boigu

Sustainable Land Use Plan

PART 2

Land Use Plan Structure

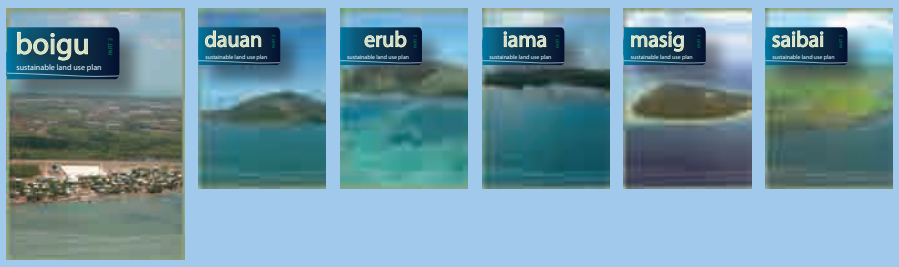
PART 1

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 lead 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 Boigu 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.

Boigu is an area of significant cultural heritage value to the Traditional Owners and 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.

Boigu is located in the top western group of islands in the Torres Strait, approximately 145 kilometres north of Horn Island and 6 kilometres south of Papua New Guinea.

Boigu is an extremely flat, mud island with large interior swamps filled with brackish water, approximately 17 kilometres long by 6 kilometres wide, with an approximate area of 6,630 hectares. It is one of the largest islands in the Torres Strait.

The village is located on the northern shoreline of the island and covers an area of approximately 800 metres by 400 metres. The terrain of the village is flat and is elevated just above lowest astronomical tide (LAT) by 4-5 metres or about 2-3 metres above mean sea level. The ground level tends to fall away gradually towards the interior swamps.

The impacts of climate change and predicted sea-level rise will have a dramatic effect on Boigu over the next 100 years and as the extent of sea-level rise due to climate change become more quantifiable in the next few years, it may be that some of the houses on Boigu become more seriously affected by extreme tide events.

Boigu is Australia's northernmost point and three kilometres from the New Guinea mainland and as such plays a significant role in relation to Australian's border security. Activities such as illegal immigration, illegal fishing and smuggling are a risk in the Torres Strait due to the proximity of Papua New Guinea and Indonesia. Furthermore, the Torres Strait serves as an early detection zone for the transmission of exotic pests and diseases into mainland Australia.

Pathogens, diseases and weeds do not respect borders and with the seasonal winds coupled with the movement of people and animals, there is a high potential for unwanted pests, weeds and diseases. As part of the Torres Strait, Boigu plays an important role in Australia's defence as it controls the main east-west shipping channel.

Despite Boigu's strategic defence importance, the question as to whether or not Community should be relocated and the island left to the sea or the Papa New Guineans is still discussed, usually by those not living on Boigu. This question arises due to the regular inundation of the village by the sea as much of Boigu is only just above the extreme tide events. However, Boigu's Community are unlikely to abandon their island home in the near future so a strategy of protection and gradual improvement of the land and living conditions needs be adopted.

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

- high quality mangrove habitats;
- lagoon, as it is an ecologically functional habitat for rare and threatened fauna; and
- Boigu's regional location, as they support species of conservation significance as a staging and foraging area for migratory wader species.

Identified **land issues** are:

- extremely flat, mud topography of Boigu, combined with the large interior swamps filled with brackish water and the extensive swamps and mangroves;
- undeveloped and relatively pristine condition of the coastline apart from around the village;
- location of the village;
- regular breaching of the sea wall around the village;
- changing land tenure system;
- increasing tide and storm surge levels;
- intermittent watercourses;
- potential acid sulfate soils;
- low to medium bushfire hazard;
- poor drainage;
- cultural heritage; and
- feral animals (dogs, cat, fish and deer).

Identified **infrastructure issues** are:

- sea water was predicted to overflow the sea wall on 25 days during 2008;
- when allowing a sea level rise of 0.59 metres, the seawall will be overflowed 141 days a year by the year 2100;
- the raising of the seawall in stages to achieve protection from current predicted highest astronomical tide (HAT);
- mitigation measures such as making habitable floor levels of new proposals;
  - a minimum of 4.9 metres LAT (being current HAT); and
  - if possible, a minimum of 5.4 metres LAT (being predicted HAT);
- the sufficient capacity of the existing water and sewerage infrastructure to serve the current population and the predicated population in the next ten years;
- the need to find a solution for the handling, sorting and disposal of waste;
- poor drainage of roads;
- the near capacity of the cemetery which is regularly inundated by king tides and storm surges;
- the limited opportunity for viable alternative sources of energy; and
- the lack of mobile coverage on Boigu which requires the installation of a Telstra Tower to overcome.

Identified **strategic location issues** are:

- Boigu plays a significant role in Australian's border security against illegal immigration, illegal fishing, smuggling and transmission of exotic pests, weeds and diseases into mainland Australia.
- the debate on whether Community should be relocated due to the regular sea inundation of Boigu.
- Community are unlikely to abandon their island home in the near future, so a strategy of protection and gradual improvement of the land and living conditions needs to be adopted.

Identified **population issues** are:

- steady population growth on Boigu which increased 0.6% in the past ten years. Current population is 290 persons;
- 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
- median household size of 5.0 persons.

Identified **growth issues** are:

- a low growth rate of 1.0% which will generate:
  - an extra 31 persons over ten years;
  - an additional housing of 0.6 houses per year; and
  - an additional 6 houses over ten years;
- a high growth rate of 2.0% which will generate:
  - an extra 65 persons over ten years;
  - an additional housing of 1.3 houses per year; and
  - an additional 13 houses over ten years;
- options available to manage growth on Boigu are:
  - utilise existing serviced lots prior to encouraging development in the investigation area;
  - to increase residential density;
  - expansion of the residential areas despite the current area being sufficient to cater for the predicted growth; and
  - population capping.

Identified **housing issues** are:

- the low-lying topography of the island;
- much of the island is subject to periodic inundation;
- the existing 16 vacant, serviced lots cater which can cater for an additional 80 persons and are therefore sufficient to cater for the predicted population increase past 2017;
- single investigation area suitable for future development, located within the existing bund wall to the east of the water storage lagoon requires major studies and significant investment including the cost associated with filling above HAT;
- the need to use existing vacant lots for either dual occupancies (duplex) or townhouses or units to maximise land availability; and
- the need to supply diverse, affordable and sustainable housing to meet population changes and move towards a sustainable environment.

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:

- there is sufficient vacant and serviced land to cater for Boigu's predicted low and high growth rates;
- an investigation area has been identified but will require significant investment in studies and fill;
- the current infrastructure can cater for the predicted population growth after 2017, if it is regularly maintained and serviced;
- the costs and feasibility of raising the seawall need to be investigated;
- Community must decide how they are going to adjust development on Boigu 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 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
- 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. One area is to be investigated for potential development
- must incorporate all processes, policies and decisions that protect and enhance the natural and made environments including cultural values and beliefs.

Table of Contents

Appendices

Maps

Tables

Figures

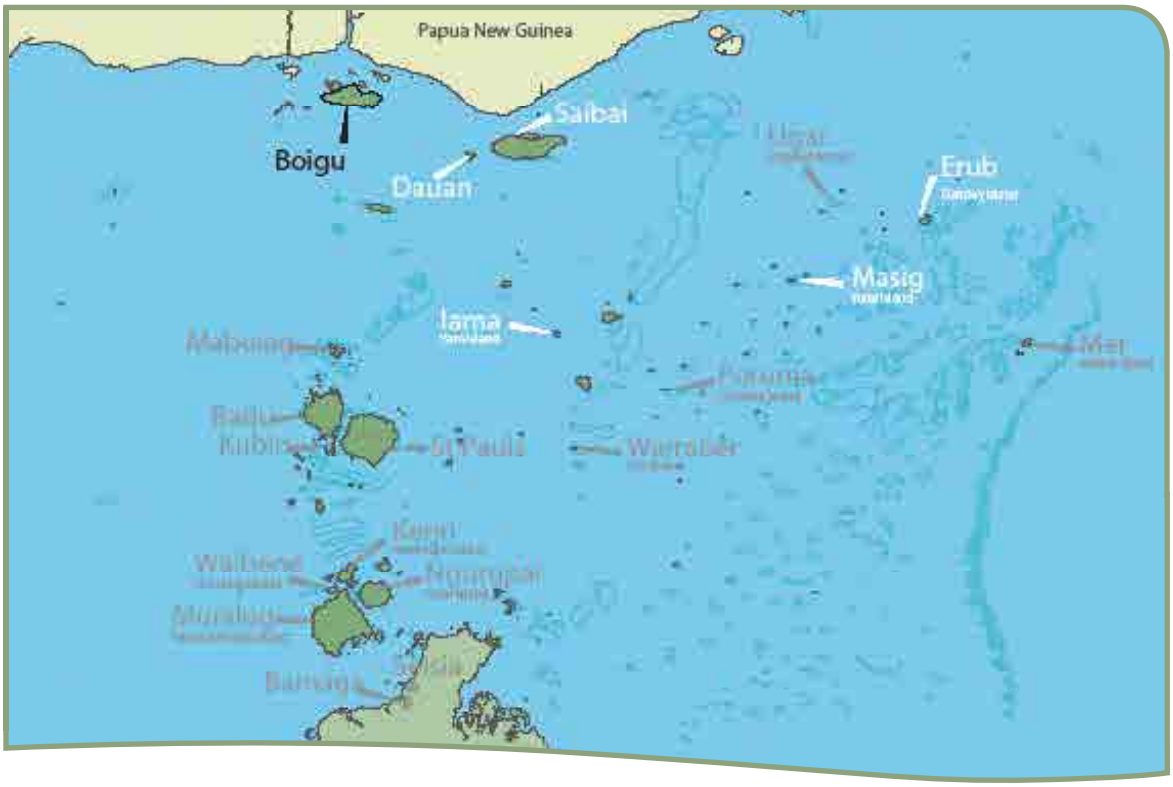
Island Overview

1.1 Location

Boigu is located in the top western group of islands in the Torres Strait, approximately 145 kilometres north of Horn Island and 6 kilometres south of Papua New Guinea.

Map 1 shows the location of Boigu in relation to the Torres Strait, other islands' (grey text) and the other five islands that form this Sustainable Land Use Plan are indicated by the white text.

Map 1 Regional Location



Map 2 Satellite Image of Boigu

For more detail, refer to Map No. 9409-100 contained in Volume 3 - Maps

1.2 Physical Characteristics

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

1.2.1 Topography

Boigu is an extremely flat, mud island with large interior swamps filled with brackish water, approximately 17 kilometres long by 6 kilometres wide, with an approximate area of 6,630 hectares. It is one of the largest islands in the Torres Strait.

The village is located on the northern shoreline of the island and covers an area of approximately 800 metres by 400 metres. The terrain of the village is flat and is elevated just above lowest astronomical tide (LAT) by 4-5 metres or about 2-3 metres above mean sea level. The ground level tends to fall away gradually towards the interior swamps.

Map 2 shows a satellite image of Boigu.

1.2.2 Geology

Boigu has occurred relatively recently in geological times through the consolidation and settlement of marine muds and silts on decayed coral platforms with origins most likely formed from vast quantities of sediments derived from the Fly River, New Guinea.

Soil types within the village area are highly plastic clays and silts, while small sandy areas exist in places.

1.2.3 Vegetation

The island is almost exclusively covered in saltpans, tidal flats and mangrove forests. The mangroves line most of the shoreline except in front of the village.

Other vegetation consists of coconut, fig, mango and almond trees within the village. Saltbushes and grasses abound in the swamps.

1.2.4 Waterways, Wetlands and Coasts

There are many watercourses on Boigu, with many flowing only during the wet season.

The coastline of Boigu is predominately mudflats and mangroves located around the tidal margins of the island. The mudflats are exposed with little or no vegetation cover.

Despite the construction of a sea wall, the village is highly susceptible to coastal flooding during high tides and storm surges.

1.3 The Village

The village is located on the northern shoreline on the island, with the airstrip located to the south of the village, somewhat protecting the village from inland inundation. The village area consists of residential dwellings, supported by a Council office, a church, primary school, two convenience stores, health centre and community hall/ indoor sports centre. The cemetery and Council workshop are located just on the western fringe the main village area.

Map 3 shows a satellite image of Boigu Village.

1.4 Population

In 2006, the total population of Boigu was 290, with no increase from the 2001 Census.

Map 3 Satellite Image of Boigu Village

For more detail, refer to Map No. 9409-100 contained in Volume 3 – 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

Boigu legal land tenure consists of a Deed of Grant in Trust (DOGIT) shown as Lot 4 on TS159, Parish of Orman, 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.

General 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 extract tenure of the land.

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

Primary discussions are required to be held 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 Boigu 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 is the best position to identify and priorities their needs and recommend how governments can best meet those need.

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.

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

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

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

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

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

Websites

Department of Natural Resources and Water

www.nrw.qld.gov.au

2.2 Native Title

2.2.1 Best Practice

- Native title should respect, protect and identify Boigu'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 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 respective fully of deaths in communities and cultural events.

2.2.2 Overview of Current Situation

Native title rights are held by the Boigu People as determined by a consent determination on 24 May 2005. Native title rights exist in the entire determination area being Boigu, Zagai Island (or Jeaka Island), Tudu Island and Cap Islet (or Makar Islet or Muguar Islet) in the Torres Strait. Native title is managed by the Malu Ki'ai (Torres Strait Islanders) Corporation.

A native title sea claim is yet to be determined.

As of November 2008, the National Native Title Tribunal records indicated there were three Indigenous Land Use Agreements (ILUA's):

- Telstra Boigu Agreement (No. QI2004/058 - Infrastructure);
- Boigu People (No. QI2004/040 - Infrastructure); and
- Boigu – Ergon Energy ILUA (No. QI2004/054 - Access).

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.

Gilbuma on behalf of the Boigu People v State of Queensland [2004] FLA 1575

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, as developments, include the provision of major infrastructure or areas of land for future village expansion.

Enquiries should be made with the PBC, the TSIRC and or the TSRA's Native Title Office to determine is 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 Boigu.

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

Indigenous Land Use Agreements

National Native Title Tribunal

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

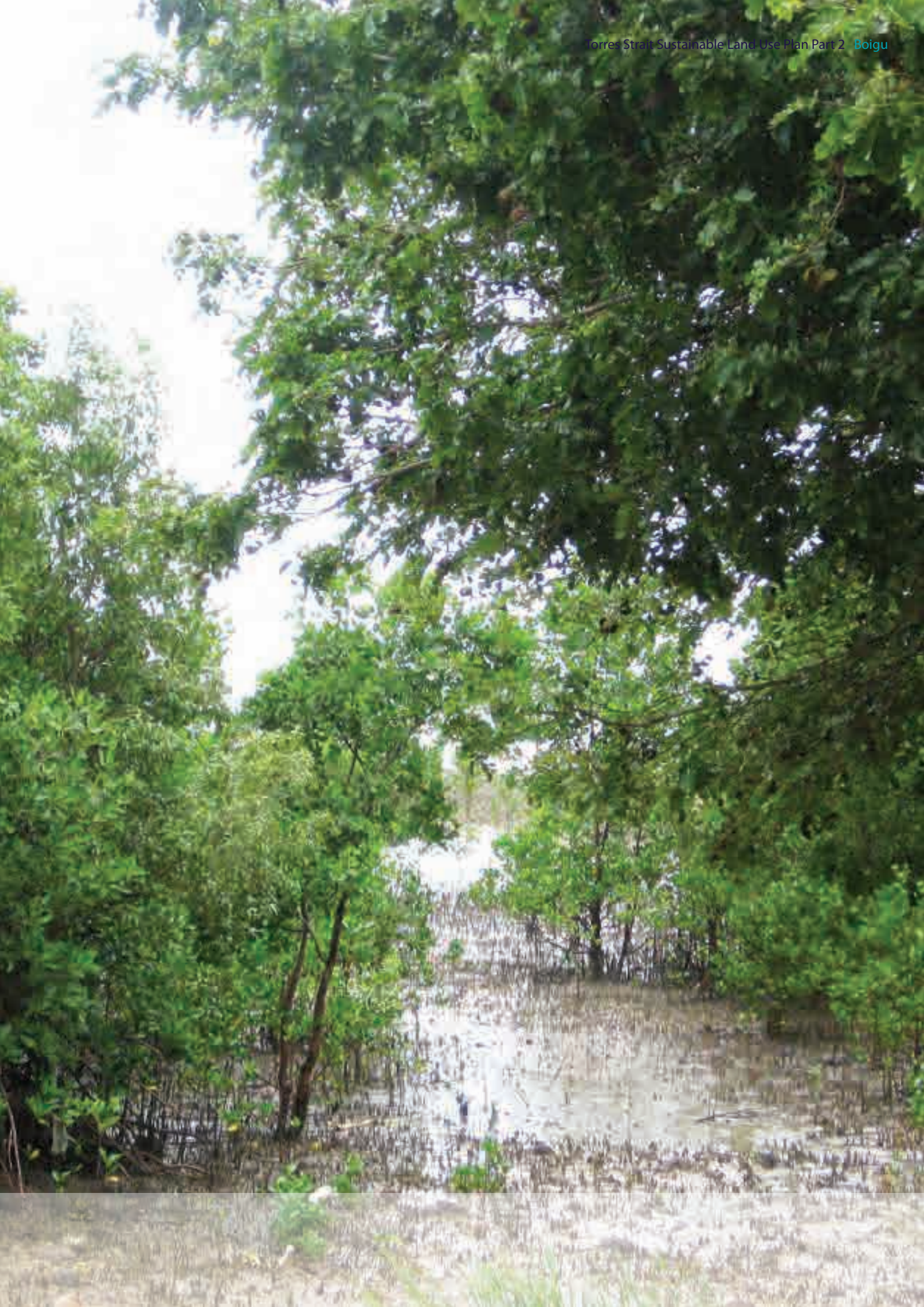
Websites

Department of Natural Resources and Water

www.nrw.qld.gov.au

National Native Title Tribunal

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 Boigu 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 Natural Solutions was undertaken on Boigu over a five day visit in late 2007. This report provides a snap shot in time and a base line for future studies and identified key natural assets, habitats, watercourses and natural land use issues for Community. It is not intended to be a complete scientific analysis of Boigu's natural environment. The report is written for the Boigu Community, the TSIRC and the TSRA. The Fauna and Habitat Assessment of Boigu, prepared by Natural Solutions Environmental Consultants, 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 Boigu recognises the importance of plants, animals and birds, natural resources and their fundamental relationship to the quality of life and viability of Boigu 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 Boigu;
  - 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 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 Boigu 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 Boigu. The preliminary fieldwork undertaken by Natural Solutions is part of the ongoing process of recording and identifying significant habitat, plants, birds and animals on Boigu. The notable ecological and habitat features of Boigu are the:

- mangrove habitat which are of a very high quality;
- lagoon as it is an ecologically functional habitat for rare and threatened fauna; and
- the islands regional location to support species of conservation significance as a staging and foraging area for migratory wader species.

