kubin

Sustainable Land Use Plan

PART 2

kubin

Buziauwar and Takamulai were the two wives of Zangagudan. One day Buziauwar and Takamulai went fishing, out on the reef and Buziauwar saw two turtles and she said to Takamulai "I found two turtles, one woman and one man".

And she sent Takamulai up to Zangagudan to tell him that they had found two turtles. So Buziauwar told Zangagudan that they wanted to catch the woman turtle. So Zangagudan went to look for help so he went to Karakarkula at a place called Tutu.

And Karakarkula went to Arkai to the reef to catch the woman turtle. Karakarkula caught the turtle because he was tall and skinny and had long arms. Then they went up to Zangagudan's place to cut the turtle. Zangagudan cut the turtle while Karakarkula was fast asleep.

When Zangagudan finished he took the good parts of the turtle and left the bad parts behind for Karakarkula. When Karakarkula woke up he saw there were no good parts on the turtle so he got very angry.

Then he went to Arkai to look for Zangagudan and his two wives, but when Buziauwar heard the big foot noise she was frightened so Zangagudan told Takamulai to swim out to the reef and she turned into a rock.

Then he told Buzaiuwar to hide in the bushes and she turned into a rock.

Then Zangagudan buried himself under the sand beach and he turned into a water spring. After the Karakarkula returned to his place and turned into a very big rick and this rock we can see today from Kubin Village, it is on the edge of the mangroves.

Source: An Explorer's Guide to Kubin, Moa Island in the Torres Strait, 1997

Land Use **Plan Structure**

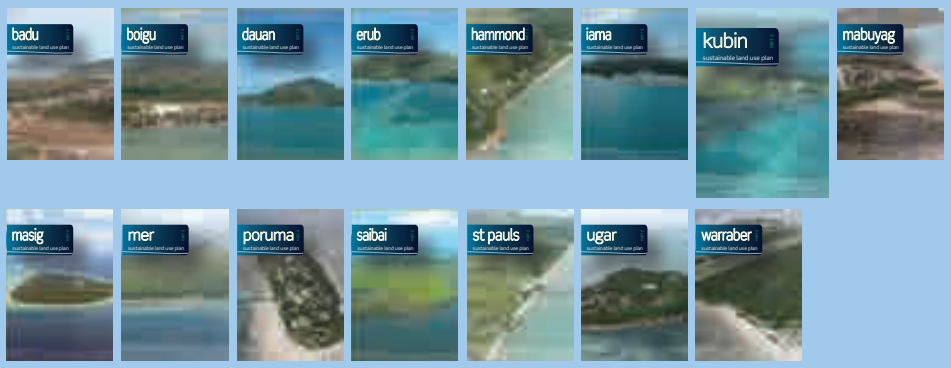
PART 1

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**

Inpast 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 Kubin 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.

Kubin 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.

Kubin community is located on the south-western side of Moa Island, which is 40kms north of Thursday Island, within the western group of islands in the Torres Strait. Kubin's closest neighbour is the St Pauls community, which is located on the eastern side of Moa and is approximately 15km from the outskirts of Kubin.

Moa is a rugged, open forested island approximately 17km in diameter at its widest point. The island rises to a maximum elevation of 370 metres above sea level.

The dominant soil within the village consists of gravely clay, with rocky outcrops at high points. Flatter areas of the village tend to be sandy clay. Tea trees cover the sandy colluvial slopes between the coast and the hills at Kubin. A natural drainage path bisects the village such that the area is generally well drained.

The village is predominately located on a small hilly headland near the south-west corner of the island. Most of the housing is located on a sloping plateau within this headland that varies from 10 to 18 metres above mean sea level.

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

- Extensive areas of pristine and diverse vine forest are present on the granite boulder slopes and gullies of hills and peaks of the island; and
- Large estuary systems on the northern and western coastlines.

Identified **land issues** are:

- development along the western coastline;
- development in areas identified as high prone erosion areas;
- potential acid sulfate soils;
- bushfire hazard;
- the changing system of land tenure;
- use of the beaches as road access;
- limited available land for future expansion
- existing residential area; and
- increasing tide and storm surge levels.

Identified **infrastructure issues** are:

- the dump needs to be better managed in sorting and segregating non-putrescible materials. This will increase its life to between 5 and 10 years;
- if water consumption is reduced to 300 litres per person per day, current water infrastructure still will need to rely on the temporary desalination plant;
- the current sewerage design of 480 persons is predicted to be reached after 2019;
- limited opportunity for viable alternative sources of energy; and
- the existing generators site is near capacity and any upgrades may require relocation of the generators.

