54 persons.

In 2006, the total population of Warraber was 269, an increase of 13.01% (35 persons) from the 2001 Census (234).

The growth rate was 2.8% or 7 persons per year in the 5 years between 2001-2006.

The growth rate was 2.3% over the 10 years to 2006.

The 2006 Census indicates following population characteristics:

- A median age of 25 years.

### 5.1.2 Overview of Current Situation

The resident population of Warraber has increased in the past ten years as indicated in Table 2.

Table 2 Population Growth

Year	Population	Growth / Year (%)	Population Density: persons/km <sup>2</sup>
1996	215	NA	NA
2001	234	1.7	NA
2006	269	2.8	269

Source: PIFU 2008.

Table 3 Population Characteristics

	Persons	(%)	Queensland Average
Population under 15yrs	93	37%	20%
Population 15 - 24yrs	47	20%	14%
Population 25 - 45yrs	65	27%	28%
Population 45 - 65yrs	28	11%	25%
Population over 65yrs	14	5%	13%
Total	247	100%	

Source: data from ABS 2006 community profile series

Further population information is available at the ABS 2006 Community series profile.

### 5.1.3 Land Use Strategy

To ensure that population trends and profiles are reflected in land use planning on Warraber it is recommended the population capacity, profiles and trends are reviewed regularly and appropriate adjustments made to ensure that an appropriate land supply and housing types are maintained.

### 5.1.4 Sustainable Population Outcomes

- Population profiles and trends are used to inform land use policy planning and development decision-making processes.
- Population and development capacity support a sustainable environment.



### 5.1.5 Useful Resources

#### Websites

Australian Bureau of Statistics (Census data)  
[www.abs.gov.au](http://www.abs.gov.au)



## 5.2 Housing

### 5.2.1 Best Practice

- Provide a range of housing choices and opportunities in locations where there is a cost effective and efficient use of existing infrastructure and not be adversely impacted by natural hazards and climate change.
- Housing choices and stock matches demand and supply.
- Identifying new areas for residential development that provides a mix of housing types and densities without an adverse impact on existing infrastructure and the natural environment.
- Promotion and incorporation of sustainable design.
- Reduce the impacts of climate change on community housing by:
  - recognising the importance of climate change on the community's housing;
  - avoiding quick decisions now that will make it more difficult to manage climate change risks in the future; and
  - building understanding and capacity of the community to deal with the impacts of climate change on housing.

### 5.2.2 Overview of Current Situation

Warraber's housing stock varies in size, architectural style, height and age. The simple architectural style, neat gardens and the clean streets give a feeling of community pride.

As with other Torres Strait islands, the houses located in the village are one or two storey containing three to five bedrooms. The older homes are of fibro construction either built on short concrete stumps with the more recent homes, slab-on-ground, two storeys and timber construction. The single storey dwellings are scattered throughout this area. Structures are in

various states of repair from those unoccupied and in disrepair to those recently constructed with well-attended gardens.

Housing density varies throughout the village with no distinct area of higher density.

There are 55 houses on Warraber for approximately 290 persons ( 5.3 persons per house).

Additionally there is a guesthouse located on Lot 21, with overflow accommodation at the airstrip terminal building. Contractor accommodation is in the house on lot 37, or more recently in the



Healthcentre



portable dongas setup on the sports field for the sewerage construction project in 2009.

There are 19 vacant serviced lots within the village

- 3 lots above the Draft Designated Storm Tide level (lots 120,121,124)
- 13 lots within the low hazard inundation area (lots 20,28A,34,35,80,81,82,112,115,116,122,123,91A)
- 3 lots within the high hazard tidal inundation area (lots 36,38 & 60)

### Family Composition

The 2006 Census indicates following characteristics of family composition on Warraber:

- 6 couples with no children;
- 24 families with children under 15 years;
- 4 families with children over 15 years;
- 15 one parent families with children under 15; and
- 5 one parent families with children over 15 years.

### Household Composition

The 2006 Census indicates the following characteristics about Warraber households:

- 47 households of which 7 consist of two people, 5 consist of three people, 6 consist of four people, 8 consist of five people and 16 consist of six more people;
- 5 lone person households; and
- an average household size of 4.1 persons per dwelling.

### Housing Rental and Ownership

The 2006 Census indicates the following characteristics on Warraber's housing rental and ownership:

- 46 households paying rent to a State or Territory housing authority;
- nil households paying rent to a housing cooperative, community or church group;
- nil households paying rent to a non-stated landlord;
- nil households paying a housing loan repayment;
- no privately owned dwellings (either fully owned or being purchased); and
- the average rent is \$50 per week.<sup>3</sup>

In summary, housing on Warraber is entirely public housing.

<sup>3</sup> In comparison, in Queensland, 31.6% of the population rent a house (predominately via either a real estate agency or third party), with an averagely weekly rent of \$200.00.



### 5.2.3 Issues Overview

Growth pressure on Warraber will be generated through population increases and the changing population structure.

The 19 serviced vacant lots within the village have the capacity to accommodate approximately 95 persons. This is the expected growth to 2019 using the high growth rate scenario.

Refer to Section 5.3 Sustainable Community Expansion for more information.

As part of meeting population changes and preserving the land and sea relationship, providing diverse, sustainable, affordable housing options and a range of site sizes is a significant issue and key challenge for community. Providing a range of housing choice assists in creating diverse communities and preventing social polarisation and displacement as well as protecting the natural environment. For example, it is important that affordable housing not be marginalised to fringe areas. It should be well located in relation to transport, community facilities and services, open space and recreation and education and employment opportunities.

In providing housing stock and choice to cater for the population growth and relocation of existing residents, the impact on the capacity of the existing landfill or dump and water supply must be taken into account.

Refer to Section 6.1 Water and Section 6.3 Waste for more information.



### 5.2.4 Land Use Strategies

To enable housing demand and supply to meet the population growth, the following strategy is recommended:

- Provide residential land to enable a supply of diverse, affordable and sustainable housing to meet the needs of current and future residents and visitors.

### 5.2.5 Land Use Considerations

In assessing the impacts of future development on Warraber, the following key questions are to be raised. If the answer to any of the questions is 'NO', the proposal must, a) justify the inconsistency, b) be amended, or c) not be accepted.

- Is the development in accordance with the Natural Environment, Cultural Heritage, Community and Infrastructure Best Practice, Land Use Strategies and Sustainable Outcomes?
- Is the development integrated with the landform and landscape?
- Does the development use:
  - energy efficiency principles in design;
  - minimise the reliance on fossil fuels for thermal comfort and water heating; and
  - minimise the use of materials, which deplete natural resources or create toxic pollution in their manufacture, use or disposal?
- If the development requires the demolition of an existing building, are the materials of the existing building to be reused? If so, where? If not, how are the materials to be disposed?
- Does the development provide sufficient onsite vehicle, boat parking and access areas for residents?
- If the development is in the nominated investigation area, is all necessary infrastructure in place and operational for the development to proceed?
- Are all existing serviced lots utilised prior to developing new lots?

## 5.2.6 Sustainable Housing Outcomes

- Plan and manage urban area growth by limiting development along the coast and encouraging new development inland.
- Provide suitable residential land to enable a supply of diverse affordable and sustainable housing to meet the needs of current and future residents and visitors.
- The provision of a diverse choice of sustainable housing which:
  - provides a high standard of sustainable living;
  - provides a variety of different residential lifestyle opportunities; and
  - is responsive to climate, landscape and the changing population structure of the community's population while being affordable.
- Areas for residential use are developed to be consistent with the planned capacity for roads, community services and infrastructure for the island.

## 5.2.7 Useful Resources

### Policies, Plans & Guidelines

*Demographic Profile, Queensland Torres Strait Islander Communities provides an overview of the 1996 to 2001 Census data for the 17 Torres Strait Islands.*

**[www.dip.qld.gov.au/population-forecasting/indigenous-population-trends.html](http://www.dip.qld.gov.au/population-forecasting/indigenous-population-trends.html)**

*State Planning Policy 1/07 – Housing and Residential Development sets out the State government's interest in ensuring that local governments identify their community's housing needs and analysis and modify if necessary, their planning schemes to remove barriers and provide opportunities for housing options that respond to identified needs.*

**[www.dip.qld.gov.au/policies/index/php](http://www.dip.qld.gov.au/policies/index/php)**

### Websites

Australian Bureau of Statistics (Census data)

**[www.abs.gov.au](http://www.abs.gov.au)**



## 5.3 Sustainable Community Expansion

### 5.3.1 Current and Predicted Growth Overview

Using the 2006 Census figure of 269 persons, the 2009 population is estimated to be 292 persons.

This Plan considers two growth scenarios based on a low growth rate of 1.0% and a high growth of 3.0 % for the next ten years.

- a low growth rate of 1.0% which will generate:
  - an extra 31 persons over ten years;
  - an additional 6 houses over ten years; and

- additional housing need of 0.6 houses per year at an average of 5 persons per household.

- a high growth rate of 3.0% which will generate:
  - an extra 101 persons over ten years;
  - an additional 20 houses over ten years; and
  - additional housing need of 2.0 houses per year at an average of 5 person per household.

In summary, in 2019, the population of Warraber is predicted to be between 323-393 people.

Table 4 shows the estimate population growth and housing demand for Warraber over the next 10 years.

Table 4 Estimated Population Growth and Housing Demand

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	addit. persons	addit. houses @5pph
Low growth 1.0%	292	295	298	301	304	307	310	314	317	320	323	31 persons over ten years	6 houses over ten years
High growth	291	303	315	328	341	355	369	384	399	415	431	101 persons over ten years	20 houses over ten years

Source: ABS 2006



### 5.3.2 Issues Overview

Under any scenario, it is considered that the population of Warraber will increase over time. In addition, the expansion of the village along the eastern coastline is inappropriate due to its impact on the environment, the high erosion of these coasts as well as the potential risks from coastal inundation of tides and storm surges or other natural hazards.