Notable rare and threatened fauna observed on Boigu include:

- Radjah Shelduck *(Tadorna radjah)* – rare under the *Nature Conservation Act 1992* (NCA);
- Eclectus Parrot *(Exlectus roratus macgillivrayl)* – rare under the NCA;
- Emerald Monitor *(Varanus prasinus)* – rare under the NCA; and
- False Water Rat *(Xeromys myoides)* – vulnerable under the NCA.

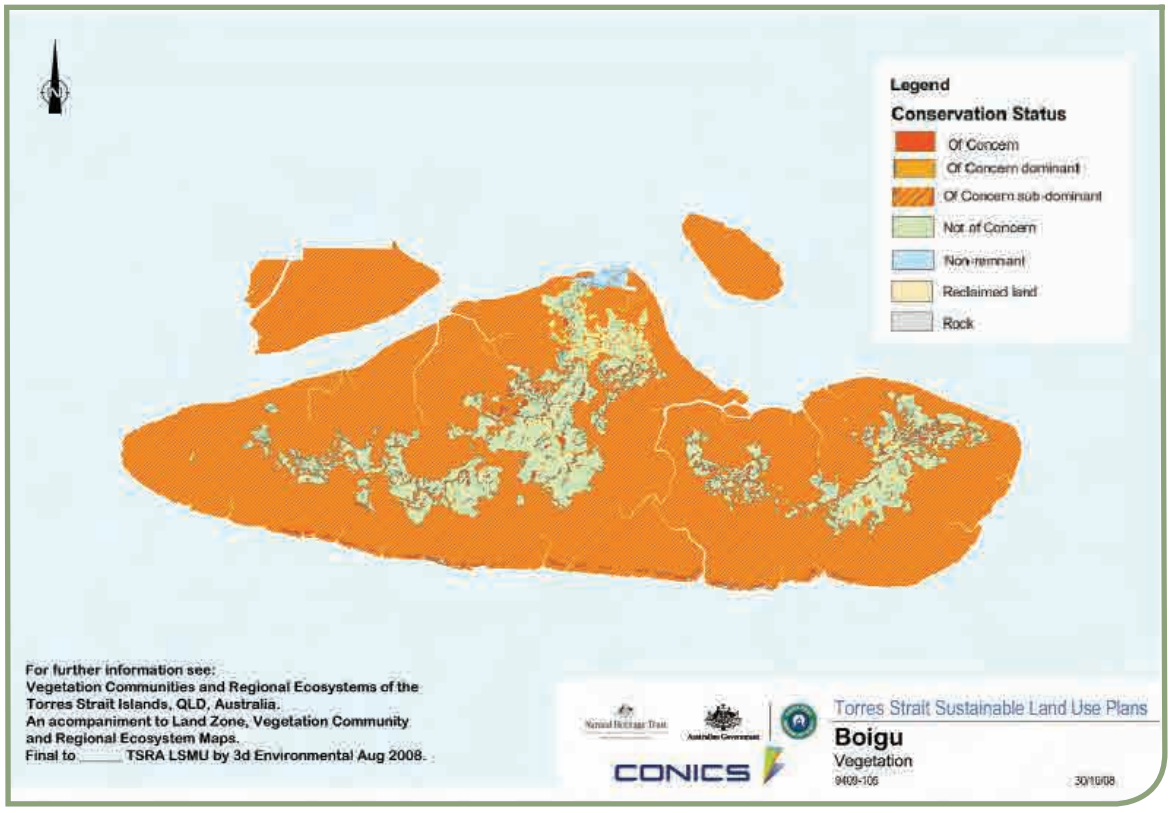
First records and collection made on Boigu of land fauna include:

- Native Melomys (*Melomys* species);
- Skinks (*Cryptoblepharus* and *Carlia* species); and
- Geckos (*Geckonidae* species).

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

Map 4 shows the significant vegetation communities on Boigu.

Map 4 Vegetation



For more detail, refer to Map No. 9409-105 contained in Volume 3 – Maps.

"Plants, animals and birds are essential to the well being of 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."

Five habitat types were identified on Boigu, including:

Mangrove Habitat

Mangrove forest habitat represents the largest areas of vegetation on Boigu. Generally, this vegetation type is in good structural condition, often with well-established and mature trees. This habitat borders the saltpans in the centre of the island.

Mangrove forests on Boigu represent the highest quality habitat due to their structure and relatively low incidences of disturbance. Mangroves support the most diverse fauna on the island including birds, reptiles and mammals. The island is well regarded by bird watchers for its diversity of birds. Species identified in this habitat included the Mangrove Gerygone, Orange Footed Scrub Fowl, Red-sided Skink (*Carlia longipes*) and a species of Melomys (a native rodent).

Mangroves adjacent to the developed areas on the island are heavily impacted and are of lower quality. Disturbed areas of mangroves represent approximately five percent of the available mangrove habitat on the island.

Lagoon Habitat

Two lagoons are located each side of the airstrip and were created when fill was required to complete its construction. Both lagoons have grasses and sedges surrounding the perimeter. The largest, southern lagoon provides good habitat and supports the highest diversity of birds for the habitat type and is relatively undisturbed; whereas, the northern lagoon is heavily impacted and provides lower quality habitat for wildlife.

Australian Pelicans had commenced migration at the time of the survey and were present in large numbers. Small numbers of the Radjah Shelduck were present daily, which is of particular note as the species is listed as rare under the *Nature Conservation Act 1992*.

Sedgeland & Saltpan Habitat

Sedgeland and saltpan habitat extend into the centre of the island from around the developed residential zone. This type of habitat covers approximately one third of the island and is mostly inaccessible due to regular tidal inundation and water logging. The vegetation in this habitat is very sparse, with low herbaceous, salt tolerant plants.

Extensive fauna surveys were not possible in this habitat due to access difficulties and because of this, no fauna were recorded. However, the quality of habitat is assumed to be moderate to high due to the lack of human impacts and its relatively intact condition.

"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."

Mudflat Habitat

The mudflat habitat includes sections of near shore and tidal mudflats of Boigu. These areas generally do not support permanent vegetation. The mudflats along the northern side of the island are heavily impacted by human activities and these areas are considered to be of low habitat quality to fauna. Despite these impacts, large numbers of birds were identified in the vicinity. The mudflats surrounding the rest of the island are buffered from human disturbance due to their inaccessibility and hence are likely to provide higher quality habitat.

Fauna identified in mudflat habitat included the saltwater crocodile, birds such as the Common Sandpiper, Eastern Reef Egret and the endangered Little Tern.

Developed Areas Habitat

The developed areas of Boigu cover a small, yet intensively modified area of the central northern coastline. Microhabitats exist around buildings, at the rubbish tip and in dumped vehicles. These areas are considered to be of low quality habitat due the high and frequent impacts of human activities.

The majority of the fauna identified in these areas are common species including the Masked Lapwing and Peaceful Dove. A Flying Fox (*Pteropus* sp.) was the only native mammal identified in this area.

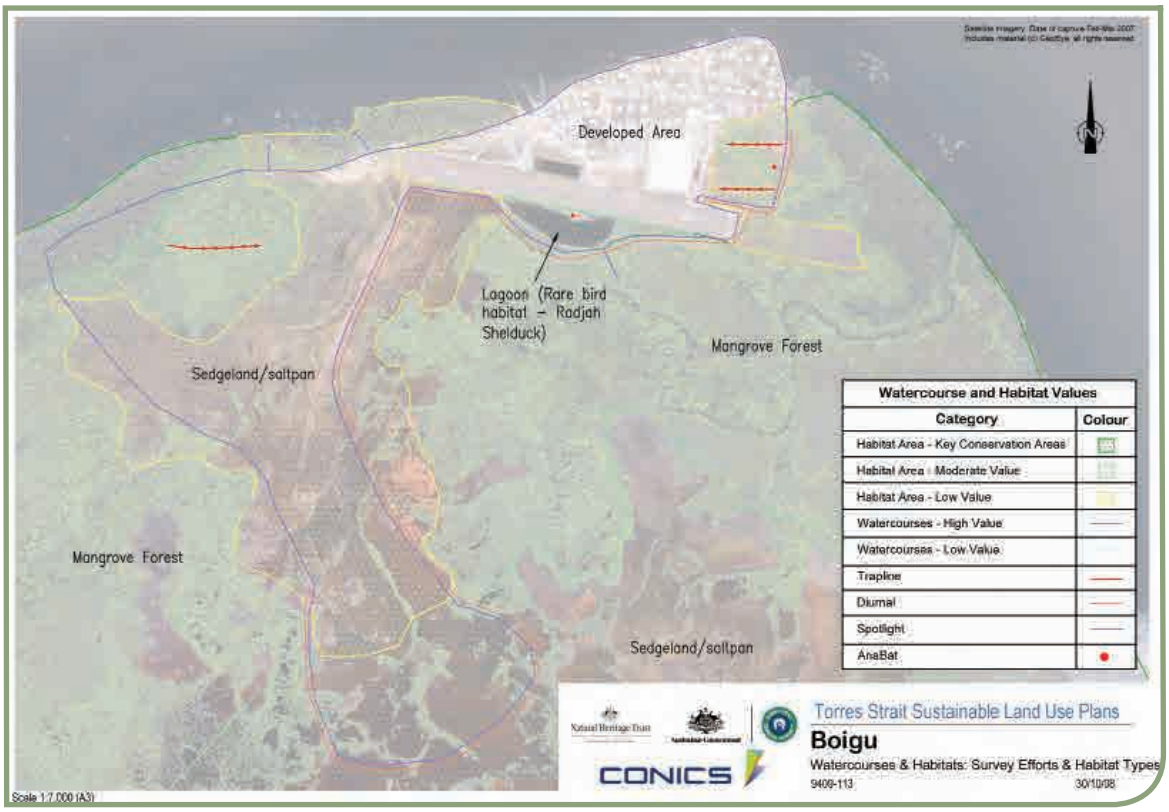
The habitat connectivity and corridors on Boigu has been maintained in the local landscape. Development associated with the village has resulted in some minor fragmentation of waterfront habitats, however the remainder of the island is intact allowing for the proper functioning of habitat corridors.

Map 5 shows the habitat areas on Boigu.

Maps 6 & 7 shows the identified ecologically significant watercourse and habitat areas.

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

Map 5 Habitat Areas

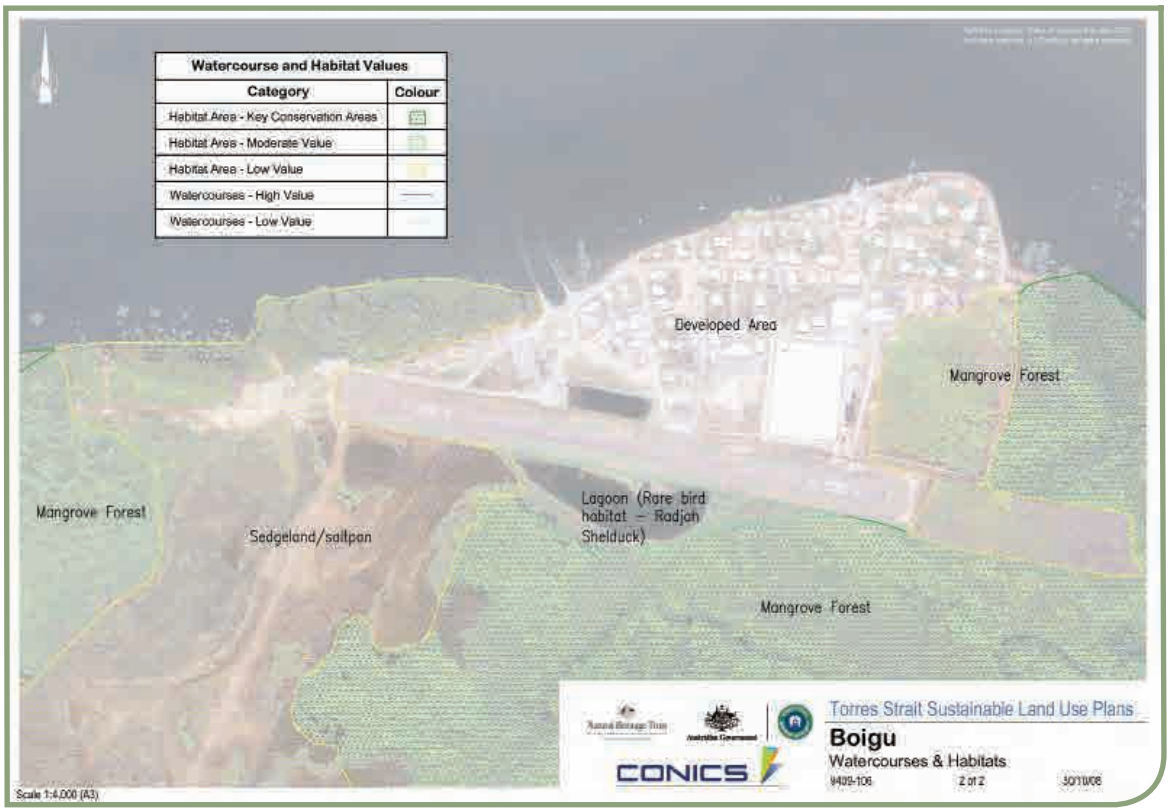


For more detail, refer to Map No.9409-113 contained in Volume 3 – Maps

Map 6 Ecologically Significant Watercourses and Habitats

For more detail, refer to Map No. 9409-106 contained in Volume 3 - Maps

Map 7 Ecologically Significant Watercourses and Habitats (Village)



For more detail, refer to Map No.9409-106 contained in Volume 3 – Maps.

"fragmentation is caused when vegetation and habitat areas are cleared resulting in these areas being divided into smaller, isolated patched"

3.1.3 Issues Overview

The distinct vegetated character of Boigu relies on the retention of biodiversity and ecosystems. In addition, many of the fauna species identified on Boigu 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 Boigu to provide high quality habitat and long-term safe refuge for species of conservation importance.