Identified **population issues** are:

- Current population is 237 persons;
- In the decade from 1996-2006, population growth has increased at an average annual rate of 2.2%
- 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 3.4 persons.

Identified **housing issues** are:

- existing 27 vacant lots cater for a population growth to over 370 people;
- the existing lots are sufficient to cater for the predicted population increase to past 2019;
- need to use existing vacant lots for either dual occupancies (duplex) or townhouses or units to maximise land availability;
- need to supply diverse, affordable and sustainable housing to meet population changes and move towards a sustainable environment;
- village needs to have areas designated for denser development outside the areas impacted by natural hazards;
- One area suitable for future development between the village and the airstrip.

Identified **growth issues** are:

- a low growth rate of 1% which will generate:
  - an extra 24 persons over ten years;
  - an additional housing of 0.5 houses per year; and
  - an additional 5 houses over ten years;
- a high growth rate of 3% which will generate:
  - an extra 80 persons over ten years;
  - additional housing of 1.6 houses per year; and
  - an additional 16 houses over ten years;
- by adopting either, the low or high growth rates, growth pressure on Kubin will be generated;
- options available to manage growth on Kubin are:
  - utilise existing serviced lots prior to encouraging development in the investigation area;
  - to increase residential density; and
  - expansion of the residential areas.

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

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

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Island **Overview**

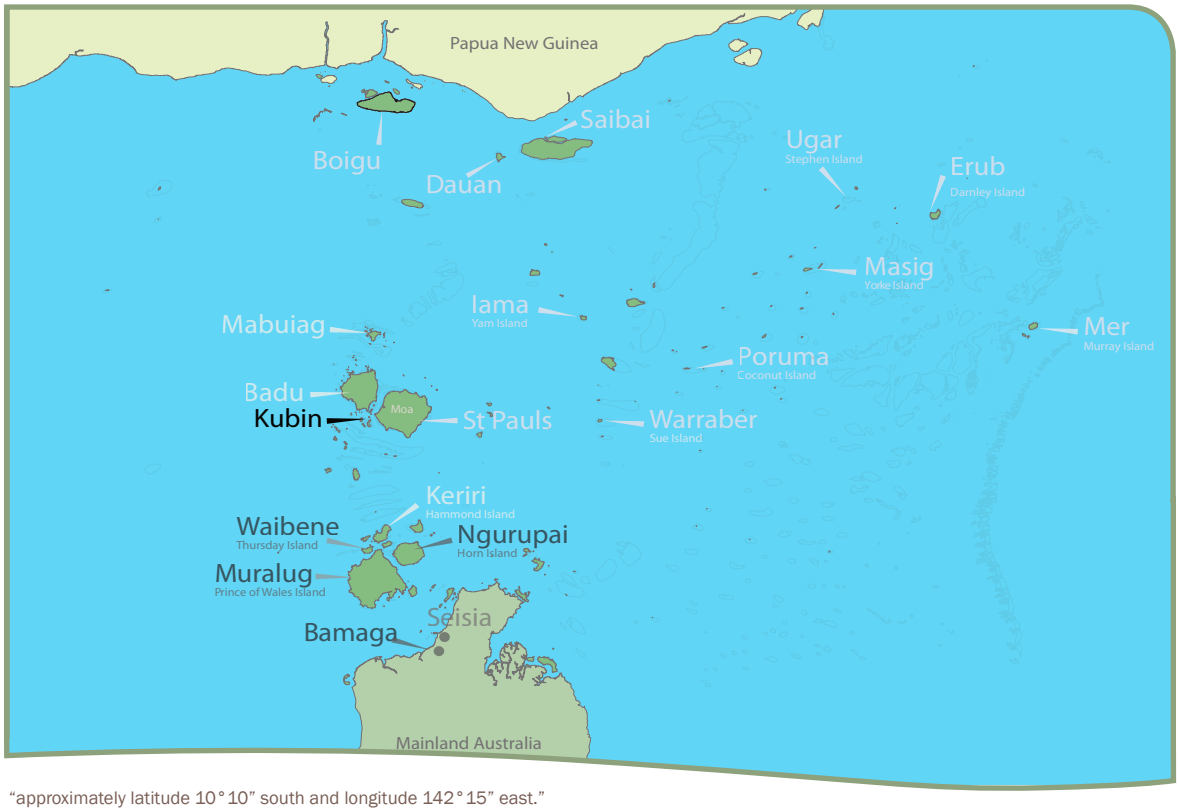
1.1 Location

Kubin community is located on the south-western side of Moa Island, which is 40kms north of Thursday Island within the western group of islands in the Torres Strait.