Some of the options available to manage growth on Warraber are:

- using existing vacant lots
- increasing residential density in the village
- expanding the residential areas.

#### Using Existing Serviced Lots

If the population on Warraber continues to increase, the existing 19 vacant lots in the village will need to be developed to provide houses for the growing population.

- All vacant lots are above the HAT 2100 making it possible for them to be developed in the immediate short term;
- Development on Lots 36 & 38 are most at risk from tidal inundation
- Lots 120 to 124 are vacant serviced lots along Garnier Street on the way to the airstrip. Development of these should be encouraged as these lots are fully serviced and are on the higher parts of Warraber.
- the vegetation on Garnier Street at the Warraber airstrip end should be maintained as an open space buffer as it is a beautiful welcoming entrance to Warraber.

The existing 19 serviced lots will cater for an additional 95 people, which is about the predicted population of Warraber of 393 for 2019.

#### Increase Residential Density

Increasing density is generally undertaken by providing a mix of housing types that use less land than a 3-bedroom dwelling house. Examples include dual occupancies (duplex or a house with two units), townhouses or units. The benefits of increased residential density include:

- more economic use of existing infrastructure and serviced land;
- reduced need for investment in new infrastructure;
- better access to existing services and facilities;
- combining existing land patterns whilst increasing the number of people living on Warraber; and
- more sustainable housing patterns.

#### Expansion of the Residential Areas

As previously outlined, the coastal expansion of the village is inappropriate due to the negative impacts on the environment and the potential risks from tides and storm surge inundation or other natural hazards. Therefore, residential development needs to occur inland from the coast.

Two potential areas for expanding the village have been identified. (Note that as lots 120-124 already exist along Garnier Street they are considered ready-to-build and are not included below)



### Investigation Area 1 – Garnier Street West -10 lots

This investigation area is located between Garnier Street and the Esplanade. A sewerage main constructed in 2009 is located along the western edge and can be used by some of the lots. The development of this area will need to address as a minimum the following:

- Preservation of appropriate buffer to the airstrip
- storm surge and predicted sea levels;
- bushfire risk;
- impact on cultural heritage; and
- impact on vegetation and habitat corridors.

### Investigation Area 2 – Phillemon Street East – 26 lots

This investigation area is located at the rear of Phillemon Street. Access is by proposed extensions of James Street and Dabus Street and possible connection to the road along the airstrip. A sewerage main constructed in 2009 is located along the back of the Phillemon Street houses can be used by some of the lots. The development of this area will need to address as a minimum the following:

- Preservation of appropriate buffer to the airstrip
- storm surge and predicted sea levels;
- bushfire risk;
- impact on cultural heritage; and
- impact on vegetation and habitat corridors.



### 5.3.3 Infrastructure Capacity

The demand for new infrastructure is usually dependent upon the size of the population.

As a community grows it will require either new infrastructure, or upgrades to its existing infrastructure (eg water treatment plants).

Figure 10 shows the expected demand for new infrastructure relative to the population size.

### 5.3.4 Land Use Strategies

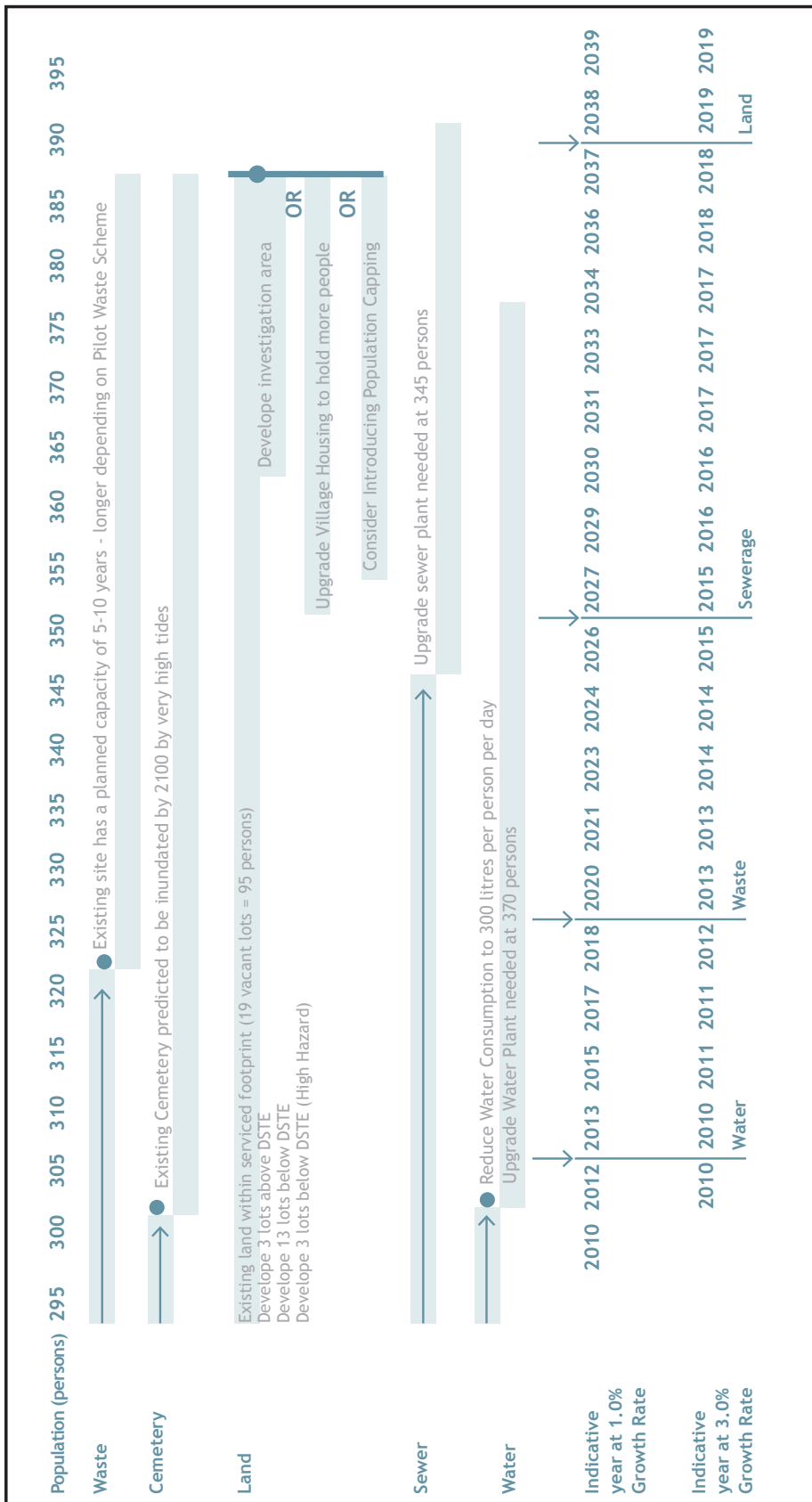
The population trends and profiles and infrastructure limitations mean that the land use strategies must be developed to:

- Manage the total population trend in a way that retains urban and island character.
- Identify and locate land suitable for urban development in non-coastal areas. One investigation area has been identified with three other areas extending the existing village.
- Provide choice in housing form and affordability in appropriate locations.
- Increase the residential density in the village without comprising the amenity and character of the village and increasing the risk to natural hazards such as storm surge and tides.

Maps 11 & 12 shows the future land use intent for lots within the village.

Map 13 shows the lots, which are presently suitable for development due to access to services. These lots are shown as “Village”. Areas that may be suitable for development in the future, subject to further investigation and/or once services have been provided, are shown as “Investigation Area”.