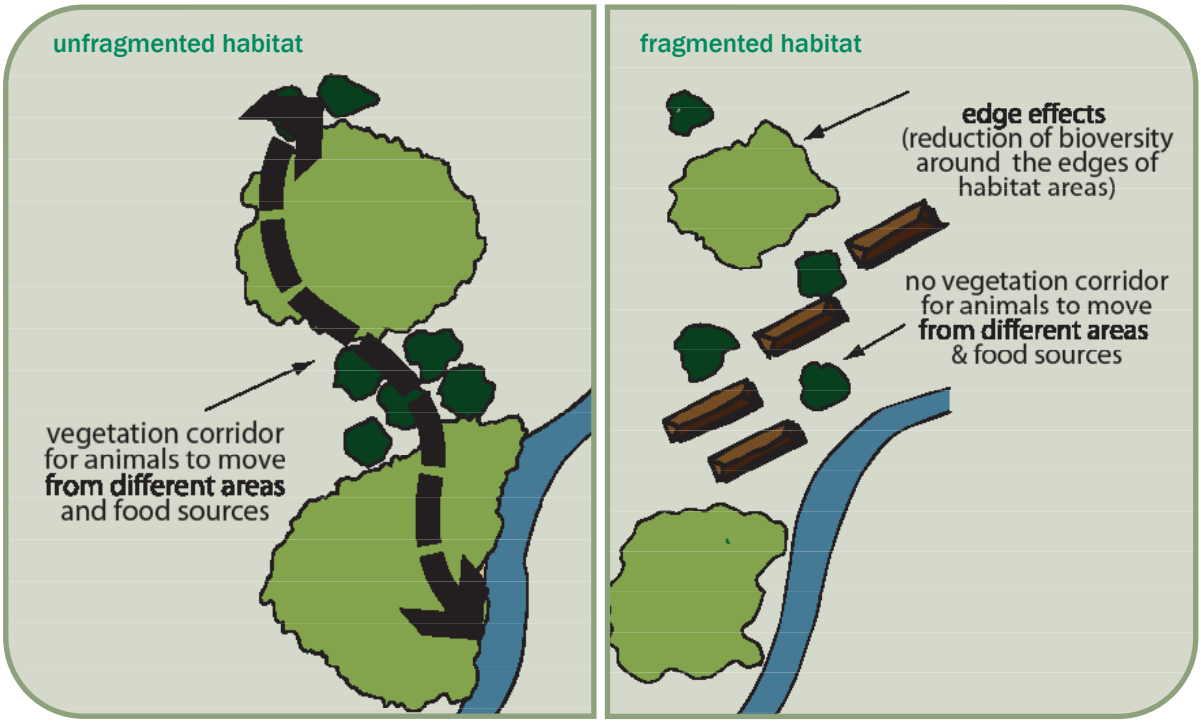
For these reasons, it is vital that land must be protected for conservation purposes. Ideally, these areas will represent the full range of habitats and species found across the island and from corridors for the safe movement and successful breeding of wildlife within the island. Such areas include the:

- the extensive wetland and mangrove areas; and
- coastal mudflat areas along the shoreline of the island.

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

Figure 1 shows the effects of fragmentation on vegetation

Figure 1 Vegetation Fragmentation



Uncontrolled burning of sedge land grass areas poses the greatest risk to continued function of corridors and connectivity for animals such as Melomys and small lizards, as their habitats are consequently eroded or destroyed.

Weed and pest control is also required to protect the localised ecological health and community wellbeing (over-population of cats and stray dogs was reported to be problematic on the island). Control of these animals could be conducted through periodic culling of stray dogs and cats; as well as placing limits on the numbers of pets allowed to be kept by island residents.

3.1.4 Land Use Strategies

To minimise existing and future development on Boigu'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; and
  - with a buffer of peripheral plantings of dense tree species to minimise encroachment into adjacent areas.

3.1.5 Land Use Considerations

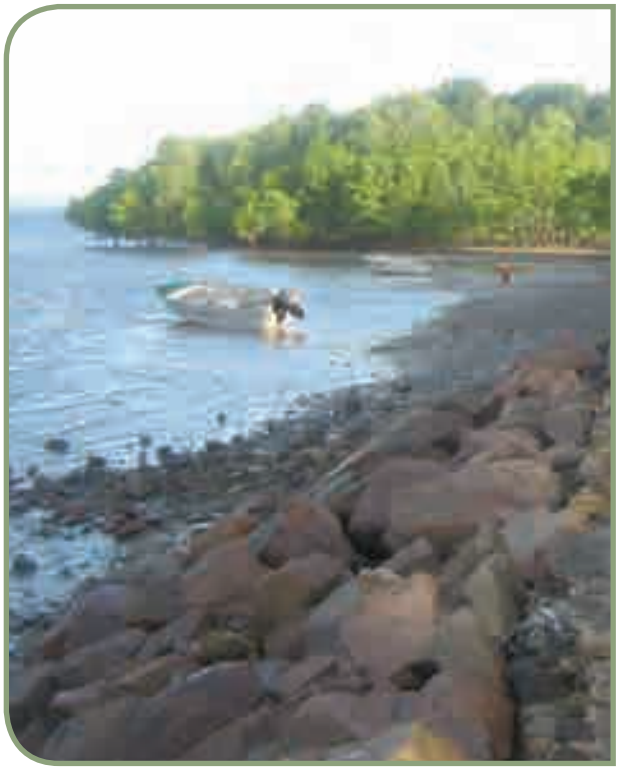
When assessing the impacts of future development on Boigu, the following key questions are to be asked. If the answer is "NO" to any of the questions, the proposal must justify the inconsistency, or be amended or not be accepted.

- 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 Boigu?
- Has a minimum of 10 metres but up to 40 metres buffer been provided between the development and the rare bird (Radjah Shelduck) habitat and coastal vegetation (the buffer area should consist of coastal vegetation)?
- Is the development outside of areas identified for conservation particularly in areas such as mangrove forests or the shoreline?
- 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; and
  - 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 Boigu;
  - will it introduce inappropriate plants into the natural areas; and
  - 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 Boigu plants, animals and birds, the following projects are recommended:

- Regulate indiscriminate dumping of rubbish and protect against local pollution.
- Regulate indiscriminate clearing and thinning of native vegetation, particularly mangroves.
- Rejuvenate areas where there have been changes in landform, drainage patterns and nutrient levels and where these changes are having an adverse impact on neighbouring vegetation.
- Implement a cat and dog management plan.
- Monitor Rusa Deer populations and if necessary, manage such populations through culling.
- Prohibit lagoons being stocked with exotic fish – use only native species.



3.1.7 Sustainable Plants, Animals and Bird Outcomes

- The unique environmental values of Boigu 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 Boigu's plants, animals and birds.
- Encourage community participation in planning, restoring and protecting Boigu'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 significance, 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

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

Vegetation Management Act 1999 (Qld) deals with the management and conservation of remnant vegetation.

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

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

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.epa.qld.gov.au/publications

Websites

Caring for our Country

www.nrm.gov.au

Environmental Protection Agency

www.nrw.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 Community to deal with the impacts of climate change on the island's coastline.

3.2.2 Overview of Current Situation

Boigu's coastline has largely been undeveloped and is in relatively pristine condition, apart from around the village. Along the shoreline of the village, a sea wall, to a height of 4.4 metres highest astronomical tide (HAT) has been constructed. However, the sea wall is regularly breached during storm surges and king tides inundating the village and does not provide protection along the full length of the village.

The Boigu village has a strong coastal focus, with the village concentrated along the northern shoreline of the island.

The planning and management of the coastal and marine environment of Boigu 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 Boigu 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.

3.2.3 Issues Overview

The primary consideration for Boigu's coastline is the conservation and protection of its coastal environments, to facilitate the natural protection of the village from tidal inundation. While the village is located directly on the shoreline, future development is proposed to the south of the village inside of another wall, known as the bund wall. However, without physical connection between the bund wall and the sea wall and significant filling of this area, the village expansion area will be subject to tidal inundation.

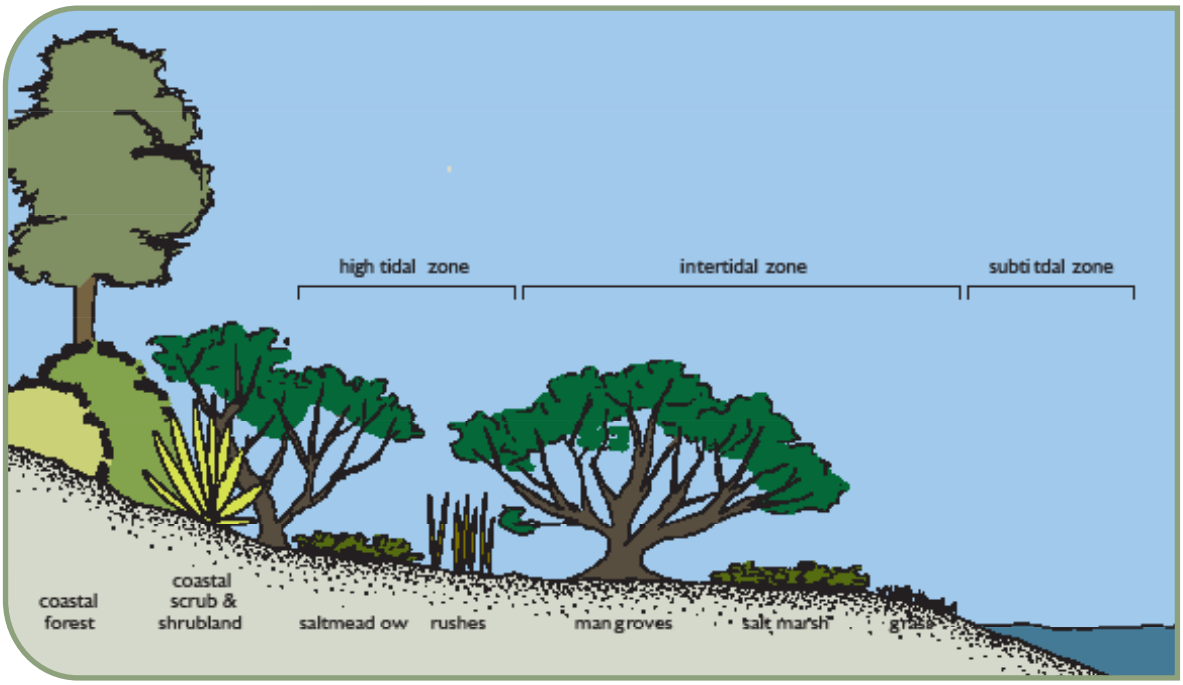
The protection of the pristine natural environment along Boigu's coastline should be addressed in all planning documents and processes relating to Boigu.

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 Community. The involvement of 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'.

Figure 2 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"

3.2.4 Land Use Strategies

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

- Not permit urban development and infrastructure along the immediate shoreline of Boigu, particularly inaccessible parts of the coast
- New development is contained with the village and the identified 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, corridors, 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).

3.2.5 Land Use Considerations

When assessing the impacts of future development on Boigu, the following key questions are to be asked. If the answer is "NO" to any of the questions, the proposal must justify the inconsistency, or be amended or 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; and
  - identify and protect important coastal assets of ecological, visual and cultural significance?

3.2.6 Sustainable Coastline Outcomes

- Protect and maintain Boigu'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 Boigu's inland waters, estuaries and the sea.
- Community is involved in the protection and management of the coastline to ensure the protection of their cultural heritage.

3.2.7 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

Policies, Guidelines and Fact Sheets

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

www.amcs.org.au

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

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.epa.qld.gov.au

Websites

Environmental Protection Agency

www.epa.qld.gov.au

Australian Maritime Conservation Society

www.amcs.org.au

CoastCare

www.coastcare.com.au

OzCoasts

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 Boigu to the impacts of climate change by:

- recognising the importance of climate change on the sea and land environments of Boigu;
- avoiding quick decisions now that will make it more difficult to manage climate change risks in the future; and
- building understanding and capacity of 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, the region is vulnerable to tropical cyclones and storms. The tropical cyclone and storm impacts on Community 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 Community during extreme events.

In Boigu, there are three types of walls built to protect the Community from storm surge and tidal inundation. These are:

Seawall

This is located around the village between the cemetery and near the barge ramp and made out of concrete blocks. This wall is overflowed by the sea allowing inundation of the village. The seawall could be raised in stages to achieve protection from current predicted HAT.

Rockwall

This is located from the barge ramp to around the church to be it meets the bund wall and is constructed from rock.

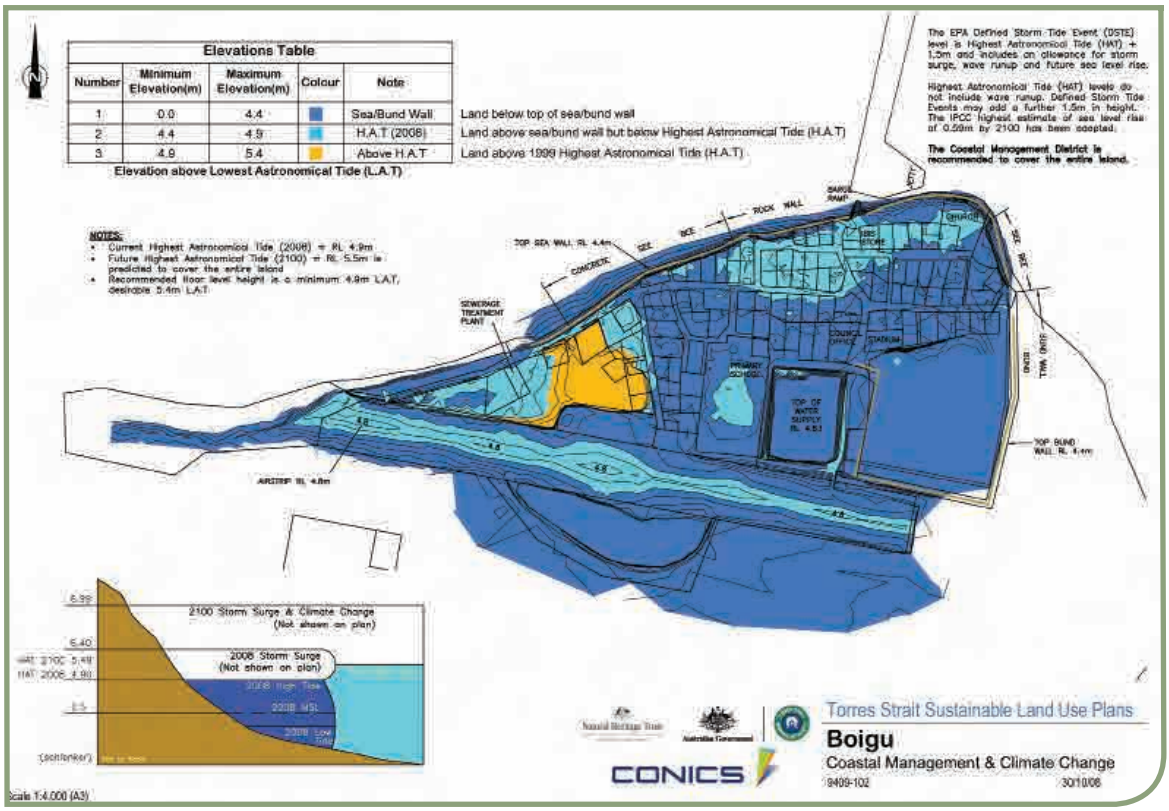
Bundwalls

The bund wall commences from the rock wall and travels inland towards the airstrip. This wall consists of a rock centre and 'bunded' with cement.

All three walls are generally at RL4.4, which is approximately 0.5 metres below HAT. This means that the village area is subject to tidal inundation.

Map 8 shows the areas of Boigu impacted by coastal inundation and seal level rises.

Map 8 Coastal Management and Climate Change (Village)



For more detail, refer to Map No. 9409-102 contained in Volume 3 – Maps.

3.3.3 Issues Overview

The Intergovernmental Panel on Climate Change has projected sea levels to rise by the end of the twenty first century between 0.26 and 0.59 metres. The values predicting sea level rises are constantly being assessed, with some scientists advising of a further 0.2 metres be added to allow for melting ice caps. This would mean a total increase of 0.79 metres by 2100.

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 rise of 0.59 metres by 2100.

The adopted 0.59 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).