Kubin's closest neighbour is the St Pauls community, which is located on the eastern side of Moa and is approximately 15km from the outskirts of Kubin.

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

Map 1 Regional Location



"approximately latitude 10°10" south and longitude 142°15" east."

Map 2 Satellite Image of Kubin

For more detail, refer to Map No 9964-800 contained in Volume 2 – Maps.

1.2 Physical Characteristics

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

1.2.1 Topography

Moa is a rugged, open forested island approximately 17 km in diameter at its widest point. The island rises to a maximum elevation of 370 metres above sea level.

Map 2 shows a satellite image of Kubin.

1.2.2 Geology

The dominant soil within the village consists of gravely clay, with rocky outcrops at high points. Flatter areas of the village tend to be sandy clay.

1.2.3 Vegetation

The vegetative landscape of Moa is characterised by vine forests, mangroves, and open forests and woodlands. A regime of prescribed burns undertaken around St Pauls has also established vast areas of grassland on the slopes surrounding the township.

Tea trees cover the sandy colluvial slopes between the coast and the hills at Kubin.

1.2.4 Waterways, Wetlands and Coasts

A natural drainage path bisects the village such that the area is generally well drained.

1.3 The Village

The village is predominately located on a small hilly headland near the south-west corner of the island. Most of the housing is located on a sloping plateau within this headland that varies from 10 to 18 metres above mean sea level.

The major drainage path, together with steep escarpments on both sides of the small headland, restrict residential development to an area of approximately 12 hectares.

The community's residential areas are supported by Council offices, a church, a primary school, store, health centre, Council workshop and Ergon.

Map 3 shows a satellite image of Kubin Village.

1.4 Population

The 2006 Census recorded the total population of Kubin as 219, a decline of 0.9% from the 2001 Census (221).

The growth rate was -0.2% in the 5 years between 2001-2006.

The growth rate was 2.2% over the 10 years to 2006.

The estimated population in 2010 was 237 persons.

Map 3 Satellite Image of Kubin Village

For more detail, refer to Map No. 9964-800 contained in Volume 2 – Maps.

Land **Tenure** & Native **Title**

2.1 Land Tenure

2.1.1 Best Practice

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

2.1.2 Overview of Current Situation

The legal land tenure of Kubin consists of a Deed of Grant in Trust (DOGIT) shown as Lot 5 on TS158, Parish of Duncan, County of Torres in the state of Queensland.

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

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

The DOGIT is exclusive of:

- Lot 16 on TS304
- Lot 35 on TS304
- Lot 17 on TS304
- Lot 8 on TS161 (School)
- Lot 9 on CP894532 (Landing strip)

For other exclusions refer to Plan CP TS158

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

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

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

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

This Act will change the land tenure on Kubin 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.

www.legislation.qld.gov.au

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

www.legislation.qld.gov.au

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 Environment and Resource Management

www.derm.qld.gov.au

2.2 Native Title

2.2.1 Best Practice

- Native title should respect, protect and identify the community's cultural heritage for present and future generations.
- A co-operative approach between all parties to land tenure, native title, development and land-management issues.
- Establish communication prior to starting a project to ensure inclusion and participation – involve 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 Mualgal People as determined by a consent determination on 12 February 1999. [1] Native title rights exist in the entire determination area and native title is managed via the Mualgal (Torres Strait Islanders) Corporation.

A native title sea claim is yet to be determined.

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

- Telstra and Moa Island ILUA (No. QI01/5 - Infrastructure)

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

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

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

1 Mualgal People v Queensland [1999] FCA 157

For more detail, refer to Map No. 9964-819 contained in Maps.

LEGEND

- Existing Structures
- DOGIT (LOT 5 TS158 – KUBIN)
  (LOT 6 TS158 – ST PAULS)
- EXCLUSION FROM DOGIT
  - Lot 16 TS304 (Location Unknown)
  - Lot 17 TS304 (Location Unknown)
  - Lot 35 TS304 (Location Unknown)
  - Lot 8 TS161 (School – Kubin)
  - Lot 9 CP894532 (Landing Strip)
- LEASES ON TITLE
  - Lease C SP145569 (Communication Tower at St Pauls)
  - Lease B SP142706 (IBIS Store)
  - Lease 43/47182 (601189727 (T22025)) (Lease A on Lot 5 TS158) (Location Unknown)
  - Lease 43/28946 (601189726 (T22024) (Location Unknown)
- NATIVE TITLE DETERMINATION (NTD)
- NTD Area
  Exclusions
  - Lot 8 TS161 (School – Kubin)
  - Lot 9 CP894532 (Landing Strip)

Scale 1:75,000 (A3)

NOTE: All Roads shown on this plan, and all other Roads whether declared, notified, constructed or surveyed including Common Roads are excluded from the NTDA.