Figure 10 Infrastructure Capacity Relative to Population Growth

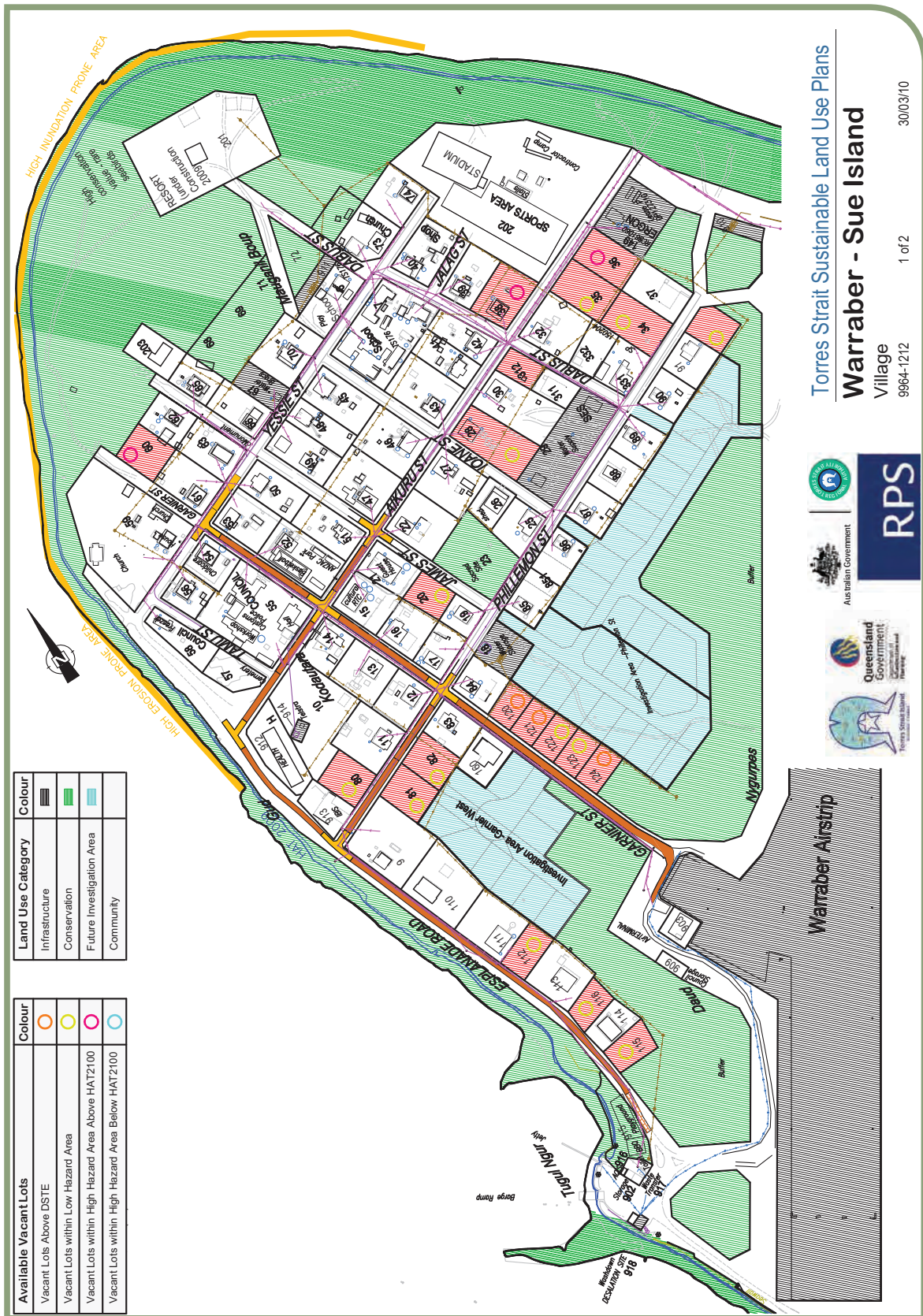


# Map 11 Land Use



For more detail, refer to Map No. 9964-1201 contained in Maps.

Map 12 Village



For more detail, refer to Map No. 9964-1212 contained in Maps.



### 5.3.5 Land Use Considerations

In assessing the impacts of future development on Warraber, the following key questions are to be raised. If the answer to any of the questions is 'NO', the proposal must, a) justify the inconsistency, b) be amended, or c) not be accepted.

- Is the development in accordance with the Sustainable Community Expansion Best Practice, Land Use Strategies and Sustainable Outcomes?
- Does the development consider its impact on population capacity, profile and trends and the effects of growth and change on Warraber?
- Is the development consistent with the strategies developed to address development growth?
- Does the development satisfactorily address its impact on the 'dump', water supply and the cemetery?



### 5.3.6 Land Use Projects

To determine where high density residential development should occur in the village, a residential strategy should be undertaken.

This could involve

- Developing the lots above the predicted tidal influence along Garnier Street
- Developing the existing vacant lots in the village, subject to suitable floor levels, refuge areas and strengthening in accordance with the Draft Queensland Coastal Plan
- Investigate a mix of housing options to increase residential density eg townhouses, units, dual-occupancys, etc
- Investigate feasibility and cost of the residential investigation areas

Unless the availability of the existing vacant serviced land is an issue, then the development of the Investigation Areas should not be required in the next 10 years

### 5.3.7 Sustainable Community Expansion Outcomes

- Decision making focuses on reducing the impacts of population growth and development on natural resources and the environment.
- A highly liveable community where there are a range of services and activities for all people who work together to identify, prioritise and address community issues.

## 5.4 Community Facilities and Services

### 5.4.1 Best Practice

- Communities are created with a recognisable character and sense of place which have a high level of amenity, safety, connectivity and integration between existing and new places.
- Create well-designed, safe and healthy environments that encourage active community participation, promote healthy lifestyles, prevent crime and maintain social equity and diversity.
- Maximise access to appropriate social and retail infrastructure for all residents.
- Reduce the vulnerability of existing and future community facilities and services to the impacts of climate change by:
  - avoiding decisions now that will make it more difficult to manage climate change risks in the future;
  - building understanding and capacity of the community to deal with the impacts of climate change on their community facilities and services; and
  - providing community facilities and services in locations not adversely impacted by natural hazards.

### 5.4.2 Overview of Current Situation

The 2006 Census indicated the following statistics:

#### Employment and Volunteering

The 2006 Census indicates the following characteristics for employment and volunteering:

- 126 people living on Warraber are employed;
- an average household weekly income of \$1,095.00;
- an average individual income of \$332.00;
- 31.0% of those working were between the ages of 15 to 24 years;
- 64.3% of those working were between the ages of 25 to 54 years; <sup>4</sup>

<sup>4</sup> In comparison, in Queensland, the average weekly household income is \$1,033.00 and weekly individual income is \$476.00. Of those working, 18.1% are between the ages of 15 - 24 years, and 67.1% are between the ages of 25-54 years.

- 58.5% of the community (over 15 years) undertake some form volunteer work in the 2006 Census. Volunteer work in the 2006 Census is someone who worked for an organisation or a group doing unpaid voluntary work in the 12 months prior to the Census;
- 18.3% of those undertaking volunteer work were between the ages of 15 and 24 years; and
- 63.4% of those undertaking volunteer work were between the ages of 25 and 54 years. <sup>5</sup>

Table 5 shows the types of employment sectors people work in.

<sup>5</sup> In comparison, in Queensland, 18.3% of the community undertaken some form of volunteer work. Of those volunteering, 14.1% are between the ages of 15 - 24 years, and 56.5% between the ages of 25 - 54 years.

Table 5 Employment Sectors

Employment Industry	Construction	Public Administration & Safety	Education & Training	Health Care & Social Assistance	Wholesale Trade	Retail Trade	Other	Not Stated
People	0	62	6	3	0	3	3	0

Source: ABS 2006

## Training and Education

From the 2006 Census, 74 people were studying or undertaking some form of further education program or training. This is 27.5% of the total population. Of those undertaking education:

- 5.4% were attending pre school;
- 37.8% were attending primary school;
- 20.3% were attending secondary school;
- 8.1% were attending a technical or further educational institution;
- none were attending university or tertiary institution; and
- 28.4% were undertaking another form of educational program or training.<sup>6</sup>

<sup>6</sup> In comparison, in Queensland, 4.9% of students were attending pre-school, 29.1% were attending primary school, 19.8% were attending secondary school, 5.7% were attending a technical school or college, 11.5% were attending university and 1.9% were attending another form of educational program or training.

The 2006 Census also shows that those that left school were over the age of 15, 42.0% left after completing Year 12, with another 19.7% leaving after completing Year 10. This means that 74.5% completed schooling after the age of 15 years.<sup>7</sup>

Table 6 shows the community facilities that are available on Warraber.

Table 7 shows the retail and public office facilities and services that are available on Warraber.

Table 8 shows the recreational facilities that are available on Warraber.

<sup>7</sup> In comparison, in Queensland, 41.3% of people complete Year 12, 35.1% of people leave school after completing Year 10 or 11. A total of 76.4% of students completed at a minimum Year 10.



Table 6 Community Facilities

Facility	Provided ( ✓ = Yes; x = No)	Location
Pre school	✓	School reserve Lot 6
Primary School	✓	School reserve Lot 7
Health Care Centre	✓	Lot 912 Lease H
High school	x	
High school	✓	Lot 54



Table 7 Retail and Public Office Facilities and Services

Facility	Provided ( ✓ = Yes; x = No)	Location
Administration offices/Workshop	✓	Lot 55
Community hall	✓	Lot 55
Guest House	✓	Lot 21
Contractor Accommodation	✓	Lot 37
Churches	✓	Lot 59
SES depot	✓	Lot 29
Supermarket (IBIS store and or Convenience store)	✓	Lot 913 lease B
Banking facilities	✓	Council or Ibis
Custom Depot	x	
Police Station	✓	In council

Table 8 Recreational Facilities

Facility	Provided ( ✓ = Yes; ✗ = No)	Location
Picnic Grounds	✓	-
Sports Area	✓	Lot 202
Sports courts	✓	In Stadium Lot 202 Also basketball Lot 52



### 5.4.3 Issues Overview

On Warraber, there are strong links between the physical environment, socio-economic issues and community health and wellbeing. Best practice planning and design of the built environment encourages physical activity and healthy lifestyle choices, provides a sense of community safety and assists in crime prevention. Communities that contain a broad mix of housing choices, appropriate local support services, adequate social infrastructure and strong community networks tend to be safer communities. This makes it vital that planning policies for community facilities and open space encourage multiple use and flexible design to allow for changing needs.

The community needs to accommodate services for convenience goods and services that

meet the normal daily needs of its residents (e.g., food, personal services and prescription drugs). At the same time, due to the limited land supply, a mix of uses need to be balanced and contribute to the sense of a complete neighbourhood offering a variety of housing types, supporting convenience commercial, job opportunities, schools, parks and open spaces. This should be encouraged on Warraber as the community facilities and services are scattered.

Some of the community services and facilities are located in areas identified as impacted by natural hazards. The predicted high hazard inundation area is at Tamu Street adjacent to Tamu Street and the Council offices. Consideration should be given to relocating these facilities and services to a safer location.



#### 5.4.4 Land Use Considerations

In assessing the impacts of future development on Warraber, the following key questions are to be raised. If the answer to any of the questions is 'NO', the proposal must, a) justify the inconsistency, b) be amended, or c) not be accepted.

- Is the development in accordance with the Natural Environment, Cultural Heritage, Community and Infrastructure Best Practice and Sustainable Outcomes?
- Is the development part of multipurpose community facilities and services?
- Can the development respond to changing and emerging community needs?
- If the development is for a new residential area, is there adequate provision made for public spaces and places for community activities?