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

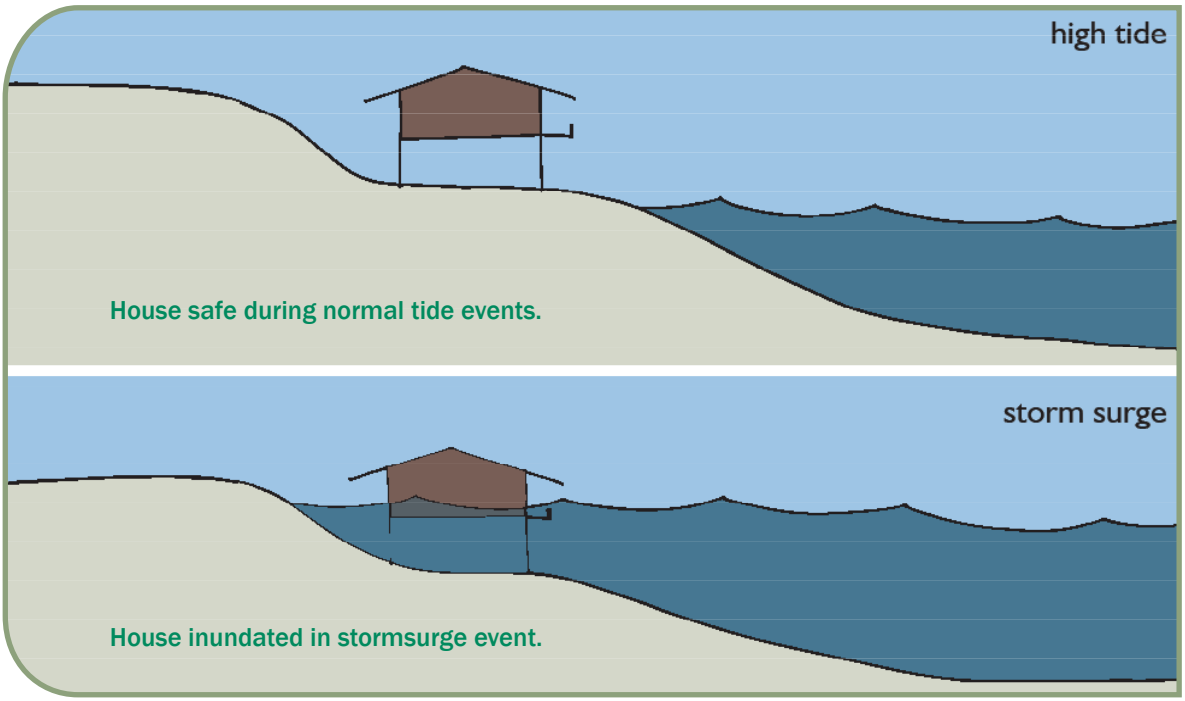
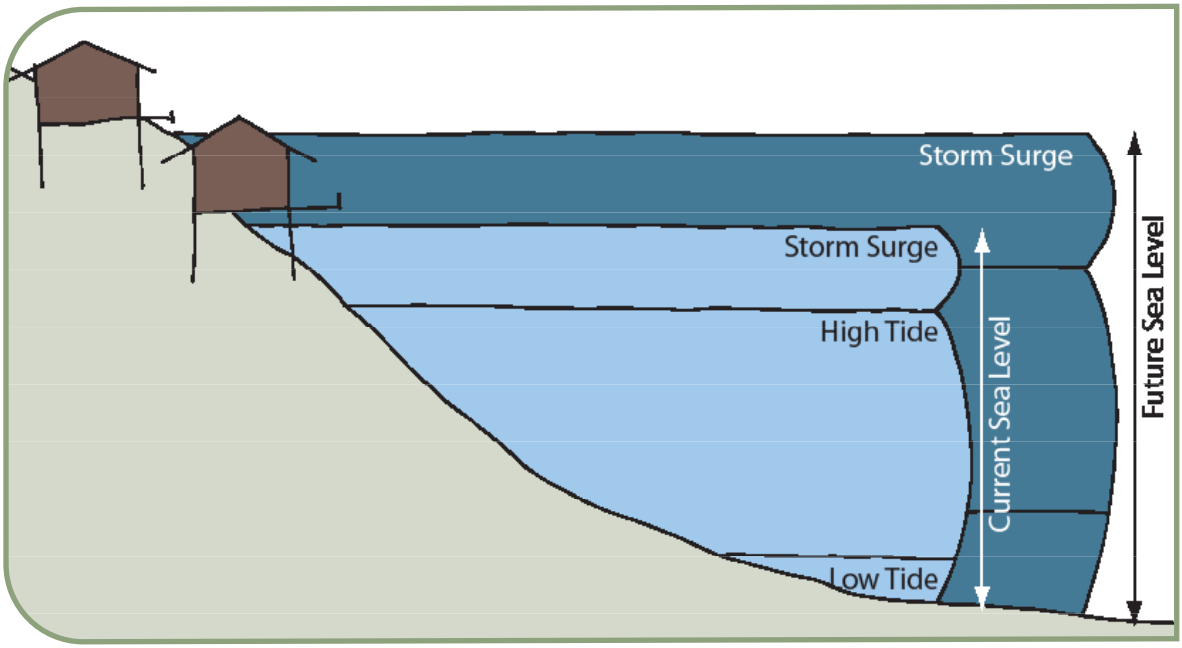


Figure 4 Climate Change and Sea Level Rise



The only tidal information available for Boigu, are the predictions in the Seafarer Tide Charts published by the Australian Hydrographic Service 2008 version. The current island mapping is based on lowest astronomical tide (LAT) which is the same datum as the tide charts.

The Seafarer Tidal Predictions were analysed to see how many times the predicted high tide overtopped the seawall each day. The seawall was predicted to be overtopped on 25 days in 2008.

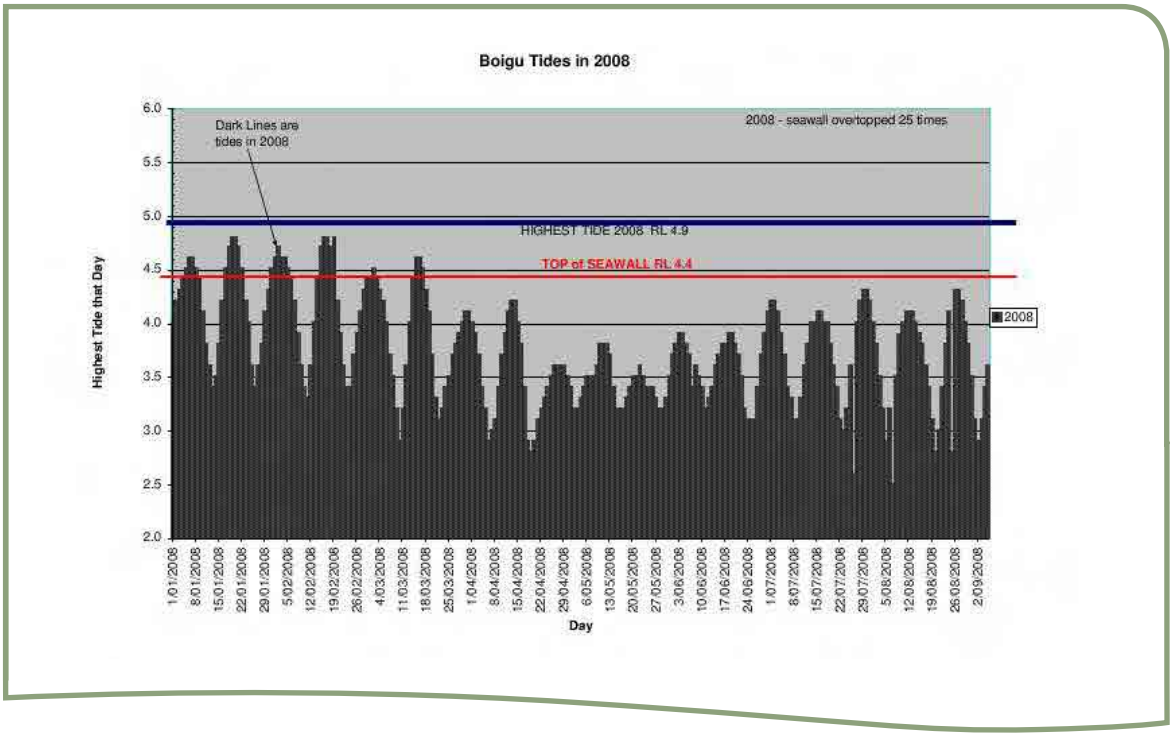
The current adopted amount for sea level rise over the next 100 years of 0.59 metres was then added to each high tide. When allowing for this sea level rise the predictions extrapolate to the seawall being overtopped 141 days a year by the year 2100.

Table 1 shows the present and predicted tide levels.

Figure 5 show the frequency of present and predicted seawall beaches.

For this reason, 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 Seawall Breaches



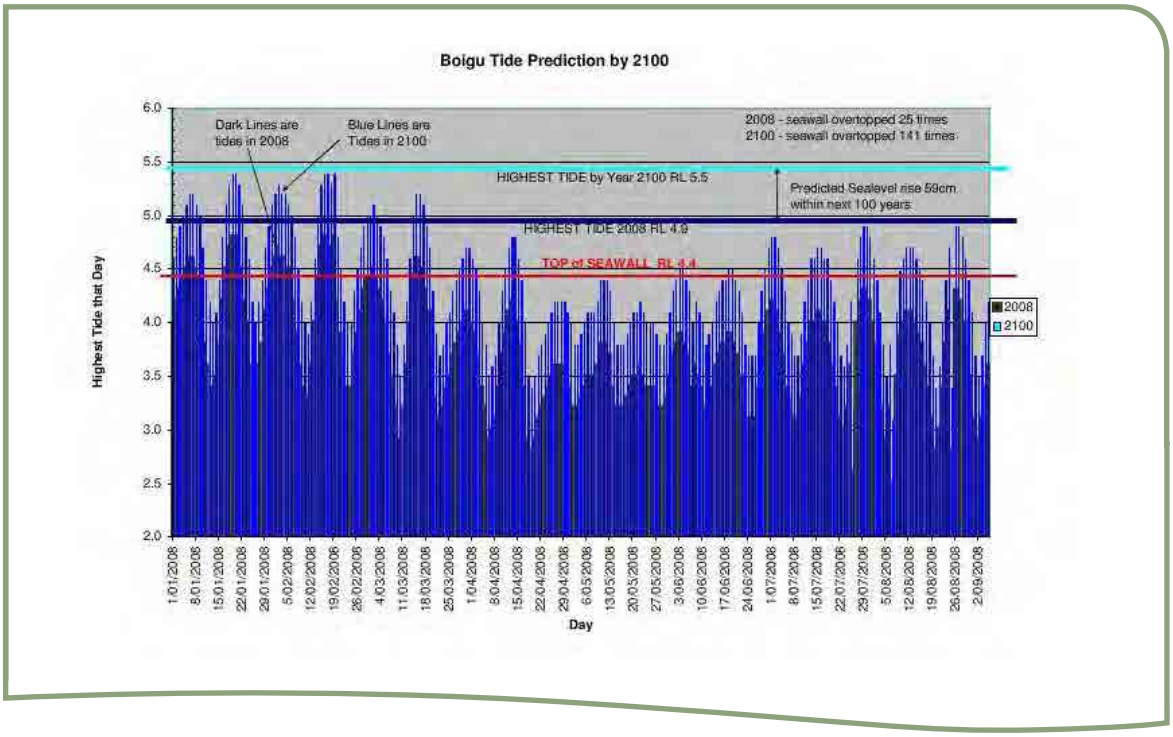


Table 1 Present and Predicted Tide Levels

Tide Description	Australian Height datum	Seafarer Tide Data (2008)	Island Mapping (Schlenker = LAT)	Tide Project 2008
Highest Astronomical Tide (HAT) 2100 adopting 0.59m rise			5.49	Not available
Highest Astronomical Tide 2008 (HAT)	Unknown	4.9	4.9	Not available
Top of Seawall RL 4.4		4.4	4.4	
Mean Higher High Water (MHHW)		4.1	4.1	Not available
Mean Lower High Water (MLHW)		3.0	3.0	Not available
Mean sea level (MSL)		2.5	2.5	Not available
Mean Higher Low Water (MHLW)		1.9	1.9	Not available
Mean Lower Low Water (MLLW)		0.8	0.8	Not available
Indian Spring Low water (ISLW)		0.4	0.4	Not available
Lowest Astronomical Tide (LAT)		0.0	0.0	Not available

Source: Australian Hydrographic Service, 2008

To improve the performance of the sea wall, it could be raised in stages to achieve protection from current predicted HAT – see Table 2. The western end of the wall is eroding and needs to be rebuilt and extended to protect the cemetery.

Table 2 Sea Wall Height Increase and Present and Predicted Impact on the Village

Stage	Level (LAT)	Incremental Height	Total Height above current wall	Comment
Current Height of Seawall/ Bund wall	4.4	-	-	Village inundated 25 time during 2008
Raise seawall to level of Current HAT	4.9	0.5	0.5	Protect Village from current HAT, but no protection for wind or extreme tides Note: Airstrip approximately RL 4.8
Raise seawall to predicted future HAT in 2100 (0.59m rise)	5.4	0.6	1.1	Protect Village from predicted HAT by 2100

In summary, in the short to medium term, works need to be undertaken to the existing sea wall to ensure that it is structurally sound and repair any damage. This should include the western extension of the sea wall to provide protection to the cemetery. The seawall should be raised in stages as follows:

- to the existing 4.9 metres HAT;
- then to cover for the existing storm surge; and
- to the predicted HAT levels in 2100.

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.

Boigu coastal ecosystems landforms — among them, mangroves, wetland and, coastal flood plains 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 Boigu'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 Boigu, this includes a combination of strategies that are addressed in Section 3.4.4.

3.3.4 Land Use Strategies

On Boigu, relocating elsewhere on the island to minimise the impacts of king tides, storm surges and sea level rise is not a viable option, given that the village is currently on the highest ground. Therefore, a number of strategies are required to secure the long-term viability of the village in its existing location, including:

- Not encouraging:
  - 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; and
  - an intensification of uses or works that are likely to increase the adverse impacts of tides and storm surges.
- Encouraging development not to affect the physical coastal processes in ways that result in the:
  - erosion of adjacent coastal areas;
  - interference with the flow of water;
  - alteration of existing water flows; and
  - damages conditions for existing coastal vegetation.
- Redevelopment of the sea wall to be higher, thus reducing the number of times per year the sea breaches the sea wall.
- The seawall raising may be undertaken in stages (of height) to achieve protection from current predicted HAT.
- The management and reduction of greenhouse gas emissions (mitigation) through the changing of Community awareness, knowledge and changing of behaviour.
- House designs for new or modifications to existing houses should incorporate mitigation measures that include:
  - a 'refuge area' which is built on concrete slab and includes reinforced masonry/concrete walls from the ground to the upper ceiling;
  - a 'strengthen area' that is generally a bathroom/ toilet or laundry/ toilet;
  - an upper living area floor;
  - habitable floor levels of a minimum of 4.9 metres LAT which is equivalent to the current HAT or where possible a minimum of 5.4 metres LAT or HAT should be achieved; and
  - mechanical and electrical works (e.g. pump stations) are above predicted 2100 HAT; and
- The sea levels should be reviewed in 10 years to take into account the most current predictions.

3.3.5 Land Use Considerations

When assessing the impacts of future development on Boigu, the following key questions are to be asked. If the answer is "NO" to any of the questions, the proposal must justify the inconsistency, or be amended or 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?
  - 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 Boigu, a regular review of scientific data on predicted sea level rises is required. It is recommended that an investigation into the predicted sea level rise due to climate change should be undertaken specifically for the Torres Strait region. This investigation would provide information that is more relevant rather than the current adopted global value of 0.59 metres.
- In the short to medium term, works need to be undertaken to the existing sea wall to ensure that it is structurally sound and repair any damage. This should include the western extension of the sea wall to provide protection to the cemetery.
- The sea wall should be raised in stages as follows:
  - to the existing 4.9 metres HAT;
  - then to cover for the existing storm surge; and
  - then to the predicted HAT levels in 2100.

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.
- Community determine the level of storm tide risk they are willing to accept.

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

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.epa.qld.gov.au/publications

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 in king tide predictions for the rest of the State.

www.epa.qld.gov.au/publications

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.epa.qld.gov.au/publications

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.epa.qld.gov.au/publications

Websites

Environmental Protection Agency

www.epa.qld.gov.au

National Tidal Centre

www.bom.gov.au

OzCoasts

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 Boigu to the impacts of climate change by:
  - recognising the importance of climate change on the waterways and wetlands environments of Boigu;
  - avoiding quick decisions now that will make it more difficult to manage climate change risks in the future; and
  - building understanding and capacity of Community to deal with the impacts of climate change on Boigu's waterways and wetlands.

3.4.2 Overview of Current Situation

As Boigu has large inundated areas that are tidally influenced, the island has limited waterway values other than those associated with marine drainage paths from mangroves and other inland areas. The extensive wetlands and mangrove areas are significant and important to the environment as well as Community for fishing and prawning.

The ecological services that the watercourse and the lagoons contribute to landscape processes, whether conspicuous surface features or partially underground, are crucial to the long-term environmental health of the island.

Maps 6 & 7 shows the identified ecologically significant watercourse and habitat areas.