DISCLAIMER:
This plan is approximate only. The full extent of Documents for the Title, Exclusions, Leases and Native Determination should be inspected for further details.
Please contact the TSRA Native Tile Office or the relevant Native Title Prescribed Body Corporate for further information.

Torres Strait Sustainable Land Use Plans

Kubin - Moa Island

Tenure Plan

9964-819 1 of 2 25/03/2010

For more detail, refer to Map No. 9964-819 contained in Maps.

2.2.3 Issues Overview

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

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

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

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

2.3 Useful Resources

Legislation

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

www.comlaw.gov.au

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.derm.qld.gov.au/publications/nativetitle

Websites

Department of Environment & Resource Management
www.derm.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 the community that the impacts on land and sea must be part of all decisions and plans.

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

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

A report by RPS Environmental Scientists was undertaken on Kubin over a five day visit in early 2009. 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 Kubin's natural environment. The report is written for the Kubin community, the TSIRC and the TSRA. The Fauna and Habitat Assessment of Kubin, prepared by RPS Environmental Scientists, is included as Appendix 1.

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

"Emerald Monitor is listed as 'rare' ... and could be considered a flagship terrostial species for Moa Isalnd"
Source: www.quantum-conservation.org

3.1 Plants, Animals and Birds

3.1.1 Best Practice

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

3.1.2 Overview of Current Situation

The land and sea of Kubin 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 Kubin. The preliminary fieldwork undertaken by RPS Environmental Scientists is part of the ongoing process of recording and identifying significant habitat, plants, birds and animals on Kubin. The notable ecological and habitat features of Kubin are the:

- Extensive areas of pristine and diverse vine forest are present on the granite boulder slopes and gullies of hills and peaks of the island; and
- Large estuary systems on the northern and western coastlines.

Notable rare and threatened fauna observed at Kubin include:

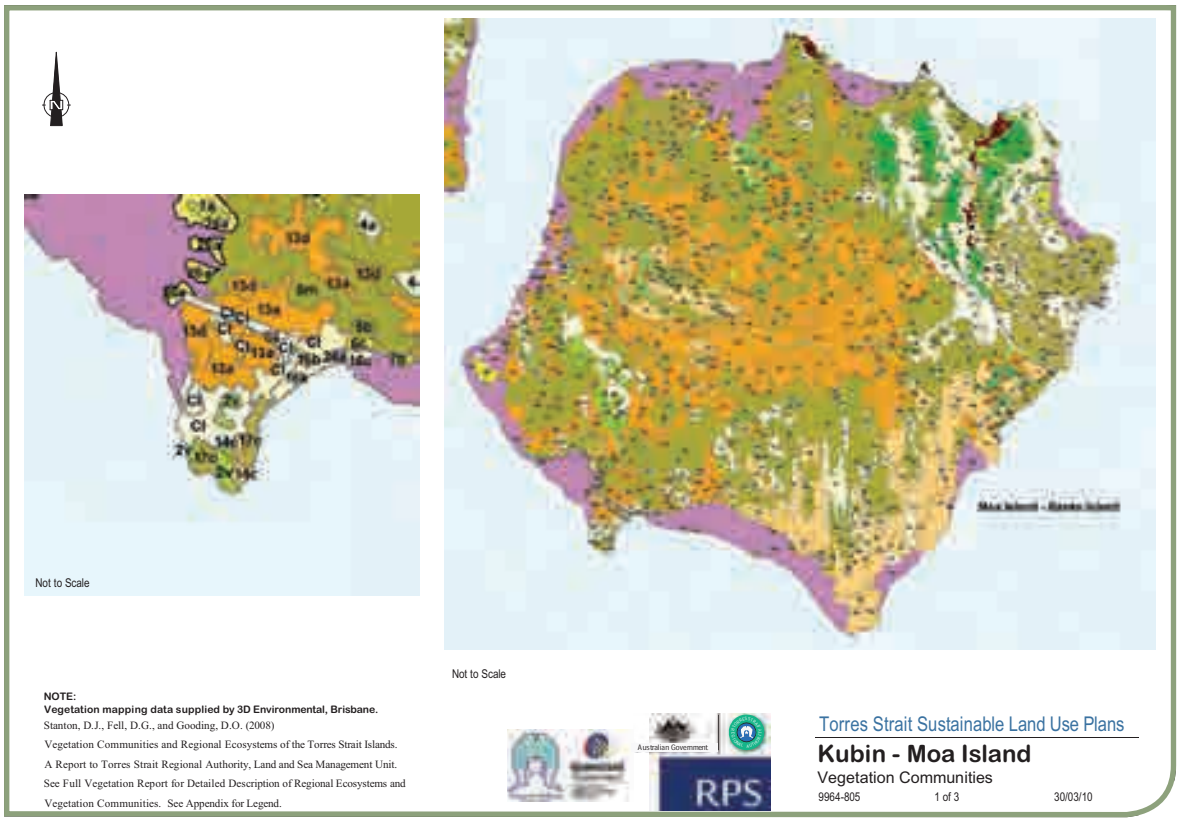
- Fawn Leaf-nosed Bat (Hipposideros cervinus);
- Grey Goshawk (Accipiter novaehollandiae);
- Emerald Monitor (Varanus prasinus);
- Fawn Leaf-nosed Bat (Hipposideros cervinus) – Vulnerable (NCA);
- Grey Goshawk (Accipiter novaehollandiae) – Rare (NCA);
- Emerald Monitor (Varanus prasinus) – Rare (NCA);
- Little tern (Sternula albifrons) – Endangered (NCA);
- Red goshawk (Erythrotriorchis radiatus) – Endangered (NCA), Vulnerable (EPBC);