### 5.4.5 Sustainable Community Facilities and Services Outcomes

- Community facilities that recognise and reflect the needs of the resident population including people with special needs such as older people, children, low-income earners and people with disabilities.
- New and existing residential areas are provided with community and social facilities that are convenient and highly accessible to the community's residents.
- The community is involved in the planning of community building and spaces to promote ownership and pride.
- Existing and new community facilities are multiple use buildings and not located in areas identified as impacted by natural hazards.
- Local sport and recreational opportunities continue to focus on natural and cultural activities.

### 5.4.6 Useful Resources

#### Websites

*Australian Bureau of Statistics (Census data)*

[www.abs.gov.au](http://www.abs.gov.au)





# Infrastructure



**Providing and managing infrastructure is a key issue facing the Torres Strait and Warraber is no exception. For sustainable land uses and a healthy community, a close and strong relationship between policies and strategies is required.**

Infrastructure plays a vital role in linking island communities within the region and mainland Australia. As a physical resource of strategic importance, infrastructure needs to be protected from any adverse effects (that may arise from land uses, natural hazards and climate change) that could affect the provision of an integrated, safe, responsive and sustainable infrastructure system. Similarly, negative environmental effects on land use activities resulting from infrastructure also need to be managed.

Infrastructure also has a significant role in the community and therefore land use and infrastructure planning whether for existing or future development must be provided in a way that is efficient, equitable, accessible and timely. On the other hand, demand and consumer behaviour must not be ignored to enable the maximisation of existing infrastructure and to minimise the need for additional infrastructure and services.

This Plan addresses the following with regard to infrastructure:

- water;
- sewer;
- waste;
- electricity;
- telecommunication;
- roads;
- drainage;
- air access; and
- sea access.



## 6.1 Water

### 6.1.1 Best Practice

- Water infrastructure is expensive to install and consideration must be given to the proximity of existing water infrastructure when planning future development.
- Protect and enhance the ecological health and water quality of surface and groundwater, including regional waterways, wetlands and estuaries.
- Development should not occur in water catchments.
- Water use should avoid or minimise land degradation, including soil erosion, compaction, geomorphic instability, contamination, acidity, water logging, decline of native vegetation or, where appropriate, salinity and, where possible, land should be rehabilitated.
- Water planning is based on a total water cycle management, which is reflected in all policy and decision-making and provides assured supplies of water to meet the reasonable needs of development and the community.
- Promote efficient use of water by improving demand management and reusing and recycling water.
- All new infrastructure with a life of 10+ years should consider climate change risks now for function, design and location.
- Reduce the impacts of climate change on the community by:
  - recognising the importance of climate change on the community's water infrastructure;
  - avoiding quick decisions now that will make it more difficult to manage climate change risks in the future; and
  - building understanding and capacity of the community to deal with the impacts of climate change on the island water infrastructure.



### 6.1.2 Overview of Current Situation

The existing water infrastructure has the following features:

Source:	<p>Water on Warraber is sourced from:</p> <ul style="list-style-type: none"> <li>• rainwater collected from the covered area of the storage lagoons located to the south west of the island;</li> <li>• a mobile reverse osmosis desalination unit located near the barge ramp; and</li> <li>• rainwater collected in household and community building water tanks</li> </ul>
Treatment:	<p>Water from the lagoons is treated via sand filtration and chlorination at the treatment plant located adjacent to the lagoons.</p>
Storage:	<p>Collected rainwater is stored the lined and covered storage lagoons. After treatment, water is pumped to the 100 kL ground level reservoir tank located in the town area. Water from the desalination plant is pumped to the storage lagoons or directly to the ground level reservoir.</p>
Delivery:	<p>Potable water is delivered to the community from the ground level reservoir via pressurised underground mains. All facilities are connected to the mains via branch lines and all facilities are individually metered.</p>
Capacity:	<p>The main source of water comes from the water collected on the covered area of the storage lagoons. The catchment area of lagoons is 22,300 m<sup>2</sup>. Based on an average rainfall of 1,500mm/year, the average yield of the lagoons is around 33ML per annum. The lagoon storage volume is approximately 24ML, which is considered a reasonable match with the average yearly rainfall to contain a year's supply of water.</p> <p>For the current estimated population of 292 people, an average yearly rainfall produces enough water to allow for a consumption of approximately 309L/person/day. Any decrease in average yearly rainfall and/or increase in demand will result in a water shortage towards the end of the dry season.</p> <p>Accordingly, the water supply from the lagoons is considered marginal for the existing population and inadequate for future growth. For the past several years, the town water supply has been supplemented by the mobile desalination unit. The maximum capacity of the mobile unit is currently 40kL of potable water per day.</p> <p>The total existing treated water storage capacity is 100kL. For the design population estimate of 292 persons and the adopted average daily consumption rate of 300L/person per day, there is approximately one days storage capacity, which is considered sufficient to meet water demand during periods of treatment plant breakdown and/or maintenance provided water maintenance staff are available on the island.</p>
Usage:	<p>The estimated current population is about 292 people. The most recent water consumption data indicates an average water consumption of 150l/person/day. This consumption is considered good, however it is not clear if this low consumption is consistent throughout the year or whether the figure is low due to water rationing during the installation of the new lagoon covers.</p> <p>A maximum consumption of 300 l/person/day should be the consistent average target.</p>

As with remote island communities, Warraber's water is expensive to source and treat and water infrastructure is expensive to install and operate. At 2008 prices, the cost to supply barged water is \$14 per kilolitre (about 26 times the national average) and desalinated water is \$7 per kilolitre (about 10 times the national average).

Map 14 shows the areas serviced by the existing water infrastructure.

Figure 11 shows the water scheme process.

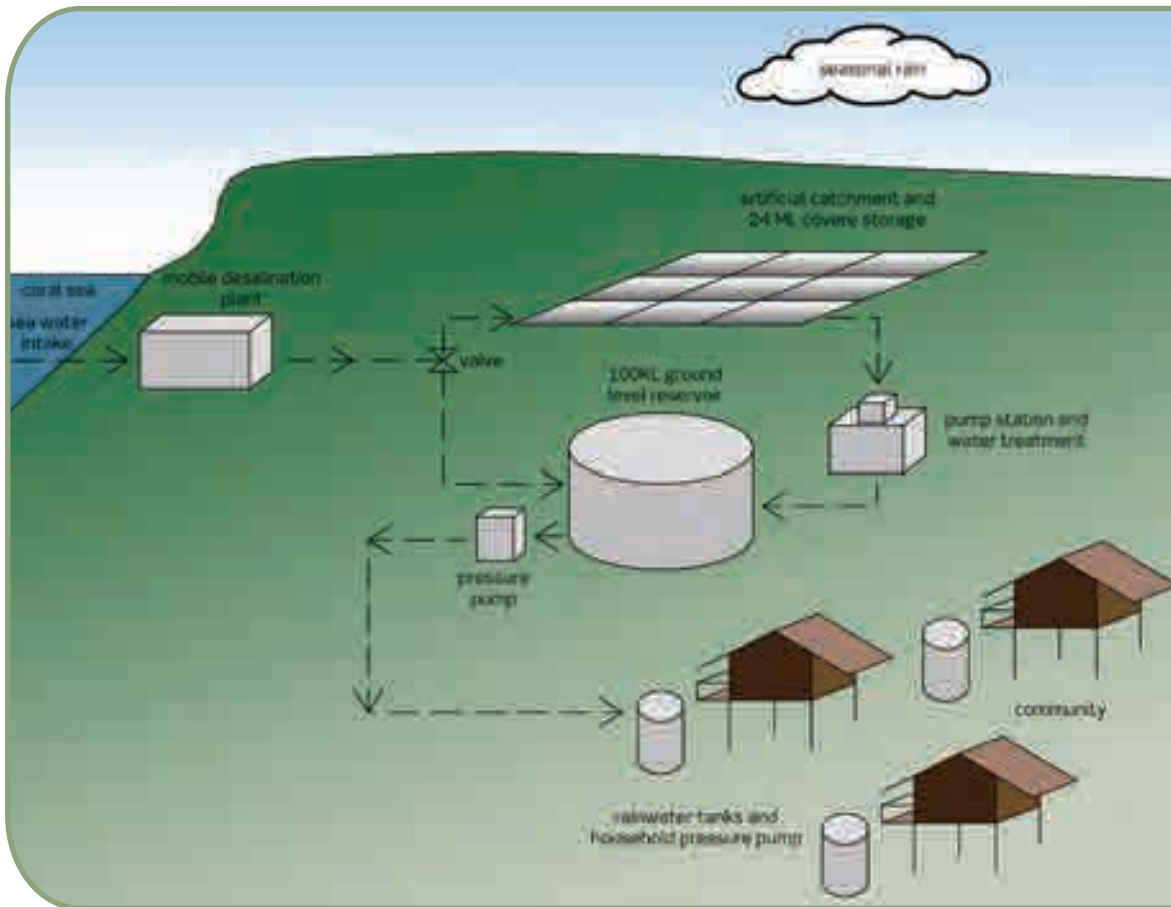
Map 14 Water Infrastructure



For more detail, refer to Map No. 9964-1211 contained in Maps.



Figure 11 Water Scheme



### 6.1.3 Issues Overview

For the purposes of determining the existing and future capacity of the water infrastructure, the following population growth forecast is used:

Existing Population	2009	= 292 persons
Predicted Population	2019	(Low Growth Estimate of 1.0% = 323 persons)
Predicted Population	2019	(High Growth Estimate of 3.0% = 393 persons)

Water supply at Warraber is currently at a level where the collected rainwater is insufficient to meet the current demand without the assistance of a supplementary desalination unit. Unless the island receives above average rainfall or implements stringent water restrictions, it is unlikely that the temporary desalination plant will be removed.