"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"

3.4.3 Issues Overview

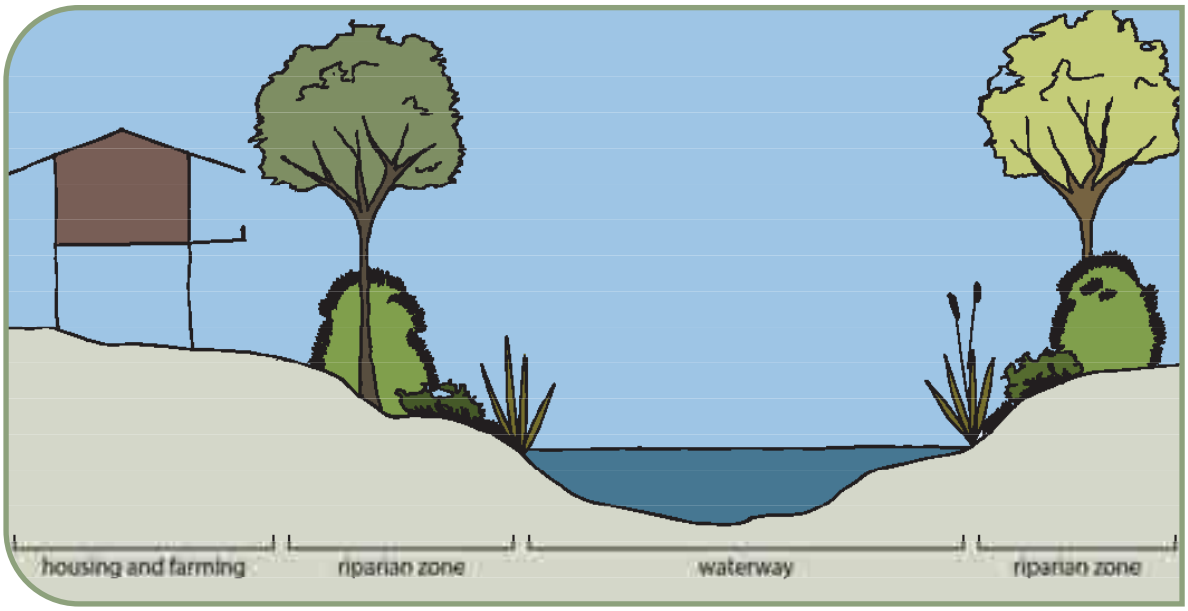
Waterways, wetlands, associated floodplains and riparian areas support a range of natural and economic functions, including habitat for land and sea wildlife, nursery grounds for creek and bay fisheries, potable water supplies, stormwater conveyance, provision of sand for building materials, ecological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

Land use activities are changing Boigu's waterways, wetlands and riparian areas. These changes include the loss and degradation of riparian vegetation, increased nutrient levels, reduction in environmental flow and destructive increases in peak flows.

Wherever possible, particularly in areas of high conservation value, development should not be encouraged. Rehabilitating degraded waterways, wetlands and riparian areas should be undertaken to restore natural ecological functions.

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.

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 that permanent wetlands"

3.4.4 Land Use Strategies

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

- All development proposals must:
  - include landscaping and/or revegetation plans that are in accordance with the Best Practice, Land Use Strategies and Sustainable Outcomes of Section 3.1 Plants, Animals and Birds;
  - be ecologically sustainable development;
  - maintain or improve the values of coastal wetland, estuaries, inlets, lagoons, shorelines, high scenic qualities and retain visual continuity;
  - address the proposals vulnerability to natural coastal processes (coastal recession, storm events and projected sea level rises); and
  - where adjacent to a degraded riparian corridor, include rehabilitation plans for the corridor.
- Development controls based on the assessed risk for developments near waters and wetlands include controls on minimum elevations, setbacks and lot sizes, as well as maximum densities and site coverage.
- Development is not encouraged:
  - in wetlands;
  - where it has detrimental impact on natural flow regimes and quality water systems;
  - in areas within 40 metres of wetlands and the lagoons to provide a buffer between riparian areas and development; and
  - to utilise groundwater resources.

"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."

3.4.5 Land Use Considerations

When assessing the impacts of future development on Boigu, the following key questions are to be asked. If the answer is "NO" to any of the questions, the proposal must justify the inconsistency, or be amended or not be accepted.

- Is the development in accordance with the Waterways and Wetlands Best Practice, Land Use Strategies and Sustainable Outcomes?
- Does the development:
  - protect water supply catchments and significant underground waterways;
  - retain vegetation cover to assist in maintaining an enhancing water quality;
  - maintain the absorptive capacity of soils;
  - maintain existing waterways and wetlands as a means of absorbing peak flows from floods or the effects of cyclones and storm surges; and
  - implement management practices during and after development to protect waterways and wetlands?

3.4.7 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 Boigu is managed in a sustainable and integrated manner to provide adequate supplies for human and environmental uses.

3.4.8 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.nrw.qld.gov.au/factsheets

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

www.nrw.qld.gov.au/factsheets

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.nrw.qld.gov.au/factsheets

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

www.nrw.qld.gov.au/factsheets

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.epa.qld.gov.au/publications

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

www.nrw.qld.gov.au/factsheets

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

www.nrw.qld.gov.au/factsheets

The Hydrological Cycle described the water cycle, both above, on and below the earth's surface.

www.nrw.qld.gov.au/factsheets

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

www.wetlandcare.com.au/fact_sheets.asp

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

www.wetlandcare.com.au/fact_sheets.asp

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

www.nrw.qld.gov.au/factsheets

Websites

Department of Natural Resources and Water

www.nrw.qld.gov.au

Environmental Protection Agency

www.epa.qld.gov.au

WetlandCare Australia

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 Boigu to the impacts of climate change by:
- recognising the importance of climate change on Boigu's land and soil
- avoiding quick decisions now that will make it more difficult to manage climate change risks in the future
- building understanding and capacity of Community to deal with the impacts of climate change on Boigu's land and soils.

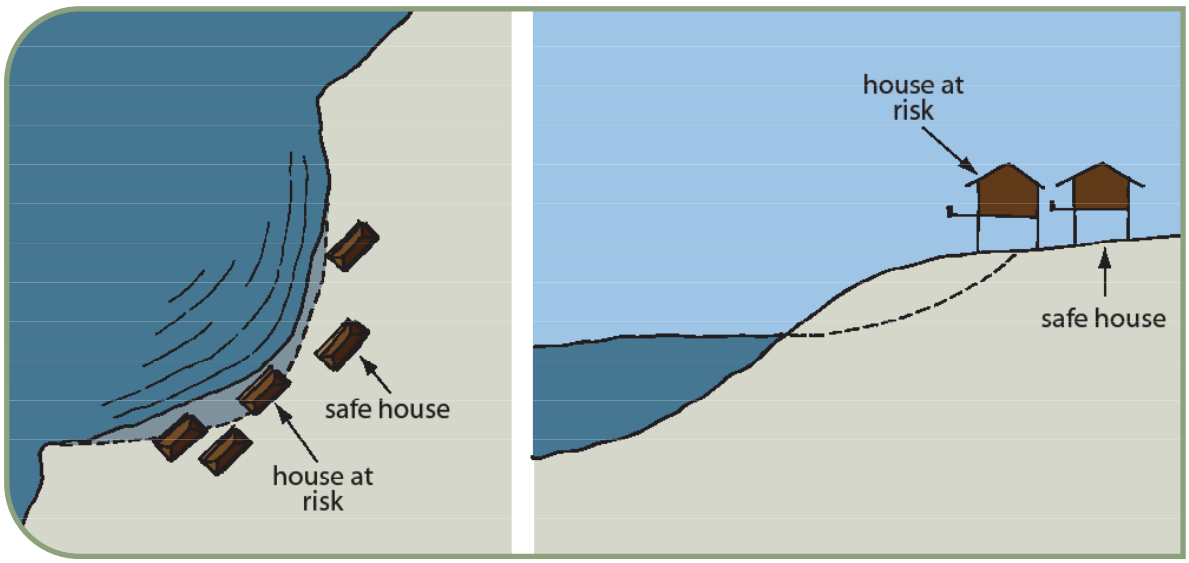
3.5.2 Overview of Current Situation

Boigu is an extremely flat mud island with large interior swamps filled with brackish water. As such, slope stability is not an issue for development. However, the shoreline is subject to significant coastal erosion due to natural forces, development and increasing tide levels.

The sea wall constructed from Army Street in the west through to Army Street to the east provides the village from protection from the day-to-day impacts of coastal erosion. However, during king tides and storm surges, the tides come over the sea wall, inundating the village.

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

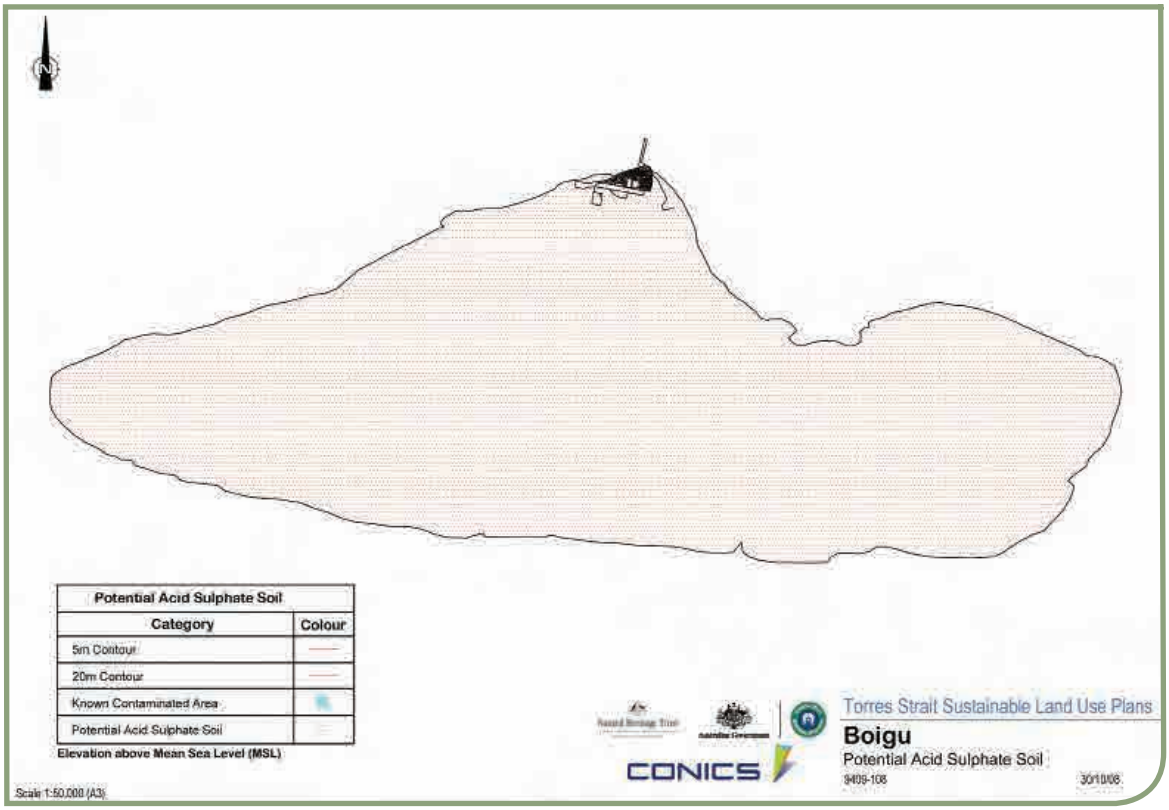
Figure 7 Coastal Erosion



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

Map 9 shows the potential location of acid sulfate soils.

Map 9 Potential Acid Sulfate Soils



For more detail, refer to Map No. 9409-108 contained in Volume 3 – Maps.

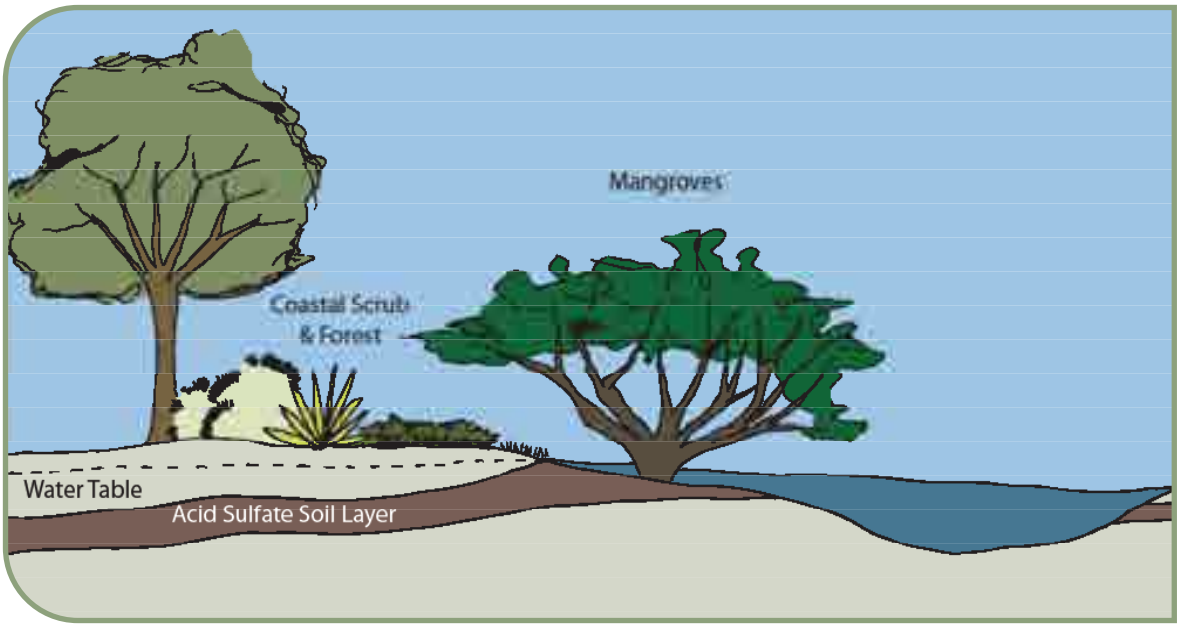
"Acid sulfate soils are naturally occurring soils and sediment containing iron sulfides, most commonly pyrite.
When acid sulfate soils are exposed to air, the iron sulfides in the soil react with oxygen and water to produce a variety of iron compounds and sulphuric acid. Initially a chemical reaction, 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 pope 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

The marsh-like nature of the island constrains any significant expansion of the existing village other than in the southeast corner of the island, which has some protection from inundation and coastal erosion by the existing bund wall.

Given that much of the village and associated community facilities and infrastructure are located on low lying areas, there is the potential for acid sulfate soils to be exposed during construction. Exposed acid sulfate soils can result in environmental harm such as fish kills and corrode infrastructure such as water and sewer pipes as well as building foundations.

3.5.4 Land Use Strategies

To minimise existing and future development on Boigu 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 3.1 Plants, Animals and Birds;
- Where development is proposed in areas at or below 5 metres AHD, an acid sulfate soil investigation is to undertaken and where necessary, an environmental management plan is prepared;
- Highly erodible or unstable soils are to be left in their natural condition to prevent erosion, sedimentation and water quality degradation problems; and
- 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

When assessing the impacts of future development on Boigu, the following key questions are to be asked. If the answer is “NO” to any of the questions, the proposal must justify the inconsistency, or be amended or not be accepted.

- Is the development in accordance with the Land and Soil Best Practice, Land Use Strategies and Sustainable Outcomes?
- 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 sulfate soils and erosion.
- Drainage activities should avoid or a 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

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

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

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

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.nrw.qld.gov.au/factsheets

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

www.nrw.qld.gov.au/factsheets

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

www.nrw.qld.gov.au/factsheets

Coastal Erosions introduces what is coastal erosion and what are the causes of coastal erosion.

www.bom.gov.au/pacificsealevel

Websites

Department of Natural Resources and Water

www.nrw.qld.gov.au

Environmental Protection Agency

www.epa.qld.gov.au

OzCoasts

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 Boigu to the impacts of climate change by:
  - recognising the importance of climate change on Boigu'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 Community to deal with the impacts of climate change Boigu's bushfire environment.