- Radjah shelduck (Tadorna radjah) – Rare (NCA);
- Lepidodactylus pumilus – Rare (NCA);
- Bare-backed fruit-bat (Dobsonia moluccensis) – Rare (NCA);
- Torresian tube-nosed bat (Nyctimene cephalotes) – Rare (NCA);
- Emoia atrocostata – Rare (NCA);
- Eastern curlew (Numenius madagascariensis) – Rare (NCA);
- Beach stone-curlew (Esacus magnirostris) – Vulnerable (NCA); and
- Coastal sheathtail bat (Taphozous australis) – Vulnerable (NCA).

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

Map 5 shows the significant vegetation communities on Kubin.

Map 5 Vegetation



For more detail, refer to Map No. 9964-1405 contained in Maps.

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

Several habitat types were identified at Kubin, including but not limited to:

Grasslands

Grassland habitat is a major feature of eastern side of Moa Island, centred around the community of Kubin.

The habitat type has arisen through modification of vegetation by prescribed burns carried out by residents of the island. This repetitive burning has caused the uphill retreat of vine forest and woodland communities on slopes around the township.

Grassland habitat, although anthropogenically created, is important for the biodiversity of the island. Many species such as Golden-headed Cisticola, Nankeen Kestrel and Black-shouldered Kite are obligate grassland species on the island. Several species including Northern Brown Bandicoot and Grassland Melomys also commonly inhabit this environment.

Many of the grassland communities present on the island are also recognised as 'of concern' under the Vegetation Management Act 1999. As such, they also have inherent conservation value in the context of the Cape York Peninsula bioregion.

The current extent of grassland on the island has been incrementally increased by anthropogenic burning regimes over an extensive period of time. Grasslands are an important habitat type, however, further increases in the area of this habitat type at the expense of vine forest or woodland communities should be avoided.

Mangroves, Samphire Herblands, Saltpans and Coastal Dunes

There are extensive areas of mangrove vegetation on Moa, particularly on the northern and western coastlines of the island. This vegetation type is clustered in bays around the perimeter of the island, particularly in areas where major creeks emerge to create estuary environments.

Saltpans, samphire herblands and coastal dunes often occur in close association with these mangrove communities. Together they form a diverse habitat type for an array of fauna.

Mangroves and associated saltpans and herblands are important for both terrestrial and marine ecosystems. They form a significant linkage between ecological processes occurring in marine and terrestrial systems. They are diverse and highly productive ecosystems that provide extensive foraging and habitat resources for an array of fauna.

"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."

Vine Forests and Rock Pavement Complexes

Vine Forest vegetation is concentrated within the more elevated portions of Moa as well as sheltered gullies where a greater amount of moisture is available. Moa peak, Damu, Womel, Mt Augustus and Lady Hill in the north east of the island create a large well connected patch of this vegetation type.