Consequently, future expansion in the short term will depend on the spare capacity of the desalination plant and any significant population increase may require the consideration of an additional artificial catchment and storage lagoon or a larger or duplicate desalination plant.

It should be noted that there are potential risks to the environment from the discharge of desalination plant effluent and that the potential impact increases with increase in desalination plant capacity. The wastewater discharge may affect coastal water quality due to the highly saline brine that is emitted to the sea, which may be increased in temperature, contain residual chemicals from any pre-treatment process and metal fragments from corrosion. However, the quantity of the discharge from this plant is generally considered negligible and too small to quantify, particularly due to the rapid dilution into the surrounding waters.

As with remote island communities, Warraber's water is expensive to source and treat and water infrastructure is expensive to install

#### 6.1.4 Land Use Strategies

To minimise the impact of water infrastructure on the natural and man made environments and to ensure that the current and future efficiency and effectiveness of Warraber water infrastructure, the following strategies are recommended:

- Development is not to occur in water catchments.
- A target of 300 litres per person per day or less is maintained by using water efficiently and managing consumer behaviour and demand for water.
- On reaching a population of 300 persons and the target consumption of 300 litres per person per day or less is achieved on a regular basis, a permanent upgrade to the water plant capacity is to be considered.



### 6.1.5 Land Use Considerations

In assessing the impacts of future development on Warraber, the following key questions are to be raised. If the answer to any of the questions is 'NO', the proposal must, a) justify the inconsistency, b) be amended, or c) not be accepted.

- Is the development in accordance with the Water Best Practice, Land Use Strategies and Sustainable Outcomes?
- Does the development adopt best practice principles in the planning, design and construction of water cycle infrastructure (including water supply, sewerage, drainage and water quality)?
- Does the proposal address its impact and cumulative impact on the existing water infrastructure?
- If the development is for a residential or community building,
  - is there a total water cycle management system addressing demand, reuse and recycling including the use of rainwater tanks for use within the building; and
  - are water saving devices proposed?
- Is the water catchment area (if one exists) affected by the development?
- Is the development located within the area serviceable by current infrastructure? If not, is the required additional infrastructure adequately funded?

### 6.1.6 Sustainable Water Infrastructure Outcomes

- Achieve targeted reductions in water consumption by using water efficiently and managing consumer behaviour and demand for water.
- Protect the quality of water draining from urban development and water infrastructure.
- All water infrastructure is inspected regularly and maintained to ensure that it is in effective working order.



## 6.2 Sewer

### 6.2.1 Best Practice

- Sewerage infrastructure is expensive to install and consideration must be given to the proximity of existing sewerage infrastructure when planning future development.
- Sewerage treatment plant design must accommodate specific design capacities and the impact of additional loading from future development.
- All new infrastructure with a life of 10+ years should consider climate change risks now for function, design and location.
- Reduce the impacts of climate change on the sewer infrastructure by:
  - recognising the importance of climate change on the community's sewer infrastructure;
  - avoiding quick decisions now that will make it more difficult to manage climate change risks in the future; and
  - building understanding and capacity of the community to deal with the impacts of climate change on the community's sewer infrastructure.

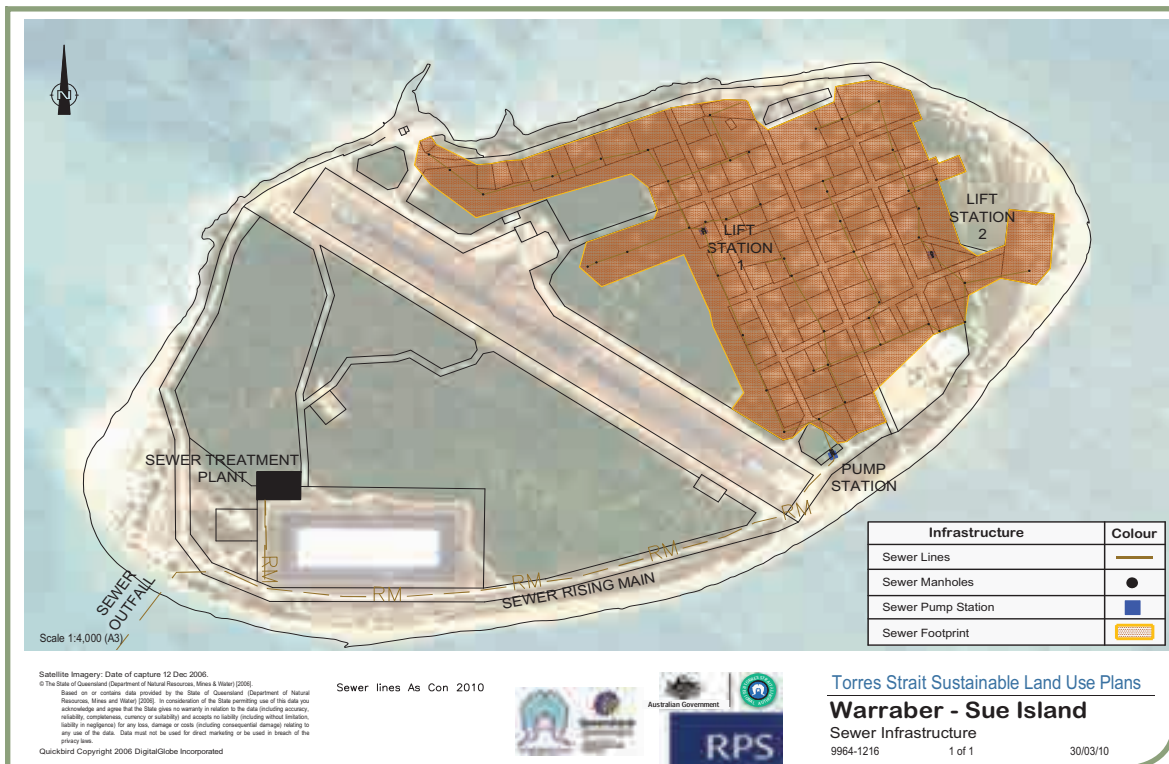
### 6.2.2 Overview of Current Situation

A new sewerage system has been installed in 2009 to service Warraber. The system has the following features:

Collection:	Sewage is collected via a reticulated gravity sewage collection system serving the village.
Transfer:	Sewage from the reticulation system is collected in two lift stations and one pump station (located in the village) and pumped via a rising main beside the water storage lagoon to the Sewerage Treatment Plant.
Treatment:	Sewage is treated at the new packaged Sewerage Treatment Plant located adjacent to the water storage lagoons. The treatment plant is a rotating biological contactor type and has been designed to treat effluent to a secondary level.  The existing treatment plant has been designed for a capacity of 345 people.
Discharge:	Treated effluent is pumped from the Sewerage Treatment Plant to an ocean outfall at the south west of the island.

Map 15 shows the areas serviced by the existing sewer lines and desalination plant.

Map 15 Sewer Infrastructure



For more detail, refer to Map No. 9964-1216 contained in Maps.

### 6.2.3 Issues Overview

The existing treatment plant has the capacity to treat effluent for population of 345 persons. Consequently, there is sufficient capacity to meet the sewerage treatment needs into the future.

For future development, the extent of infrastructure needs will depend on the exact location of the development in relation to the existing gravity sewers. If development is contained within the edges of the existing town, infrastructure may be limited to the construction of sewers and house connections. If the development is further away, it is likely that a new lifting station will be required as the land is relatively flat

The sewerage design population of 345 persons is predicted to be reached

- In approx. 2015 using a high population growth scenario
- After 2019 using a low population growth scenario

### Effluent Re-use

Effluent from the treatment plant is treated to a secondary level only and as such, is unsuitable to be considered for potable use. The treatment plant as designed is not readily modifiable to enable effluent treatment to a tertiary level.

There may be an opportunity to use the secondary treated water to irrigate recreational or similar areas during the dry season; however, this would involve the provision significant infrastructure and the need for strict environmental health management systems to be implemented. An indicative estimate for such a system is approximately \$1,500,000.

## 6.2.4 Land Use Strategies

To minimise the impact of sewer infrastructure on the natural and man made environments and to ensure that the current and future efficiency and effectiveness of Warraber sewer infrastructure, the following strategies are recommended:

- Development in close proximity to a sewerage treatment plant is discouraged.
- Where development occurs outside the area serviced by the existing sewer infrastructure, sewer infrastructure must be provided in accordance with the Queensland Plumbing and Wastewater Code and AS/NZS1546:2008 On-site domestic wastewater treatment units – aerated wastewater treatment systems.



## 6.2.5 Land Use Considerations

In assessing the impacts of future development on Warraber, the following key questions are to be raised. If the answer to any of the questions is 'NO', the proposal must, a) justify the inconsistency, b) be amended, or c) not be accepted.

- Is the development in accordance with the Sewerage Best Practice, Land Use Strategies and Sustainable Outcomes?
- Does the development adopt best practice principles in the planning, design and construction of sewerage infrastructure (including water supply, sewerage, drainage and water quality)?
- Does the proposal address its impact and cumulative impact on the existing sewerage infrastructure?
- Is the development near or adjacent to an existing or proposed sewerage treatment plan?
- Is the development located within the area serviceable by the current infrastructure? If not, is the required additional infrastructure adequately funded?



### 6.2.6 Land Use Projects

To maximise the use of secondary treated water, it is recommended that an investigation into the feasibility and costs of using the secondary treated water to irrigate the recreational or similar areas during the dry season be undertaken.