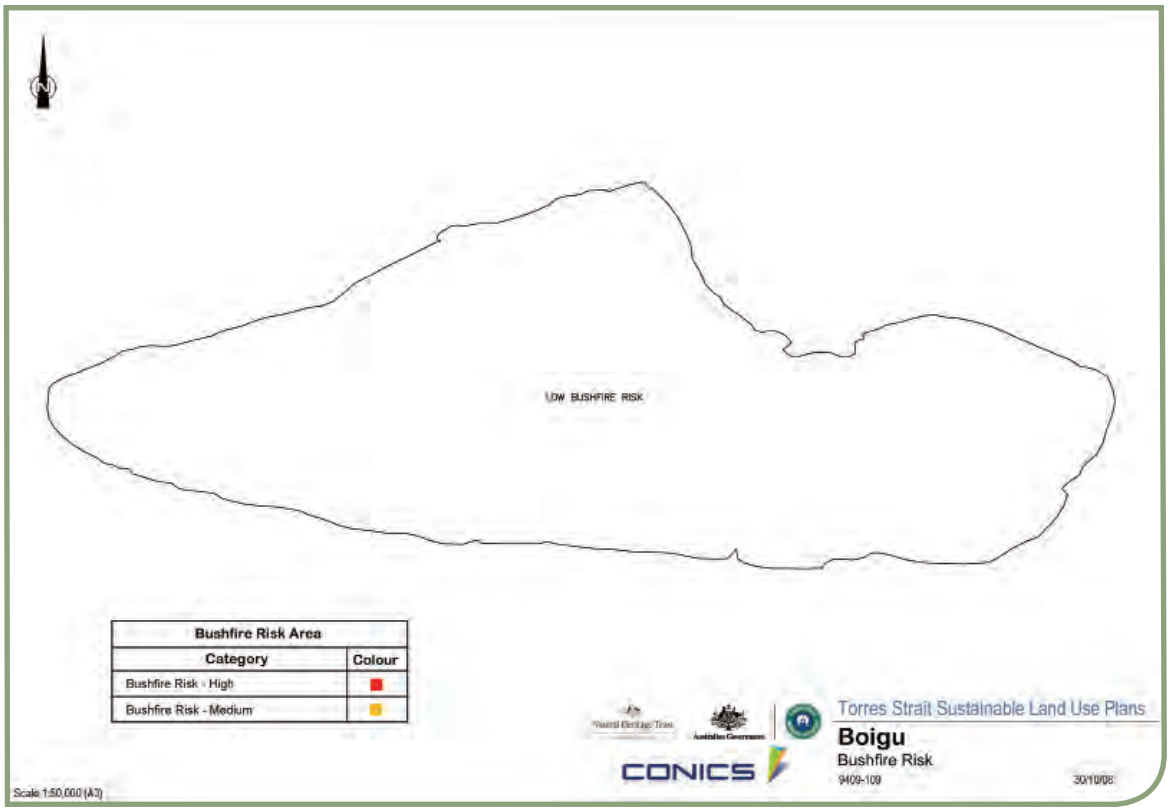
3.6.2 Overview of Current Situation

Boigu is extensively covered with swamps and mangroves, which are subject to a low bushfire risk. The presence of human occupation raises the likelihood and frequency of fire, which may significantly alter the ecological characteristics of Boigu. Inappropriate burning of mangroves and wetlands could cause the margins of this vegetation type to contract – effectively reducing its area and function as a habitat.

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

Map 10 shows the location of bushfire hazard areas.

Map 10 Bushfire Risk



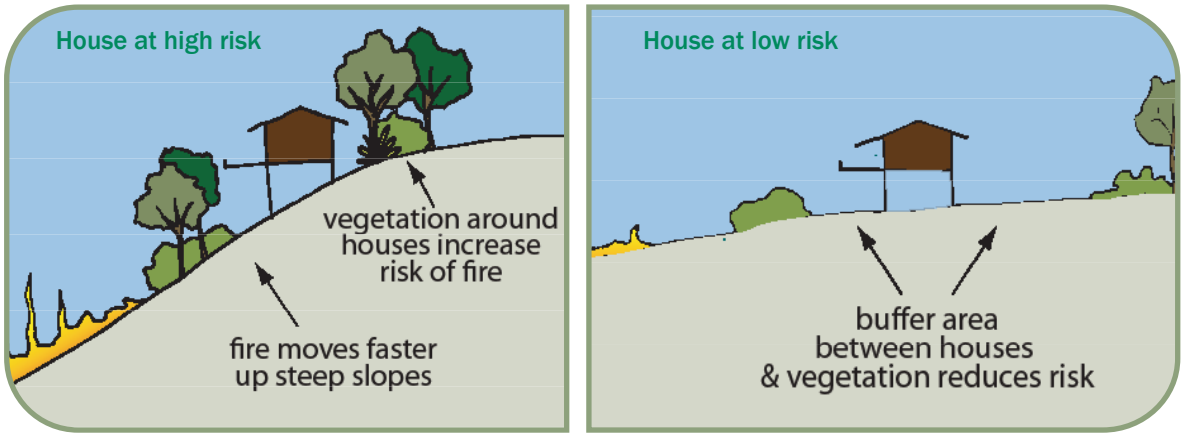
For more detail, refer to Map No. 9409-109 contained in Volume 3 – Maps.

3.6.3 Issues Overview

Fire is likely to be a naturally low occurrence event given the presence of damp areas from tidal inundation, which reduces the potential for fire. However, bushfires represent an ever present risk to life, property and the environment. While the bushfire risk on Boigu is low, it is always important to manage the risk to life, land, property and the environment from bushfire through appropriate land use planning strategies. Identifying areas, which have been subject to bushfire in the past, will inform future generations and guide where development should not occur.

Figure 9 shows how be 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:

- 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

When assessing the impacts of bushfire on future development, the following key questions are to be asked. If the answer is "NO" to any of the questions, the proposal must justify the inconsistency, or be amended or 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 high 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 Boigu'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 within sedge land habitat adjacent to the village (controlled burning of a fire management line);
  - 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.

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

Your Bushfire Action Checklist provides a list of tasks individuals and 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.

www.fire.qld.gov.au

Websites

Queensland Fire & Rescue Service

www.fire.qld.gov.au

Cultural Heritage

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 Community's cultural heritage by:
  - recognising the importance of climate change to Boigu'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 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 Boigu is an area of significant cultural heritage value to the Traditional Owners and the people of Boigu.

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:

- old village sites;
- middens;
- wells – Mai, Katana May, Loey May and Thgeraw May and Maikibu;
- coconut and bamboo groves;
- horticultural sites;
- The Tree of Spy (dhani) and Tree of Skulls;
- stone dugong carvings;
- rainstones; and
- zogo sites.

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

Further details on Boigu's culturally significant places and sites are included in Appendix 3.

The cemetery is located at the western end of the village. Its capacity is extremely limited in area and there is restricted potential for increasing its current capacity. Further, as there is no sea wall at this end of the village, the cemetery is susceptible to tidal inundation during king tides and storm surges.

"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 helps us to 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 Boigu, 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 Boigu's Traditional Owners in order to manage and protect their unique areas of cultural significance.

Engagement and partnerships with 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 Boigu'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 such as middens and other low lying sites. The intensification of environmental impacts associated with climate change may result is some areas of significance being submerged or eroded. The existing cemetery is one case in point. Decisions need to be made whether or not the cemetery should be expanded in its present location or be relocated to avoid the tidal and storm surges.

4.4 Land Use Strategies

To protect Boigu'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 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.
- 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 Boigu's cultural heritage.

4.5 Land Use Considerations

When assessing the impacts of future development on Boigu, the following key questions are to be asked. If the answer is "NO" to any of the questions, the proposal must justify the inconsistency, or be amended or not be accepted.

- Is the development in accordance with the Cultural Heritage Best Practice, Land Use Strategies and Sustainable Outcomes?
- Boigu is a significant area of cultural heritage to 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? It addresses 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 Boigu'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).
- An analysis of the future of the existing cemetery.
- Facilitate opportunities for young people to build understanding and capacity about Boigu'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 Boigu is avoided, mitigated or remedied.
- The impact of climate change on Boigu cultural heritage is managed in a sustainable and integrated way to provide appropriate solutions.
- Ensure Community are 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

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

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.nrw.qld.gov.au/cultural_heritage

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

www.nrw.qld.gov.au/factsheets

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

www.nrw.qld.gov.au/factsheets

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.nrw.qld.gov.au/factsheets

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

www.nrw.qld.gov.au/factsheets

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

www.nrw.qld.gov.au/factsheets

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

www.nrw.qld.gov.au/factsheets

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

Publications

Cordell, J. and McNiven, I. (1999). *Torres Strait Community Socio-Cultural Interests and Heritage Study: PNG gas project consultancy report.* Prepared for the Island Co-ordinating Council (Pipeline Reference Group), Torres Strait

Neal, R. A. (1989) *An Archaeological Inspection of Alternative Telecom Locations on Mabuiag and Yam Island, Torres Strait.* Prepared for Department of Community Service and Ethnic Affairs, Brisbane.

Websites

Department of Natural Resources and Water

www.nrw.qld.gov.au

Environmental Protection Agency

www.epa.qld.gov.au

National Native Title Tribunal

www.nntt.gov.au

Australian Heritage Council

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 well-being report be developed through a comprehensive community engagement process, as it would highlight the needs, concerns and aspirations of 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.

5.1.2 Overview of Current Situation

The resident population of Boigu has increased in the past ten years as indicated in Table 3.

Population growth on Boigu is steady, increasing only 0.6% in the past ten years (1996-2006). However, it is generally considered that Census data concerning population is not an accurate reflection of the population of the island, as many have not completed the questionnaire.

The 2006 Census indicates the following population characteristics:

- an average age of 21 years;
- 42.8% of the population is under the age of 15 years;
- 18.6% of the population is between the age of 15 and 24 years;
- 22.5% of the population is between the ages of 25 and 34 years;
- 17.2% of the population is between the ages of 35 and 54 years; and
- 7.7% of the population is 55 years and older.

Table 3 Population Growth

Year	Population	Growth / Year (%)	Population Density: persons/km^2
1996	239	NA	NA
2001	333	0.6	NA
2006	327	0.0	4

Source: ABS, 1996, 2001 and 2006

5.1.3 Land Use Strategy

To ensure that population trends and profiles are reflected in land use planning on Boigu, 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.nrw.qld.gov.au

1. In comparison, in Queensland, 20.7% of the population is under the age of 15, 13.8% of the population is between 15 – 24 years, 13.4% of the population is between 25-34 years, 28.6% of the population is between 35 – 54 years, and 23.6% of the population is 55 years and older.

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 Boigu'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 Community to deal with the impacts of climate change on housing.

5.2.2 Overview of Current Situation

Given the nature of the island, the village is contained to a definable area along the northern shoreline. Houses located in the village are generally one storey, but are on stumps that elevates the house to the equivalent of a two storey buildings.

Map 11 shows the types of dwellings (one or two storey houses)

Older houses and community facilities are generally one storey at ground level. Recent homes are generally, slab-on-ground open ground level, with the dwelling elevated on stumps and timber construction. Structures are generally in good condition apart from some older homes directly on the foreshore, which are set for demolition or are in the process of being demolished.

There are currently 16 vacant serviced lots within the village.

The village also contains visitor accommodation, which is self-sufficient and each room having private bathroom facilities. Visitors who wish to use the accommodation must book through the Council office.

Map 11 Dwelling Types

For more detail, refer to Plan No.9409-114 contained in Volume 3 - Maps

Family Composition

The 2006 Census indicates the following characteristics of family composition on Boigu:

- no couples with no children;
- 28 families with children under 15 years;
- 28 families with children over 15 years;
- 26, one parent families with children under 15 years; and
- seven, one parent families with children over 15 years.

Household Composition

The 2006 Census indicates the following characteristics about Boigu households:

- 56 households of which 4 consist of two people, 11 consist of three people and 14 consist of six or more people;
- four lone person households; and
- an average household size of 4.6 persons per dwelling.

Housing Rental and Ownership

The 2006 Census indicates the following characteristics on Boigu housing rental and ownership:

- 50 households paying rent to a housing co-operative, community or church group;
- 4 households paying rent a non-stated landlord;
- no household paying a housing loan repayment;
- no privately owned dwellings (either fully owned or being purchased); and
- an average rent is $30 per week.

In summary, housing on Boigu is public housing with the current number of dwellings meeting the demands of Community.

From the 2006 Census data, Boigu has an average household size of 4.6 persons per dwelling. However, due to seasonal population fluctuations an average of 5.0 persons per dwelling is used to assist in the calculation of the number of lots and dwellings required.

5.2.3 Issues Overview

While there is minimal population, growth forecast for Boigu, there will be demand for new dwellings as the population increases over the next 10-20 years. Given the low-lying topography of the island and that much of the island is subject to periodic inundation, there is limited scope for expanding the village. The only area suitable for future development is to utilise the land contained within the existing bund wall to the east of the water storage lagoon.

Should this area be developed, sufficient housing will be available to meet demand on the island because of population growth? However, this investigation area will require significant investment associated including the cost associated with filling this area above HAT.

Refer to Section 5.3 Sustainable Community Expansion for more information.

As such, part of meeting the short-term population pressures and preserving the land and sea relationship is to provide diverse, sustainable, affordable housing options. Providing a range of housing choice assists in creating diverse communities as well as minimising impact on the environment.

In providing housing stock and choice to cater for the population growth, the impact on the capacity of the existing infrastructure must be taken into account.

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

When assessing the impacts of future development on Boigu, the following key questions are to be asked. If the answer is "NO" to any of the questions, the proposal must justify the inconsistency, or be amended or 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 one of the two investigation areas, is all necessary infrastructure in place and operational for the development to proceed?

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 Boigu 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

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

Websites

Australian Bureau of Statistics (Census data)

www.nrw.qld.gov.au

5.3 Sustainable Community Expansion

5.3.1 Current and Predicted Growth Overview

The population is expected to grow between a low rate of an additional 3 persons/year, being an additional 31 people between 2007-2017 and a high rate of 6 persons/year, being an additional 65 people between 2007-2017.

In summary, in 2017, the population of Boigu is predicted to be between 320-355 people.

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

Table 4 Estimated Population Growth and Housing Demand

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	addit. persons	addit. houses at 5pph
Low Growth (1.0%)	280	293	296	299	302	305	308	311	314	317	320	324	31 persons over ten years	6 houses over ten years
High Growth (2.0%)	290	296	302	308	314	320	327	333	340	347	354	361	65 persons over ten years	13 houses over ten years

Source: ABS 2006

This Plan considers two growth scenarios based on a low growth rate of 1.0% and a high growth of 2.0 % 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 2.0% which will generate
  - an extra 65 persons over ten years;
  - an additional 13 houses over ten years; and
  - additional housing need of 1.3 houses per year at an average of 5 person per household.

5.3.2 Issues Overview

Boigu is Australia's northernmost point and three kilometres from the New Guinea mainland and as such plays a significant role in relation to Australian's border security.

Activities such as illegal immigration, illegal fishing and smuggling are a risk in the Torres Strait due to the proximity of Papua New Guinea and Indonesia. Furthermore, the Torres Strait serves as an early detection zone for the transmission of exotic pests and diseases into mainland Australia. Pathogens, diseases and weeds do not respect borders and with the seasonal winds coupled with the movement of people and animals, there is a high potential for unwanted pests, weeds and diseases. As part of the Torres Strait, Boigu also plays an important role in Australia's defence as it controls the main east-west shipping channel.

Despite Boigu's strategic defence importance, the question as to whether or not Community should be relocated and the island left to the sea or the Papa New Guineans is still discussed, usually by those not living on Boigu. This question arises due to the regular inundation of the village by the sea as much of Boigu is only just above the extreme tide events.

The impacts of climate change and predicted sea-level rise will have a dramatic effect on Boigu over the next 100 years and as the extent of sea-level rise due to climate change become more quantifiable in the next few years, it may be that some of the houses on Boigu become more seriously affected by extreme tide events.

However, Boigu's Community are unlikely to abandon their island home in the near future so a strategy of protection and gradual improvement of the land and living conditions needs be adopted. Such strategies include:

- Enabling Community to restore the local and regional significant flora and fauna of Boigu.
- In the short to medium term, work needs to be undertaken to the existing sea wall to ensure that it is structurally sound and repair any damage. The seawall should be raised in stages as follows:
  - to cover for the existing storm surge;
  - to cover existing HAT levels in 2008; and
  - to the predicted HAT levels in 2100.
- House designs for new or modifications to existing houses should incorporate mitigation measures that are addressed in Section 3.3.3 Land Use Strategies and Sustainable Housing considerations outlined in Section 5.2.6 Housing Land Use Strategies.
- Reviewing sea levels in 10 years to take into account the most current predictions.
- Managing Boigu's development growth.

While there is minimal population growth forecast for Boigu, there will be demand for new dwellings as the population increases over the next 10 years, with a need of approximately 6-13 dwellings.

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

- using existing vacant lots in the village (village infill development);
- increasing residential density in the village;
- village relocation; and
- expanding the residential area.

These options are new discussed.

Village Infill Development

There are currently 13 vacant serviced lots within the village. As such, there are sufficient infill development opportunities within the village to accommodate any short to medium term housing demand. However, many of these vacant lots form part of the visual open space and as such are used by younger members of Community.

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 Boigu; and
- more sustainable housing patterns.