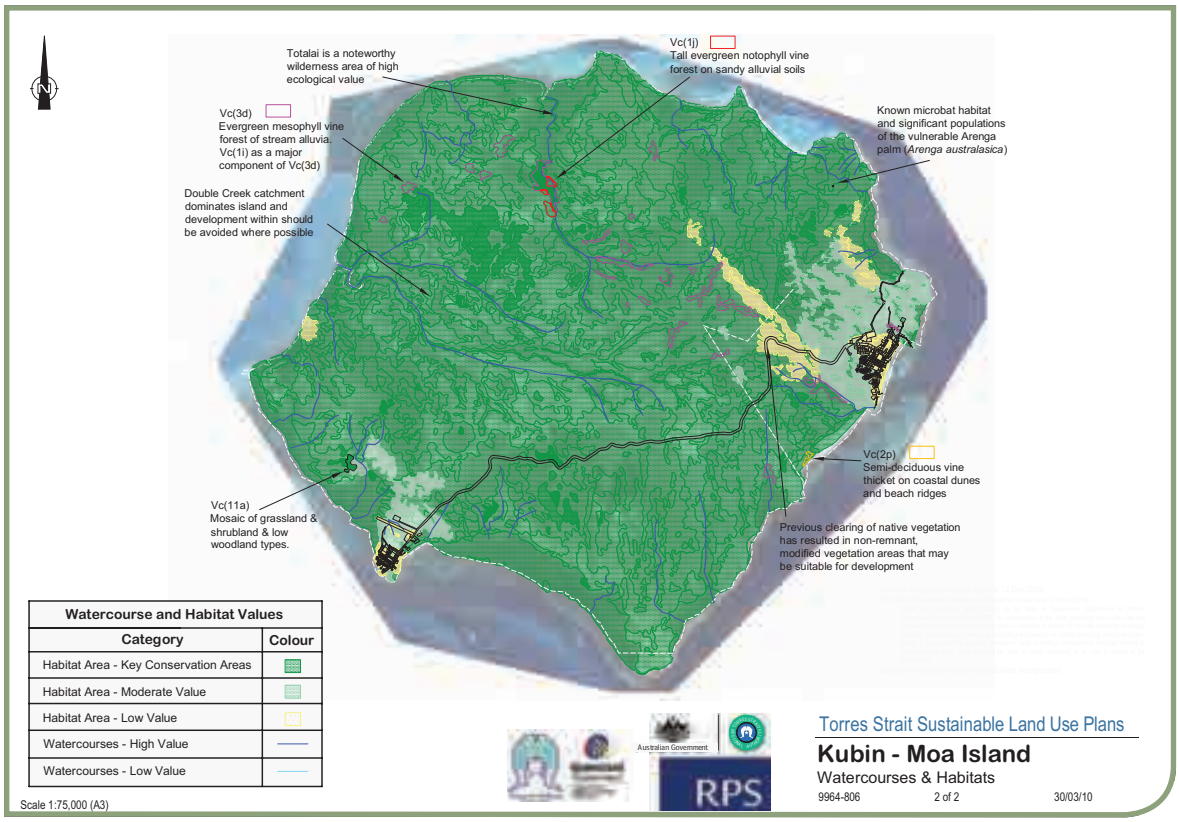
Habitat features including leaf litter, fallen wood and decorticating bark habitats provide the structure to support a range of faunal species. Reptile and small mammal diversity within this habitat is high. Species recorded included Grassland Melomys (Melomys burtoni), Bar-lipped Sheen Skink (Eugongylus rufescens), Carlia macfarlani and Carlia longipes and Glaphyromorphus pumulis.