### 6.2.7 Sustainable Sewer Infrastructure Outcomes

- Waste water conservation should be practised and waste water production should be minimised.
- All sewer infrastructure is inspected regularly and maintained to ensure that it is in effective working order.

### 6.2.8 Useful Resources

#### Policies, Plans & Guidelines

*Queensland Plumbing and Wastewater Code sets out the framework for Queensland's plumbing and drainage standards.*

[www.dip.qld.gov.au/plumbing/2.html](http://www.dip.qld.gov.au/plumbing/2.html)

*AS/NZS 1546:2008 is the Australian Standard for on-site wastewater treatment units.*

[www.standards.org.au](http://www.standards.org.au)



## 6.3 Waste

### 6.3.1 Best Practice

- The siting and maintenance of waste disposal facilities (dump or tip) must not have a detrimental impact on the natural environment.
- Removal of waste from the community is expensive and the minimisation of waste and associated environmental impacts and maximisation 'reduce, reuse, recycle' of waste generated occurs on a daily basis.
- All new infrastructure with a life of 10+ years should consider climate change risks now for function, design and location.
- Reduce the impacts of climate change on the community's waste generation and disposal facilities by:
  - recognising the importance of climate change;
  - avoiding quick decisions now that will make it more difficult to manage the community's waste generation and disposal facilities; and
  - building understanding and capacity of the community to deal with the impacts of climate change on the community's waste generation and disposal facilities.

### 6.3.2 Overview of Current Situation

Like many of the Torres Strait island communities, Warraber has limited space available for waste disposal.

Warraber currently has a small solid waste depot located at the south-western side of the island, adjacent to the water storage compound. The waste depot is setback approximately 100 metres from the coastline.

In 2009 the Warraber implemented a Waste Pilot project for the Torres Strait.

The Warraber Waste Pilot Project diverts greater resources from landfill in the quest to conserve the extremely limited space available and improve environmental and social outcomes for the community, with the greatest diversion from landfill being achieved by recovering the organic components and producing a compost product on the Island.

Each household is provided with the following:

- 40-litre bin for general waste
  - collected weekly
- 240-litre bin for garden waste
  - collected weekly,

- 20-litre food-waste bucket – collected twice per week
- 60-litre crate for the storage and presentation of recyclables – collected weekly.

The proposed new waste management program involves the community separating its waste into a number of streams. These include:

- General waste - The general waste bin contents are delivered to the landfill.
- Garden waste and Food waste
  - The garden waste bin contents are delivered to a part of the new landfill site, which accommodates the new composting program. New BiobiNs process the garden waste, food waste and paper and cardboard. The garden waste is chipped prior to being placed in the bin by a front-end loader or bobcat. The compost could be made available for use on public areas and to community members for their own home gardens.
  - To assist householders to separate their food waste in the kitchen, a Max Air Bin and bio-degradable garbage bags for that bin, is provided to each household. All food and fish waste is placed in 20-litre

sealed plastic buckets for collection (either directly or the bio-degradable bags will be placed in the bucket). The food waste buckets are collected and emptied into wheelie bins located on a trailer, which also accommodates bins for the separation of recyclables into their respective products at the point of collection from the crates.

- Recyclables - Aluminium cans, PET, HDPE, steel cans, paper and cardboard.
  - The recyclables are delivered to the sorting shed located near the barge ramp. Cardboard collected from the commercial sector and from households will be shredded at the sorting shed in a new purpose-built shredder, prior to being added to the BiobiNs for composting. A multi-purpose baler will also be installed in the sorting shed; this will bale aluminium cans, PET plastic, mixed HDPE, liquid paperboard and steel cans for later shipment to Cairns.
  - The recyclable containers are stored under cover on a hard stand, baled and then placed in a shipping container, to

which the local AQIS Officer will apply a knock-down spray. The container will be sealed for shipment to Cairns. At the Cairns Port the shipping container will be opened and inspected by the AQIS Officer and, should any evidence of insects be found in the container, the container will require fumigation. AQIS advised that under no circumstances can unbaled materials be transported between the Island and the mainland.



### 6.3.3 Issues Overview

Management:	Monitoring the effectiveness of the Waste Pilot Program
Vehicles:	<p>A significant issue for all Torres Strait Islands is the impact of disused vehicles once they have reached the end of their usable life. Typically, these vehicles are in poor condition when they reach the Torres Strait. Once broken down, they consume valuable space in the landfill sites. This space should be reserved for general domestic rubbish. Materials other than general domestic waste, should be separated and stocked piled so that they can be re-used or transported off the island.</p> <p>Quarantine restrictions imposed for the Torres Strait protected zones mean that any material transported between zones requires Australian Quarantine and Immigration Service clearance that usually involves removal of any dirt from old car bodies. This can be logistically difficult and expensive. Additional requirements of the Department of Primary Industries apply to the transfer of putrescibles matter between islands.</p> <p>Given the above, consideration should be given to imposing a levy on all vehicles brought onto the island. Such a levy could pay for the ultimate removal of the vehicle from the island.</p>
Future Expansion:	The existing dump near the water compound is unfenced and unsuitable.

### 6.3.4 Land Use Strategies

To minimise the impacts of waste infrastructure on Warraber's natural and man made environments, the following strategies are recommended:

- Future landfills are located in geologically stable areas, not flood prone or adjacent to areas of high ecological significance or in areas identified as affected by natural hazards.
- Waste generation is avoided in the first instance. Where waste generation cannot be avoided, practices are implemented to reuse, recycle or recover wastes and materials prior to disposal.
- A voluntary target of reducing waste through recycling.
- Waste disposal to landfill is minimised through applying waste recovery techniques that gain optimum recovery of reusable and recyclable materials.
- Materials other than general domestic waste, should be separated and stocked piled to enable their re-use or transportation off Warraber.
- The waste pilot scheme is monitored for effectiveness.

### 6.3.5 Land Use Considerations

In assessing the impacts of future development on Warraber, the following key questions are to be raised. If the answer to any of the questions is 'NO', the proposal must, a) justify the inconsistency, b) be amended, or c) not be accepted.

- Is the development in accordance with the Waste Best Practice, Land Use Strategies and Sustainable Outcomes?
- Does the development encourage conservation, composting and recycling of waste?
- Has the development considered the impact it will have on the capacity of the landfill site?
- If the development involves demolition of an existing structure, is the removal of
  - material from the island or its reuse; and
  - contractor's vehicles from Warraber at the end of the project addressed?



### 6.3.6 Land Use Projects

The following projects are recommended to be undertaken:

- A study to quantify the need for waste management capacity for all waste streams until 2020.
- Consider the cost and feasibility of a 'vehicle disposal levy' to cover the cost of removing abandoned vehicles from Warraber.



### 6.3.7 Sustainable Waste Infrastructure Outcomes

- The development of an integrated and strategic approach to regional and local waste management.
- The volume of waste requiring disposal is reduced to a minimum, while maximising the economic value of resources during their life cycle through reuse, recycling, reprocessing and energy recovery.
- Any future landfills are located in geologically stable areas and are not flood prone or adjacent to areas of high ecological significance.
- Achieve targeted reductions in waste consumption by using waste efficiently and managing consumer behaviour and demand for waste.
- All waste infrastructure and landfill sites are inspected regularly and maintained to ensure that they are in effective working order.



## 6.4 Electricity

### 6.4.1 Best Practice

- Electric infrastructure is expensive to install and consideration must be given to the proximity of existing electricity infrastructure when planning future development.
- Provide energy generation production, transmission and distribution capacity to meet the needs of the population and support the use of viable alternative energy sources where appropriate.
- All new infrastructure with a life of 10+ years should consider climate change risks now for function, design and location.
- Reduce the impacts of climate change on the community's electricity infrastructure by:
  - recognising the importance of climate change on the community's electricity infrastructure;
  - avoiding quick decisions now that will make it more difficult to manage climate change risks in the future; and
  - building understanding and capacity of the community to deal with the impacts of climate change on the community's electricity infrastructure.

### 6.4.2 Overview of Current Situation

Electricity is supplied to Warraber from a power station located in the town area on Lot 149 Aikuru Street on the eastern side of Warraber. The generation, distribution and supply of electricity is undertaken by Ergon Energy on behalf of the State government.

Electricity is generated through multiple diesel generator sets (gensets), which are sized to match the load as it fluctuates during the day. The gensets are modular and interchangeable and as such, are relatively easy to repair or relocate without disturbance to the continuity of electricity supply.

The cost to generate electricity on remote islands is significantly higher than the income received

from the consumers, between a factor of 5 – 10. The State Government Community Service Obligation, as an equalised tariff, covers the difference in generation costs and income.

Although the cost of electricity to consumers at Warraber is the same as for anywhere in Queensland, there is a pressing need for the all people on the island to conserve electricity. Electricity generated by the combustion of diesel fuel causes significant greenhouse gas emissions and the burning of fossil fuels, is not a sustainable practice.

Map 16 shows the areas serviced by the existing electricity infrastructure



## Map 16 Electricity Infrastructure



For more detail, refer to Map No. 9964-1217 contained in Maps.

### 6.4.3 Issues Overview

There is limited opportunity for viable alternative sources of energy on remote islands. It may be feasible to use gas to fire the gensets, as gas is a lower emitter of Greenhouse gas, however it is impractical and expensive to barge in large gas bottles for power generation.

Renewable energy sources such as wind and solar could be considered as a supplement to the base power supply. However, any renewable resource would not be able to completely replace the existing base diesel generator sets as, the demand on the island is too high for a renewable supply to support and there is no realistic method of storing generated electricity during periods of low generation (lack of wind or solar radiation).

From a land use perspective, gradual increase in population and the corresponding increase in demand is generally met by the inherited scalability in the system, i.e. the modular gensets can be reshuffled to suit. Large-scale

increases in demand might require the upgrade of a switching and distribution infrastructure. Any new development away from the main powerlines may require a contribution to Ergon for the installation of powerlines/transformers etc, however this is generally considered on a case-by-case basis.