Village Relocation

When the ocean breeches the sea wall during king tides and storm surges, the majority of the village is inundated. As such, it is not recommended to relocate any houses on the shoreline to other locations within the village or to the village expansion area.

Expansion of the Village Area

Given the low-lying topography of the island and that much of the island is subject to periodic inundation, there is limited scope for expanding the village. The only area suitable for future development is to utilise the land contained within the existing bund wall to the east of the water storage lagoon.

Should this area be developed, sufficient housing will be available to meet future housing demand on the island because of population growth. However, this investigation area will require significant investment including the cost associated with filling this area above HAT.

Map 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”

With the limited potential for expansion and the near capacity and location of the cemetery, Community must decide how they are going to address these issues. What strategies are they going to adopt? For example:

- do they have a maximum number of people living on Boigu (population cap) by voluntarily limiting return of people to Boigu?
- restrict development without specifically limiting the number of residents and visitors, that is do not build any new houses.

Table 5 shows the advantages and disadvantages of a population cap.

Table 5 Advantages and Disadvantages of a Population Cap

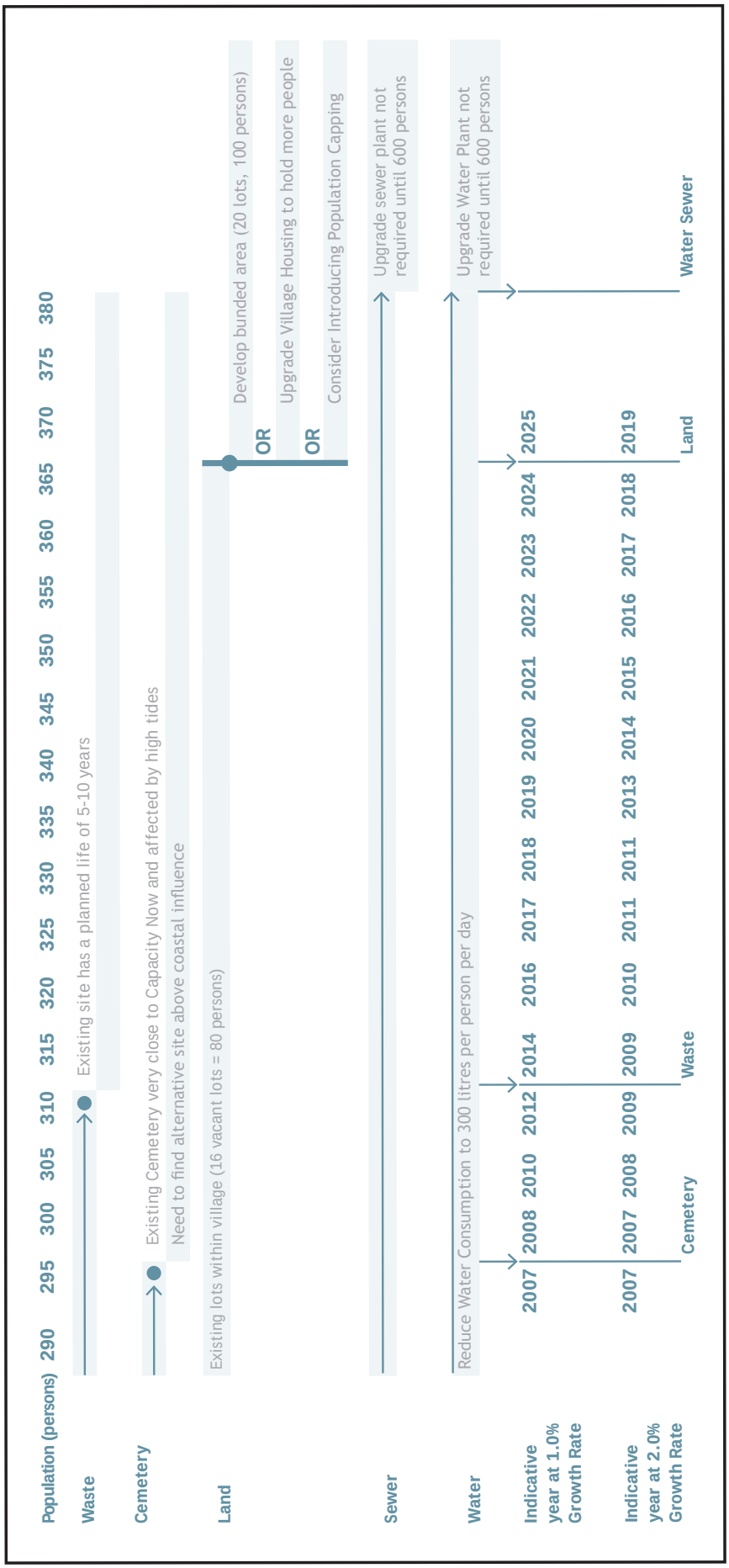
Advantages	Disadvantages
Protection of the natural environment, Boigu character and Community cultural heritage	Does not protect the environment from new development
Certainty about infrastructure planning, particularly water supply, sewerage and roads	Further development becomes progressively more exclusive
Development is sustainable	Population of Boigu may drift towards extreme levels.
Ongoing community engagement and support	Village character may loose some of its vibrancy due to the lack of population mix.
	Continuation of the population cap depends on Community will
	How development may impact on cultural heritage

5.3.3 Land Use Strategies

The population trends, 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. Land bounded by the bund wall and water storage lagoon has been identified subject to further investigations to address impacts on the environment and infrastructure.
- 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.

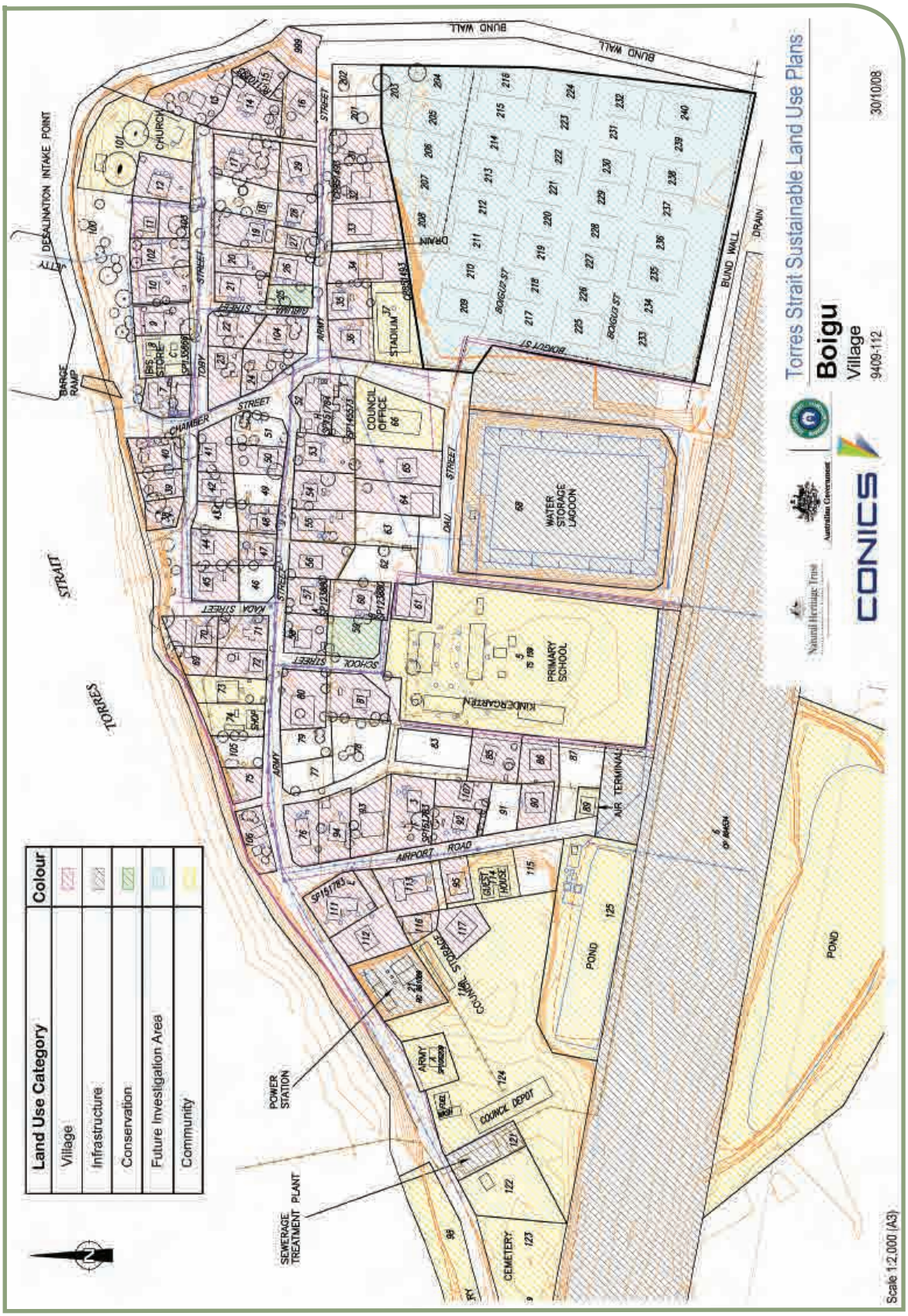
Figure 10 Timeline Limits on Population Growth



Map 12 Land Use (Village)

For more detail, refer to Map No. 9409-101 contained in Volume 3 – Maps.

Map 13 Village



For more detail, refer to Map No. 9409-500 contained in Volume 3 - Maps

5.3.4 Land Use Considerations

When assessing the impacts of future development on Boigu, the following key questions are to be asked. If the answer is "NO" to any of the questions, the proposal must justify the inconsistency, or be amended or 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 Boigu?
- Is the development consistent with the strategies developed to address development growth?

5.3.5 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:

- 1215 people living on Boigu are employed;
- an average household weekly income of $724.00;
- an average individual weekly income of $235.00;
- 57.0% of those working were between the ages of 15 to 34 years;
- 55.4% of those working were between the ages of 25 to 54 years;
- 16.6% of Community on Boigu 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;
- 22.2% of those undertaking volunteer work were between the ages of 15 and 24 years; and
- 18.5% of those undertaking volunteer work were between the ages of 25 and 54 years.

Table 6 shows the types of employment sectors people work in.

Table 6 Employment Sectors

Employment Industry	Construction	Public Administration & Safety	Education & Training	Health Care & Social Assistance	Wholesale Trade	Retail Trade	Other	Not Stated
People	3	83	14	7	0	0	0	18

Source: ABS 2006

Educational Attainment

From the 2006 Census, 91 people were studying or undertaking some form of further education program or training. This is 32.2% of the total population. Of those undertaking education:

- 6.5% were attending pre school;
- 9.8% were attending primary school;
- 6.5% were attending secondary school;
- 7.6% were attending a technical or further educational institutional;
- none were attending university; and
- none were undertaking another form of educational program or training.

Note: 69.6% of respondents did not provide a response to which type of study or training they were undertaking.

The 2006 Census also shows that those that left school were over the age of 15, 43.8% left after completing Year 12 with another 31.9 % leaving after completing Year 10. This means that 75.6% completed schooling after the age of 15 years.

Table 7 shows the community facilities that are available on Boigu.

Table 8 shows the retail and public office facilities and services that are available on Boigu.

Table 9 shows the recreational facilities that are available on Boigu.

Table 7 Community Facilities

Facility	Provided (✓ = Yes; ✗ No)	Location
Pre school	✓	Part of the Primary School
Primary School	✓	Located on School Road, east of the water storage lagoon
Health Care Centre	✓	Located in the centre of the village, on the corner of Chamber and Army Streets
High school	✗	Students board on Thursday Island

Table 8 Retail and Public Office Facilities and Services

Facility	Provided (✓ = Yes; ✗ = No)	Location
Administration Offices/Workshop	✓	Located at the east of the village
Community Hall (including indoor sports courts)	✓	Located opposite the Council offices on Camber Street
Guest House	✓	Located north of the airstrip on Airport Road
Contractor Accommodation	✗	
Church	✓	Located on the eastern shoreline of the village on Toby Street
SES depot	✗	
Supermarket (IBIS store and or convenience store)	✓	IBIS is located near the barge ramp on Toby Street Tipan is located on the foreshore in the west of the village on Army Street
Banking facilities	✓	Located in the IBIS store
Custom Depot	✓	Located next to the Tipan store on Army Street
Police Station	✗	

Table 9 Recreational Facilities

Facility	Provided (✓ = Yes; ✗ = No)	Location
Picnic Grounds	✗	Seating facilities are provided in front of the store
Sports Oval	✓	Located in the Primary School grounds
Sports Courts	✓	Located inside the Community Hall on Chamber Street

5.4.3 Issues Overview

On Boigu, 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.

In general, the residents of Boigu have access to a range of convenience goods and services that meet their daily needs as well as recreational opportunities, through the provision of both indoor and outdoor recreational facilities.

Due to the development constraints on the village, there is insufficient land to justify the relocation of community uses into a centralised location. Further, the limited size of the village encourages residents to walk to those services that they require.

5.4.4 Land Use Considerations

When assessing the impacts of future development on Boigu, the following key questions are to be asked. If the answer is "NO" to any of the questions, the proposal must justify the inconsistency, or be amended or 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 Boigu residents.
- 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.nrw.qld.gov.au

Infrastructure

Providing and managing infrastructure is a key issue facing the Torres Strait and Boigu 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 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 Community by:
  - recognising the importance of climate change on Boigu'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 Community to deal with the impacts of climate change on the island's water infrastructure.

6.1.2 Overview of Current Situation

The existing water infrastructure has the following features:

Source:	Water on Boigu is sourced from: • Captured rainwater from the cover of a lined lagoon and from the surrounding lined catchment area • A supplementary reverse osmosis desalination plant • Supplementary household rainwater tanks.
Treatment:	Water is treated within the treatment plant building via: • filtration by duel media pressure sand/anthracite filters • disinfection through sodium hypochlorite dosing.
Storage:	Treated water is stored in an elevated 90kL fibreglass tank located in the middle of the town.
Delivery:	Potable water is delivered to Community from the reservoir via 80mm underground mains. All facilities are connection to the mains via branch lines. The majority of household water tanks can be topped-up by the reticulation system. Small individual pressure pumps deliver the water from rainwater tanks to a single internal tap isolated from the mains as an emergency. Figure 11 illustrates the water scheme on Boigu.
Capacity:	The main source of water comes from the rainwater collected from the covered area of the lagoon and the surrounding lined catchment area. The catchment area of the lagoon is approximately 9,100m^2. Based on an average rainfall of 1,125mm per year, the average yield of the lagoon covers is around 10ML per year. The reverse osmosis desalination plant has a capacity to treat 180kL of seawater per day. This equates to a maximum yearly production of approximately 65ML. The covered lagoon storage volume is approximately 25ML. For the current population estimate of 291 persons and the adopted average daily consumption rate of 300L per person per day, there is approximately 286 days storage capacity, which is considered sufficient to meet water demand during the annual dry season and for periods of desalination plant break down or maintenance.
Usage:	The average water usage from the most recent data provided from the TSIRC Water and Sewerage Infrastructure Unit is around 277L per person per day. The desalination plant currently averages a water production of 120kL per day.

As with remote island communities, Boigu'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).

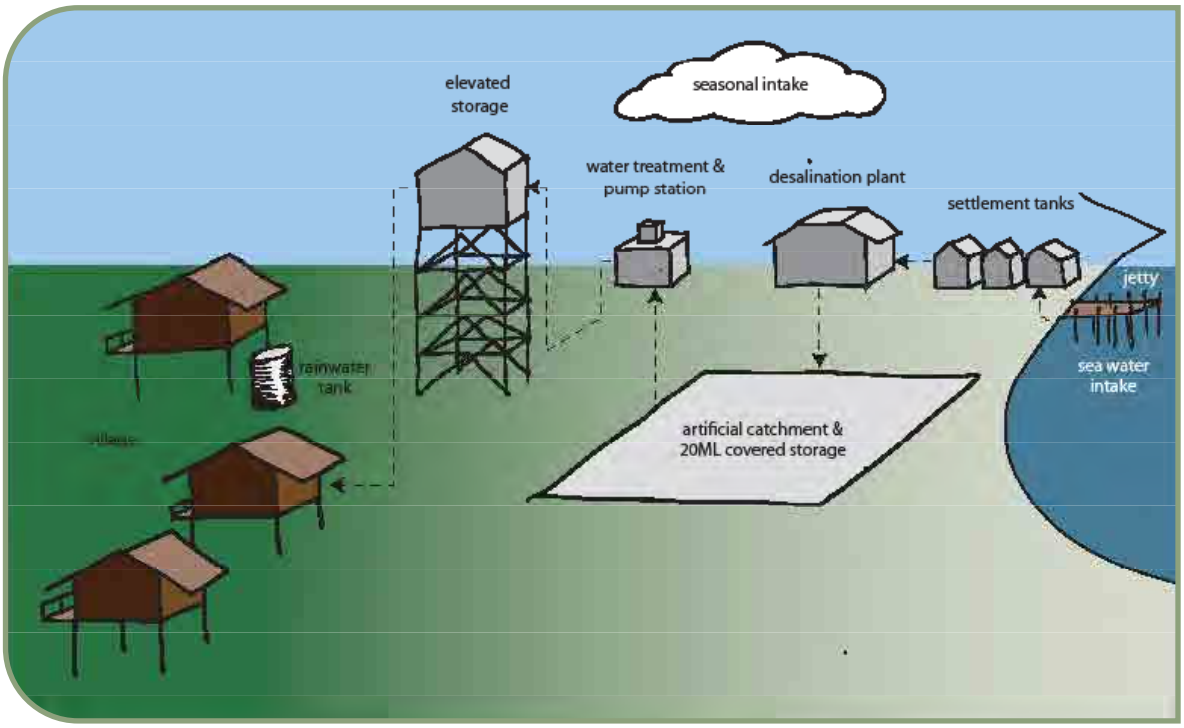
Map 14 shows the areas serviced by the existing water infrastructure.