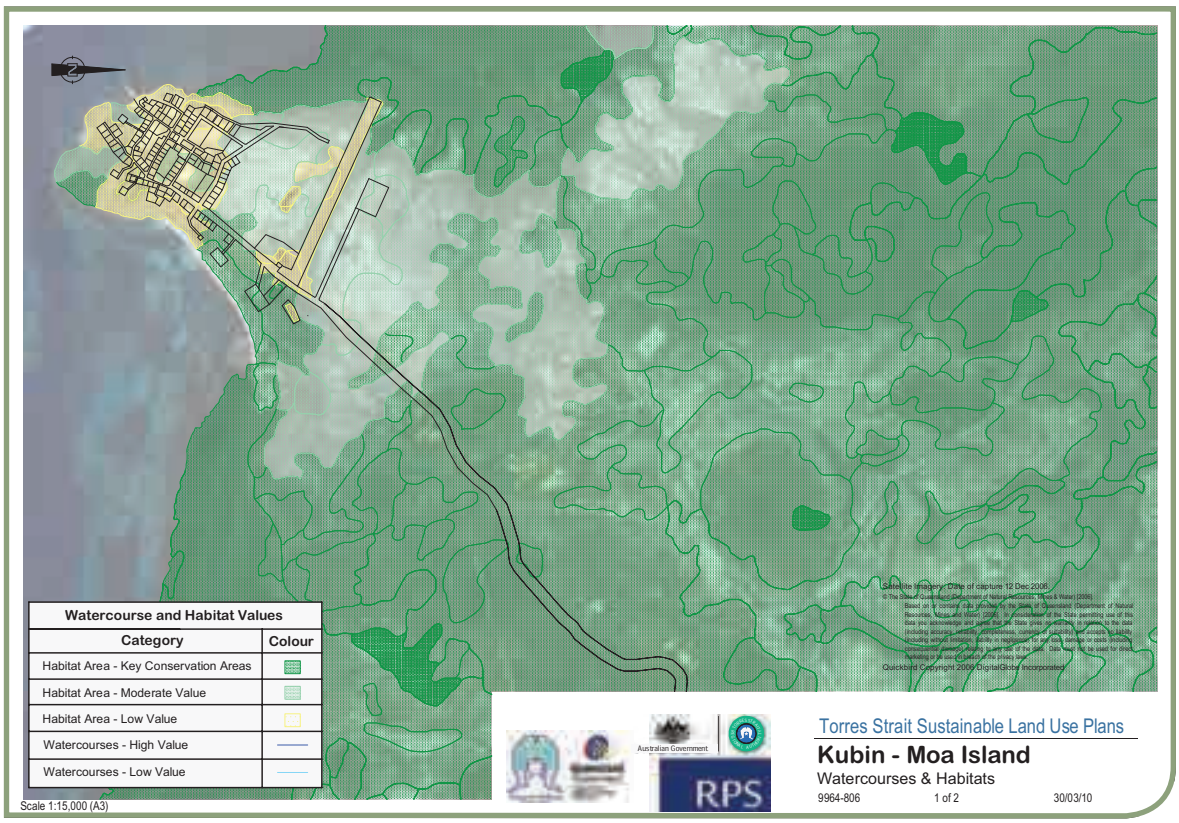
Identified communities are generally clustered in the north-western quarter of the island.

The unique assemblage of floristic components described for these communities infers the potential for significant habitat qualities to be present. Their importance as distinct vegetation types warrants a high level of protection from future land uses, and preliminary assessments indicate that associated fauna habitat values support this determination.

Map 6 shows the habitat areas on Kubin.

Map 6 Significant Watercourses & Habitats





For more detail, refer to Map No. 9964-806 contained in Maps.

3.1.3 Issues Overview

The remaining and distinct vegetated character of Kubin relies on the retention of biodiversity and ecosystems. Many of the fauna species identified on Kubin 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 Kubin 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.

Grasslands provide habitat for a number of specialist fauna species and are an important part of the habitat diversity of Moa, however, continued expansion of this habitat at the expense of vine forest habitat would be detrimental to the overall ecological diversity of the island.

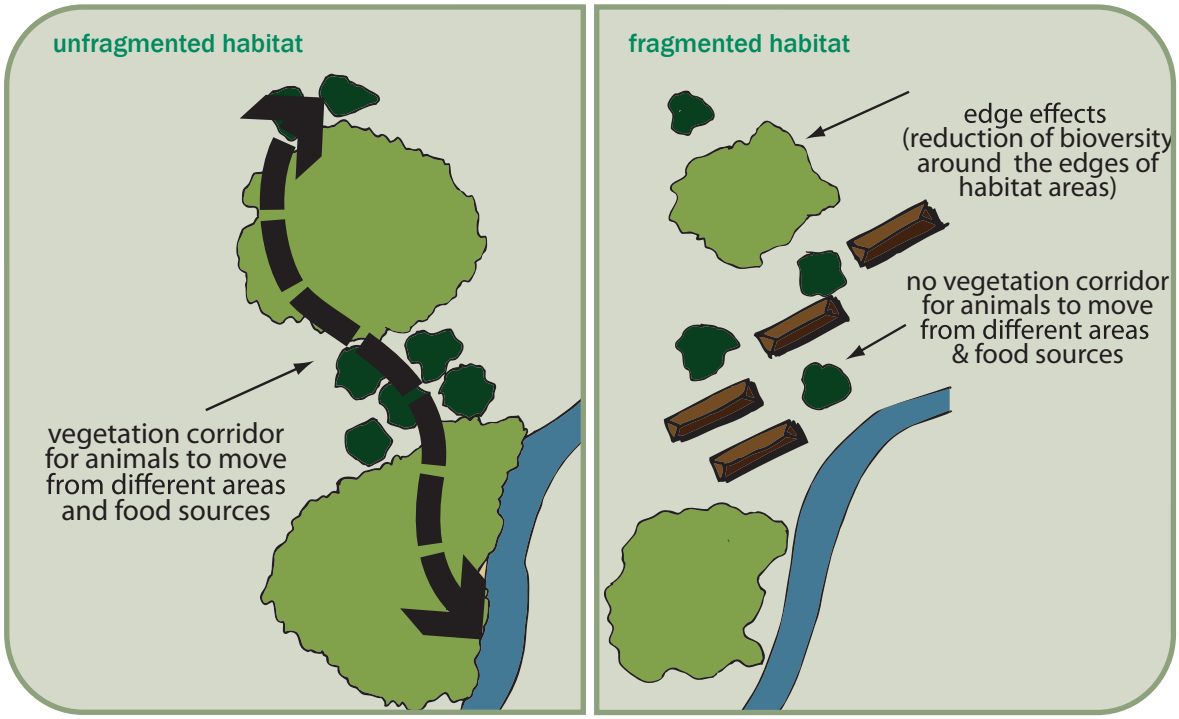
Mangroves provide important fish breeding habitat and support a number of specialist shoreline species including birds and reptiles.