Although the cost of electricity to consumers at Warraber is the same as for anywhere in Queensland, there is a pressing need for the all people on the island to conserve electricity. Electricity generated by the combustion of diesel fuel causes significant greenhouse gas emissions and the burning of fossil fuels, is not a sustainable practice.



### 6.4.4 Land Use Strategies

To ensure the effectiveness and efficiency of the electric infrastructure network, the following strategies are recommended:

- Development should not occur in areas in close proximity to the generators.
- If development occurs adjacent or nearby to the generators, noise retention measures must be incorporated in the design of the development.
- Development must not impede the supply and access to the electric infrastructure network.
- The visual impact of electricity infrastructure on development and the natural environment is to be minimised through the provision of landscaping.
- Inappropriate land uses such as a school or a play area should not be located in an electricity easement or within close proximity of the generators.



### 6.4.5 Land Use Considerations

In assessing the impacts of future development on Warraber, the following key questions are to be raised. If the answer to any of the questions is 'NO', the proposal must, a) justify the inconsistency, b) be amended, or c) not be accepted.

- Is the development in accordance with the Electricity Best Practice, Land Use Strategies and Sustainable Outcomes?
- Can the existing electric infrastructure cater for the development without requiring an upgrade of the system?
- If the development is adjacent to or near a generator, does it include noise attenuation measures?
- If the development is for a new system or an enlargement of the existing infrastructure, have noise and landscape studies been undertaken?
- Has an agreement with Ergon regarding the supply of electricity been reached?

### 6.4.6 Sustainable Electricity Infrastructure Outcomes

- An efficient, sustainable and reliable electricity infrastructure.
- Energy efficient principles are included in the design and layout of new urban areas and developments.
- The visual and noise impact of electricity infrastructure on the natural and man made environments is minimised through landscaping and appropriate noise attenuation measures.
- All electricity infrastructure is inspected regularly and maintained to ensure that they are in effective working order.

## 6.5 Telecommunication Infrastructure

### 6.5.1 Best Practice

- Telecommunication facilities are expensive to install and consideration must be given to the proximity of existing telecommunication infrastructure when planning future development.
- The land around a telecommunication facility or service should be integrated and maintained to protect the land and marine environments.
- Planning around a telecommunication facility or service should aim to achieve and maintain a high standard of environmental quality and minimise noise to adjacent residential areas.
- All new infrastructure or modification to existing infrastructure with a life of 10+ years should consider climate change risks now for function, design and location.
- Reduce the impacts of climate change on the community by:
  - recognising the importance of climate change on existing and future telecommunication facilities or services;
  - avoiding quick decisions now that will make it more difficult to manage climate change risks in the future; and
  - building understanding and capacity of the community to deal with the impacts of climate change on the Island's natural environments.

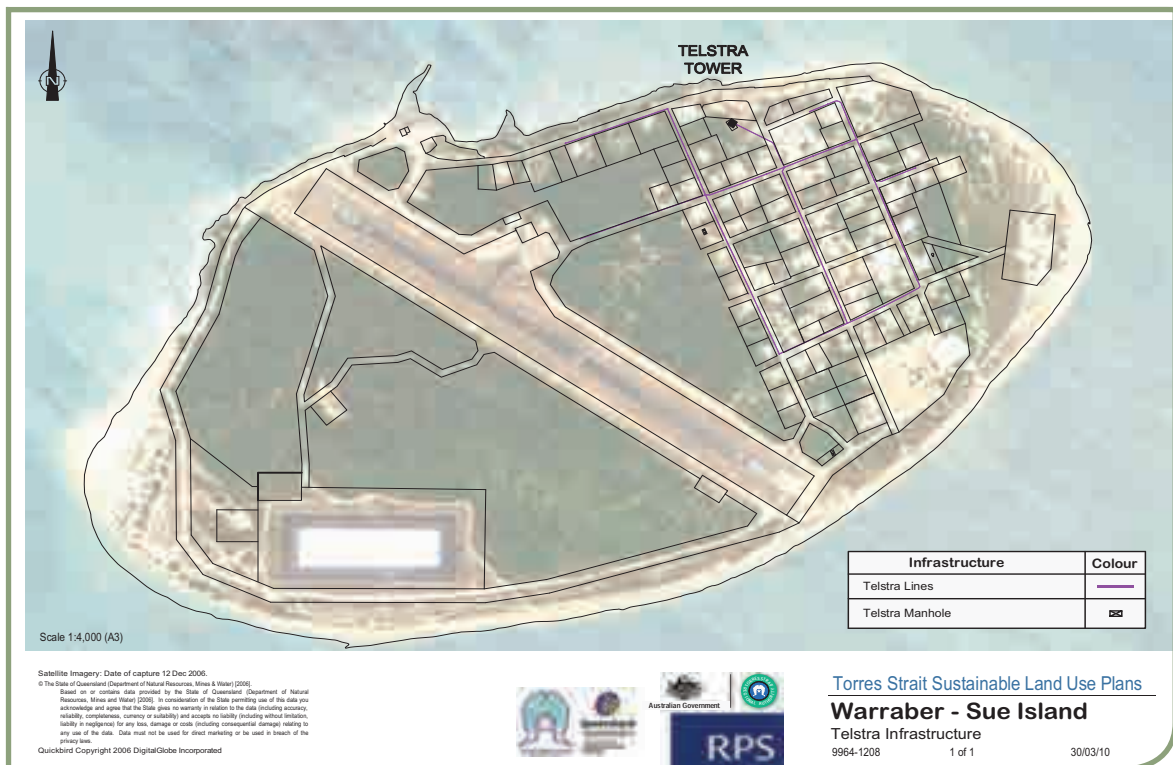
### 6.5.2 Overview of Current Situation

A Telstra tower is located at the end of Aikuru Street next to the IBIS Store. There is no mobile phone coverage over Warraber.

Map 17 shows the location of telecommunication infrastructure.



## Map 17 Telstra Infrastructure



For more detail, refer to Map No. 9964-1218 contained in Maps.

### 6.5.3 Issues Overview

There are no known issues regarding telecommunications on Warraber apart from a lack of mobile phone coverage.

It is sound land use planning practice to ensure that compatible development occurs near telecommunication infrastructure. Residential development should not be permitted near the Telstra tower.

### 6.5.4 Land Use Strategies

The following strategy is recommended:

- The Telstra tower is protected from urban encroachment, including noise sensitive development and any other development that may impact on current or future operations.

### 6.5.5 Land Use Considerations

In assessing the impacts of future development on Warraber, the following key questions are to be raised. If the answer to any of the questions is 'NO', the proposal must, a) justify the inconsistency, b) be amended, or c) not be accepted.

- Is the development in accordance with the Telecommunication Best Practice, Land Use Strategies and Sustainable Outcomes?
- Does the development provide affordable access to reliable telecommunication services?

### 6.5.6 Sustainable Telecommunication Outcomes

All telecommunications infrastructure is inspected regularly and maintained to ensure that they are in effective working order.

## 6.6 Roads

### 6.6.1 Best Practice

- Roads are expensive to construct and maintain so consideration must be given to the proximity of existing roads when planning future development.
- Foster investment in road improvements to ensure a high standard of road and adjoining environments.
- Encourage the use of walking and cycling rather than the use of vehicles.
- All new infrastructure with a life of 10+ years should consider climate change risks now for function, design and location.
- Reduce the impacts of climate change on the community's road infrastructure by:
  - recognising the importance of climate change on the existing and future road infrastructure on the community;
  - avoiding quick decisions now that will make it more difficult to manage climate change risks in the future; and
  - building understanding and capacity of the community to deal with the impacts of climate change on the community's road infrastructure.

### 6.6.2 Overview of Current Situation

Many of the main internal roads on Warraber are paved with concrete pavers. The remaining internal roads are constructed from sandy soils at varying widths and are unsealed. The roads can generally be trafficked in all weather, except for short periods of localised flooding. There are no defined stormwater drainage systems on the island apart from minor culvert and above ground crossing of some roads.

The main road connecting the airstrip to the Warraber community is a main thoroughfare and has been paved with concrete pavers for durability.

The barge area is currently unsealed. This area supports a large amount of traffic being the primary access point for goods to the island from the ferry service. This area should be sealed to facilitate easy loading and unloading of goods during the wet season.

The 2006 Census indicates the following statistics:

- 20 privately owned vehicles;
- 31 households did not have a vehicle;
- 12 households had one vehicle; and
- 4 households had two vehicles.

Note: there are more vehicles on Warraber than the Census indicates as it does not include vehicles used by the Council or construction workers



### 6.6.3 Issues Overview

The Council has expressed a desire to extend the existing concrete paving around the township area and the barge area to reduce dust and water ponding.

A total of 1900m of unsealed roads exist within the residential village area. This length excludes the unsealed roads around the airstrip, the water storage lagoons and the barge area.

Note that all of the roads around the school (Ioane St, Yessie St and Dabus St) are unsealed.

Sealing Phillemon ST, Aikuru St and Yessie St (a total of 900m) would provide a sealed access servicing most of the community, the school, the sports stadium/field and the Ergon depot



### 6.6.4 Land Use Strategies

To minimise existing and future development on the natural environment of Warraber and the impacts of natural hazards, the following strategies are recommended to be implemented:

- All development proposals must include landscaping and/or revegetation plans that are in accordance with the Best Practice, Land Use Strategies and Sustainable Outcomes outlined in this Plan.
- Transport planning considers the risk of natural hazards such as cyclones, tides, storm surges and acid sulfate soils with transport infrastructure located and designed to avoid or minimize the impact of such events.
- A safe and convenient network for pedestrians is provided along street networks, linking residences and providing access to points of attraction within and beyond the urban areas.
- Parking areas do not affect the unique characteristics of sites and are linked to more sensitive features of each site with safe pedestrian and cycle ways.
- The beaches along the northern and southern coasts not be used by any form of vehicle.
- Encourage alternative forms of transportation around the community such as bicycle, scooter to reduce the reliance on petrol driven vehicles. This would also improve the problem of disused and abandoned vehicles consuming valuable space in the dump.