Figure 11 shows the water scheme process.

Map 14 Water Infrastructure

For more detail, refer to Map No. 9409-111 contained in Volume 3 – 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:

The exiting water infrastructure has sufficient capacity to serve the current population and the predicated population in the next ten years at current consumption levels based on an average yearly rainfall.

Current average yield including desalination water	75ML per year
Achievable target consumption	300L per person per day
Population that existing water infrastructure can sustain	685 persons

It should be noted, that this is based on an average yearly rainfall. Should the average rainfall be less than this, then the population that the water infrastructure sustains is reduced. However, in the absence of rainfall, the desalination plant on its own can sustain a population of 600 persons at maximum production.

There is currently an issue with the raw sewerage storage tanks involving the settlement of the tanks causing pipeline breakages. This needs to be rectified to ensure continuity of supply.

Another noted deficiency in the water infrastructure involves the low head pressure from the header tank. For any future development, sufficient head pressure must be considered, particularly if the development is located at an extended distance from the header tank. Variable Speed Drive (VSD) pumps maybe needed to address the pressure issue.

One issue that may become a problem in the future is the level of the bund wall surrounding the lagoon. The current height of the bund wall is approximately 300mm below the 2008 HAT and although seawater has not breached the bund wall to date, there is a strong possibility that this may occur in the near future as sea levels rise. Consideration should be given to providing some form of height extension to present inundation occurring.

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 Boigu 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; and
- Consideration should be given to raising the level of the top of the lagoon bund wall in anticipation of seawater inundation by current HAT. A minimum rise of 300mm would equate to current HAT levels.

6.1.5 Land Use Considerations

When assessing the impacts of future development on Boigu, the following key questions are to be asked. If the answer is "NO" to any of the questions, the proposal must justify the inconsistency, or be amended or 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
  - 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 Land Use Project

To protect the islands water supply from tidal inundation and subsequent seawater contamination, the height of the bund wall will need to be increased so that it is not breached by increasing king tides and storm surges.

Further, breakages in the pipelines will need to be repaired.

6.1.7 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 Boigu'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 Community to deal with the impacts of climate change on Boigu's sewer infrastructure.

6.2.2 Overview of Current Situation

The existing sewerage infrastructure 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 a single pump station located in the centre of the village and transferred via a rising main to the sewerage treatment plant. A lift station is included to serve the southeast corner of the village.
Treatment:	Sewage is treated at the packaged sewerage treatment plant located at the western end of the village. The treatment plant includes a biofilter as the main treatment component and has been designed to treat effluent to a secondary level.
Discharge:	Treated effluent is pumped from the sewerage treatment plant to an ocean outfall at the north of the island.

The existing treatment plant has been designed for a capacity of 600 persons. The plant currently handles the existing effluent load comfortably and does not require any upgrade work at this stage.

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. 9409-111 contained in Volume 3 – Maps.

6.2.3 Issues Overview

The existing treatment plant has the capacity to treat effluent for a population of 600 persons. There have been major issues regarding the design of the plant and the ability of the plant to comply with the design requirement. However, it is understood that all issues have now been resolved and that the plant has been formally commissioned and accepted. It is anticipated that the plant will have spare capacity to handle general increases over the next few years.

The sewerage design population of 600 persons is not predicted to be reached prior to 2017.

There is concern over the level of the sewer manhole covers. Many of the covers are below 4.9 metres HAT. The top of the sea wall is 4.4 metres. Consequently, there is a high risk of salt-water inundation of the sewers. For future development, consideration should be given to ensuring that future manhole covers and overflow relief gullies at the houses are above the HAT level.

If future development is planned within the bunded area at the eastern end of the northern side of the airstrip, a sewerage lift station will be required to elevate the sewerage into the existing reticulation system. This land has been nominated for future development, however, the land is low-lying and considerable fill will be required before development can commence.

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 community areas during the dry season, however this would involve the provision of significant infrastructure and the need for strict environmental health management systems to be implemented.

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 Boigu sewer infrastructure, the following strategies are recommended:

- Not encouraging development to occur in close proximity to a sewerage treatment plant.
- 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

When assessing the impacts of future development on Boigu, the following key questions are to be asked. If the answer is "NO" to any of the questions, the proposal must justify the inconsistency, or be amended or 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?
- Are sewer manholes covered above 4.9 metres HAT?
- Where development is located within the Investigation Area, has a sewage lift station been provided?

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 sports field or similar areas during the dry season be undertaken.
- Sewer manholes should be sealed or raised greater than HAT levels.

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 they are 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

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

www.standards.org.au

6.3 Waste

6.3.1 Best Practice

- The siting and maintenance of waste disposal facilities (dump) must not have a detrimental impact on the natural environment.
- Removal of waste from Boigu 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 Boigu'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 Boigu's waste generation and disposal facilities; and
  - building understanding and capacity of Community to deal with the impacts of climate change on Boigu's waste generation and disposal facilities.

6.3.2 Overview of Current Situation

Boigu currently has a waste depot (dump) located the western end of the village, just past the cemetery.

The waste depot is bounded by the airstrip on the eastern side, mangroves on the northern seaward side, mangrove forest on the western side and sedgeland/salt pan on the southern side. Access to the existing dump is by road past the sewerage treatment plant, the cemetery and the western end of the airstrip. Waste is currently collected by mini-pactor rubbish truck and deposited in the open waste depot area.

The waste depot is located under the flight path of the airstrip. As all of Boigu goes underwater several times a year due to high tides, the waste depot has been located in the only possible location that enables access during the wet season.

Ideally, the waste depot should be located further away from the village of Boigu. The closest residence is approximately 490 metres from the existing dump. However, as there are no trafficable roads during the wet season or in high tide inundation, it is not possible to locate the waste depot further away from the village.

A current major infrastructure project is looking at improving access to the dump and constructing a bund wall around the waste depot to prevent the effects of tidal inundation.

As the water table on Boigu is extremely high and the site is inundated by high tides, the trench and cover method of waste disposal is not practical due to the trenches filling up with water.

The waste depot should be operated on an "area-fill" method, where waste is spread out in sections or cells and progressively covered. This should create a rising platform of waste that will eventually be above the high tide level.

6.3.3 Issues Overview

Management:	The dump needs to be better managed to sort and segrate non-putrescible materials (such as cars, timber, building demolition waste etc). This would allow the landfill cells to contain only household rubbish.
Vehicles:	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. 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. 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.
Future Expansion:	The existing dump has a planned life of 5-10 years, depending on the amount of management and separation of materials that is undertaken. There is land available for expansion of the waste depot on Boigu immediately south of the existing waste depot. However, the continuation of an existing waste dump that is essentially under high-tide level is not an ideal situation.

Alternative options such as the introduction of a waste transfer station and removal of waste from Boigu to another site (such as Cairns, Horn Island, or a yet to be determined regional waste depot for the Torres Strait), is desperately needed for Boigu.

6.3.4 Land Use Strategies

To minimise the impacts of waste infrastructure on Boigu'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 Boigu.
- The waste depot should be operated on an "area-fill" method, where waste is spread out in sections or cells and progressively covered.

6.3.5 Land Use Considerations

When assessing the impacts of future development on Boigu, the following key questions are to be asked. If the answer is "NO" to any of the questions, the proposal must justify the inconsistency, or be amended or 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 Boigu 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.
- A study to determine a solution for the handling, sorting and disposal of waste.
- Consider the cost and feasibility of a 'vehicle disposal levy' to cover the cost of removing abandoned vehicles from Boigu.

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 Boigu's electricity infrastructure by:
  - recognising the importance of climate change on Boigu'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 Community to deal with the impacts of climate change on Boigu's electricity infrastructure.

6.4.2 Overview of Current Situation

Electricity is supplied to Boigu from a central power station located at the western end of the village adjacent to the beach. 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.

Map 16 shows the areas serviced by the existing electricity infrastructure.

Map 16 Electricity Infrastructure

For more detail, refer to Map No. 9409-111 contained in Volume 3 – Maps.

6.4.3 Issues Overview

Although the cost of electricity to consumers at Boigu is the same as for anywhere in Queensland, there is a pressing need for 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.

There is limited opportunity for viable alternative sources of energy on Boigu. It may be feasible to use gas to fire the gensets, as gas is a lower emitter of greenhouse emissions. 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.

Any significant increase in generation capacity may require consideration of enlarging the power station site or relocating the site.
If a new site is required, an analysis of potential noise levels should be undertaken to avoid background diesel generator noise pollution in residential areas.

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

When assessing the impacts of future development on Boigu, the following key questions are to be asked. If the answer is "NO" to any of the questions, the proposal must justify the inconsistency, or be amended or 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 being 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 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 Community to deal with the impacts of climate change on the Islands natural environments.

6.5.2 Overview of Current Situation

There is no mobile phone coverage at Boigu. A small Telstra tower is located near the Council. signals to the underground landline system.

Map 17 shows the location of telecommunication infrastructure land lines.

Map 17 Telstra Infrastructure

For more detail, refer to Map No. 9409-111 contained in Volume 3 – Maps.

6.5.3 Issues Overview

The lack of mobile phone coverage in Boigu needs to be addressed. The current situation is dangerous in times of crisis or extreme weather conditions.

6.5.4 Land Use Strategies

The following strategy is recommended:

- The Telstra Tower, when constructed be located to ensure protection 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

When assessing the impacts of future development on Boigu, the following key questions are to be asked. If the answer is "NO" to any of the questions, the proposal must justify the inconsistency, or be amended or 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 Boigu's road infrastructure by:
  - recognising the importance of climate change on the existing and future road infrastructure on Boigu;
  - avoiding quick decisions now that will make it more difficult to manage climate change risks in the future; and
  - building understanding and capacity of Community to deal with the impacts of climate change on Boigu's road infrastructure.

6.6.2 Overview of Current Situation

The majority of sealed roads on Boigu are concrete roads constructed of 100mm thick fibre reinforced concrete on a stabilised sub grade. A large proportion of the roads have suffered extensive cracking. In addition to the required repairs, the roads need to be reformed with central crown and spoon drains added to the sides to facilitate drainage and reduce ponding.

6.6.3 Issues Overview

The existing unsealed roads to the west of the village have been identified as requiring sealing in the future. This includes the area around the seafood processing facility. In addition, sealed roads will be required in the proposed residential areas to the south-east of the village.

The 2006 Census indicates the following statistics:

- 52 privately owned vehicles;
- 38 households did not have a vehicle;
- 14 households had one vehicle; and
- no households had two vehicles.

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

6.6.4 Land Use Strategies

To minimise existing and future development on the natural environment of Boigu 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 of Section 3.1 Plants, Animals and Birds.
- 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 network of functional, legible and convenient street signs is established.
- 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.
- Encourage alternative forms of transportation around the community such as bicycle, scooter or golf buggies 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

When assessing the impacts of future development on Boigu, the following key questions are to be asked. If the answer is "NO" to any of the questions, the proposal must justify the inconsistency, or be amended or not be accepted.

- Is the development in accordance with the Roads Best Practice, Land Use Strategies and Sustainable Outcomes?
- Does the development integrate the land use, efficient movement of people and goods and growth for Boigu?
- If the development is in a natural hazard area, 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; and
  - does it propose road signage in keeping with Boigu'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 Community.
- Development encourages lower impact modes of travel such as walking and cycling.
- All vehicles bought onto Boigu are to be removed from the island after construction is completed.
- All road infrastructure is inspected regularly and maintained to ensure that is it 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 Boigu.
- Reduce the impacts of climate change Boigu's drainage system and infrastructure by:
  - recognising the importance of climate change on Boigu'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 Community to deal with the impacts of climate change on Boigu's drainage system and infrastructure.

6.7.2 Overview of Current Situation

Residents on Boigu are generally situated less than one (1) metre above the level of the surrounding swampy areas. Due to this low-lying nature, drainage is poor and many areas of the community are adversely affected by both stormwater and extreme tides. Where drainage is poor, ponding often occurs for extended periods, including under some high set homes.

A new bund wall includes drains and culverts has been constructed around the proposed new development area.

6.7.3 Issues Overview

Formal surface drains and extensions to the bund wall have been constructed at Boigu to help alleviate drainage problems, however the lack of suitable fill material and the low-lying nature of the village means that poor drainage will continue to present itself as a major development constraint.

6.7.4 Land Use Strategies

The following strategies are recommended:

- That development is not permitted in overland flow paths or drainage paths.
- Any new development must address drainage of the site and its cumulative impact downstream and on adjoining sites.

6.7.5 Land Use Considerations

When assessing the impacts of future development on Boigu, the following key questions are to be asked. If the answer is "NO" to any of the questions, the proposal must be amended or 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, downstream catchment and adjoining properties?

6.7.6 Land Use Projects

To minimise flooding of properties caused by stormwater flows (as opposed to tidal inundation) it is recommended that a drainage study be undertaken.

6.7.7 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 Boigu by:
  - recognising the importance of climate change and fuel costs on air access to and from Boigu;
  - avoiding quick decisions now that will make it more difficult to manage climate change risks in the future; and
  - building understanding and capacity of 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 Boigu comprise of a 780 metres (730 metres useable) long by 60m wide sealed all-weather airstrip located immediately south of the village, access via Airport Road. The airstrip is on an east-west alignment. Other facilities include a hardstand apron, shelter and helipad.

Air services exist between Boigu and Saibai, Badu, Ngurupai (Horn) Islands, with regulated passenger transport provided between Boigu and Ngurupai (Horn) Island. These flights occur three times a day, morning, midday 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. Addition facilities, including an all weather shelter for passengers and storage facility.

The airstrips and the land around it, is a sensitive and valuable resource. 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.

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.

6.8.5 Land Use Considerations

When assessing the impacts of future development on Boigu, the following key questions are to be asked. If the answer is "NO" to any of the questions, the proposal must justify the inconsistency, or be amended or 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?

6.8.6 Sustainable Air Infrastructure Outcomes

- Recognise the importance of the airstrip to 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 Boigu by:
  - recognising the importance of climate change and fuel costs on sea access to and from Boigu;
  - avoiding quick decisions now that will make it more difficult to manage climate change risks in the future; and
  - building understanding and capacity of 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 Boigu consist of a precast concrete barge ramp and a narrow timber-decked, steep piles finger pier. The barge ramp is located at the end of Chamber Street, with the jetty located approximately 70 metres to the east. Other facilities include a causeway, storage compound, storage shed and hardstand.

The barge ramp is accessed via a dredged entry channel marked by navigational buoys

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

Boigu is serviced weekly by a barge service from Port Kennedy.

6.9.3 Issues Overview

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

The entry channel to the barge ramp needs to be dredged to remove the silt build up. The sea wall has gradual deteriorated over the past few years and required reconstruction. Similarly, the finger pier requires repairs as it has received limited maintenance since construction.

Council has expressed its concern about safety during night time operations and it is their desire to install lighting to the finger pier and barge ramp ad have the channel markers fitted with beacon lights.

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.

6.9.5 Land Use Considerations

When assessing the impacts of future development on Boigu, the following key questions are to be asked. If the answer is "NO" to any of the questions, the proposal must justify the inconsistency, or be amended or 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 jetty is it a compatible land use for port activities and the adjacent village?

6.9.6 Sustainable Sea Access Outcomes

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

CONICS

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

www.conics.com.au

Australian Government

TORRES STRAIT REGIONAL AUTHORITY

Natural Heritage Trust

Helping Communities Helping Australia

An Australian Government Initiative