### 6.6.5 Land Use Considerations

In assessing the impacts of future development on Warraber, the following key questions are to be raised. If the answer to any of the questions is 'NO', the proposal must, a) justify the inconsistency, b) be amended, or c) not be accepted.

- Is the development in accordance with the Roads Best Practice, Land Use Strategies and Sustainable Outcomes of this land use plan?
- Does the development integrate the land use, efficient movement of people and goods and growth for Warraber?
- If the development is in a natural hazard area or adjacent to the northern and southern coastline, is the road located and designed to avoid or minimize the impact of such events?
- If a new street or road is proposed,
  - does it provide for vehicles, pedestrians and cyclists adequately
  - is it highly connected within the development, with the surrounding area and between settlements
  - does it propose road signage in keeping with Warraber's signage network?

### 6.6.6 Sustainable Road Infrastructure Outcomes

- The integration of land use and an efficient, safe and sustainable road network that minimises adverse impacts on the environment and reflects the needs of the community.
- Development encourages lower impact modes of travel such as walking and cycling
- All vehicles bought onto the community are to be removed from the island after construction is completed.
- All road infrastructure is inspected regularly and maintained to ensure that it is in effective working order.





## 6.7 Drainage

### 6.7.1 Best Practice

- Protect drainage infrastructure and receiving waters from sedimentation and other contaminants.
- Ensure that streets operate adequately during major storm events and provide for public safety and minimise the drainage infrastructure cost of development.
- All new infrastructure with a life of 10+ years should consider climate change risks now for function, design and location.
- Manage quality and quantity of urban runoff by using stormwater in the landscape by incorporating multiple-use corridors that maximise the visual and recreational amenity of the community.
- Reduce the impacts of climate change the community's drainage system and infrastructure by:
  - recognising the importance of climate change on the community's drainage system and infrastructure;
  - avoiding quick decisions now that will make it more difficult to manage climate change risks in the future; and
  - building understanding and capacity of the community to deal with the impacts of climate change on the community's drainage system and infrastructure.

### 6.7.2 Overview of Current Situation

The village area has sandy soil and as stormwater runoff generally soaks through the paved/sandy streets into the soil, there is no piped drainage system.

### 6.7.3 Issues Overview

The Council has expressed a desire to extend the existing concrete paving around the township area to reduce dust and water ponding.

### 6.7.4 Land Use Strategies

The following strategy is recommended:

- That development is not permitted in overland flow paths or drainage paths.



### 6.7.5 Land Use Considerations

In assessing the impacts of future development on Warraber, the following key questions are to be raised. If the answer to any of the questions is 'NO', the proposal must, a) justify the inconsistency, b) be amended, or c) not be accepted.

- Is the development in accordance with the Drainage Best Practice, Land Use Strategies and Sustainable Outcomes?
- Is the development designed to minimise its impact on the existing drainage network. Down stream catchment and adjoining properties?

### 6.7.6 Sustainable Drainage Infrastructure Outcomes

- Minimise damage to properties and inconvenience to residents from urban runoff by integrating stormwater treatment into the landscape.
- All drainage infrastructure is inspected regularly and maintained to ensure that it is in effective working order.



## 6.8 Air Access

### 6.8.1 Best Practice

- Efficient air transport to service both freight and passenger needs is provided.
- Freight and passenger air access is integrated and maintained to protect the adjoining natural and man made environments.
- Adjoining land uses and development are compatible with the operation of airstrip with houses shielded from the impact of aircraft noise by requiring appropriate noise attenuation measures.
- All new infrastructure or modification to existing infrastructure with a life of 10+ years should consider climate change risks now for function, design and location.
- Reduce the impacts of climate change and fuel costs on air access to and from the community by:
  - recognising the importance of climate change and fuel costs on air access to and from the community;
  - avoiding quick decisions now that will make it more difficult to manage climate change risks in the future; and
  - building understanding and capacity of the community to deal with the impacts of climate change and fuel costs on air access.

### 6.8.2 Overview of Current Situation

The aircraft facilities at Warraber comprise of a 720m sealed airstrip located on the central area of the Island. Other facilities include a helicopter landing area, paved apron and waiting building.

Air services exist between Warraber and neighbouring islands, with regulated passenger

transport provided between Warraber and Ngurupai (Horn) Island. These flights generally occur twice a day a day, morning and late afternoon.

Emergency access is available via medivac rescue helicopter (day and night) if required.



### 6.8.3 Issues Overview

Lighting of the airstrip would assist in night-time emergency or bad weather access to the island, although it may be cost prohibitive and contribute to increase in energy consumption of the island.

The airstrip and the land around it, is a sensitive and valuable resources. It is the what, where and how we build that can endanger an airstrip; therefore, it is critical that compatible land use planning receives particular consideration.

Each end of the airstrip abuts the beach and ocean, so these areas need to be closely monitored to ensure any coastal erosion is fixed before it threatens the length of the airstrip.

### 6.8.4 Land Use Strategies

The following strategy is recommended:

- The airstrip is protected from urban encroachment, including noise sensitive development and any other development that may impact on current or future operations.
- Monitor each end of the airstrip for coastal erosion.

### 6.8.5 Land Use Projects

Studies that are undertaken to determine the suitability of the investigation area for development must address the impact of the airstrip and measures required to be implemented to ease these impacts.



### 6.8.6 Land Use Considerations

In assessing the impacts of future development on Warraber, the following key questions are to be raised. If the answer to any of the questions is 'NO', the proposal must, a) justify the inconsistency, b) be amended, or c) not be accepted.

- Is the development in accordance with the Air Access Best Practice, Land Use Strategies and Sustainable Outcomes?
- If the development is located near or adjacent to the airstrip is it:
  - a compatible land use with the airstrip; and
  - if so, does it incorporate noise attenuation measures?
- Does the development impact on the approach/take-off areas of the runway?

### 6.8.7 Sustainable Air Infrastructure Outcomes

- Recognise the importance of the airstrip to the community and the Torres Strait Islands.
- The integration of land use and air access purposes to ensure that there is minimal adverse impact on the development.
- All air infrastructure is inspected regularly and maintained to ensure that it is in effective working order.



## 6.9 Sea Access

### 6.9.1 Best Practice

- Planning around a barge ramp and jetty should aim:
  - to achieve and maintain a high standard of environmental quality;
  - minimise noise to adjacent village areas;
  - to protect land around a barge ramp and jetty to preserve their value for uses which depend upon proximity to the sea for access to services and facilities; and
  - to integrated and maintained sea access infrastructure to protect the land and marine environments.
- Provide efficient sea transport to service both freight and passenger needs.
- All new infrastructure or modification to existing infrastructure with a life of 10+ years should consider climate change risks now for function, design and location.
- Reduce the impacts of climate change and fuel costs on sea access to and from the community by:
  - recognising the importance of climate change and fuel costs on sea access to and from the community;
  - avoiding quick decisions now that will make it more difficult to manage climate change risks in the future; and
  - building understanding and capacity of the community to deal with the impacts of climate change and fuel costs on sea access.

### 6.9.2 Overview of Current Situation

The marine facilities at Warraber consist of a concrete barge ramp located on the northern side of the island at the end of the airstrip and a timber finger pier adjacent to the ramp. The barge ramp and finger facilities are accessed from the deep water by a dredged channel.

The barge ramp provides access for all goods transported to the island and is an essential part of the community's infrastructure.

Warraber is serviced weekly by a barge service from Port Kennedy at Thursday Island.



### 6.9.3 Issues Overview

The finger pier is a narrow timber deck that is supported on timber piles. The structure is suitable for the mooring of small vessels, however it is understood that there is limited mooring space at certain periods.

The barge channel through the reef needs to be dredged to remove the sand build up. Ideally, a specific set down area for the storage of goods being loaded/unloaded onto the barge would remove the short-term congestion around the barge ramp whenever the Barge is at the island. However, limited space on Warraber makes this task difficult to achieve.

### 6.9.4 Land Use Strategies

The following strategy is recommended:

- Land use and barge ramp purposes are to be integrated to ensure that development is compatible with adjacent village development.
- Dredge the barge channel to improve access
- Seal the barge area roads and identify a specific setdown area for the storage of goods being loaded/unloaded onto the barge.



### 6.9.5 Land Use Considerations

In assessing the impacts of future development on Warraber, the following key questions are to be raised. If the answer to any of the questions is 'NO', the proposal must, a) justify the inconsistency, b) be amended, or c) not be accepted.

- Is the development in accordance with the Sea Access Best Practice, Land Use Strategies and Sustainable Outcomes?
- Does the development provide efficient access to the barge ramp and jetty?
- If the development is located near or adjacent to the barge ramp and the desalination plant is it a compatible land use for port activities?

### 6.9.6 Sustainable Sea Access Outcomes

- Recognise the importance of sea access to the community and the Torres Strait Islands.
- Develop and implement an integrated management plan for land uses around the barge ramp and jetty.
- All sea infrastructure on or abutting the community is inspected regularly and maintained to ensure that they are in effective working order.





RPS

Please contact RPS, Cairns Office on 07 4031 1336 for all enquiries

[www.rpsgroup.com.au](http://www.rpsgroup.com.au)



Australian Government