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

Figure 1 shows the effects of fragmentation on vegetation

"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"

Figure 1 Vegetation Fragmentation



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

Dogs are present in considerable numbers on the island and pose a risk to public and environmental health. Wild pigs are also present on the island and are likely to significantly affect the ground layer habitat structure, water quality and ground dwelling fauna (including significant species such as the emerald monitor). Regulated management of these animals is recommended.

Horses also range freely around the Kubin settlement, and it is recommended an assessment of the impact of these animals on terrestrial biodiversity be undertaken.

The introduction of pests to Moa Island is a major threat to the continued ecological health of the island. This is especially relevant for the introduction of cane toads that my come to the island in freight, and their potential impact to significant species such as varanids (emerald monitor).

An assessment of pest species and their impact on the local ecology is recommended.

3.1.4 Land Use Strategies

To minimise existing and future development on Kubin's plants, animals and birds, the following strategy is recommended:

- Those areas that are of critical environmental significance, host rare and endangered species, are in pristine condition and corridors that provide for the safe movement and successful breeding of wildlife should be protected:
  - from development
  - with a buffer of peripheral plantings of dense tree species to minimise encroachment into adjacent areas.

3.1.5 Land Use Considerations

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

- Is the development in accordance with the Plants, Animals and Birds Best Practice, Land Use Strategy and Sustainable Outcomes?
- Has the development addressed its impact on the natural environment of Kubin?
- Has a minimum of 10 metres but up to 40 metres buffer been provided between the development and wading bird habitats and coastal vegetation (the buffer areas should consist of be coastal vegetation)?
- Is the development outside of areas identified for conservation particularly in areas such as forests in the western area of Kubin, along the southern and eastern tip of the island and the area south of the water storage area?
- Where new corridors are being created as part of a revegetation program do they:
  - have a minimum width of 50 metres
  - link remnant areas of bushland habitat
  - provide landscape connectivity
  - propose to revegetate using seed collected from plants that are indigenous to the Island
  - use plants grown from the area being revegetated
  - introduce inappropriate non-indigenous plants into the natural areas
  - propose to control weed growth and remove areas of infestation?
- If development is being proposed in the village, or around existing infrastructure or in proposed investigation areas:
  - are buffers, a minimum of 50 metres wide being provided between the development and the area requiring protection
  - does the proposed landscaping use plants native to Kubin
  - will it introduce inappropriate plants into the natural areas
  - does it propose to control weed growth and eradicate areas of festation?

3.1.6 Land Use Projects

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

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

3.1.7 Sustainable Plants, Animals and Bird Outcomes

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

3.1.8 Useful Resources

Legislation

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

www.comlaw.gov.au

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.derm.qld.gov.au/services_rescources/index.php

Websites

Caring for our Country
www.nrm.gov.au

Department of Environment and Resource Management

www.derm.qld.gov.au

3.2 Coastline

3.2.1 Best Practice

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

3.2.2 Draft Queensland Coastal Plan

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

Extracts from the Draft policy appear below...

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

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

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

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

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

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

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

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

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

The Draft Queensland Coastal Plan proposes to adopt

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

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

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

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

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

Further information is available at:
www.derm.qld.gov.au/coastalplan/index.html

3.2.3 Overview of Current Situation

The coastline has largely been undeveloped and is in relatively pristine condition, apart from around the St Pauls and Kubin communities, both of which have a strong coastal focus.

The planning and management of the coastal and marine environment of Kubin 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 Kubin's 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.

3.2.4 Issues Overview

The primary consideration for the Kubin coastline is the conservation and protection of its coastal environments, which are subjected to urban pressure, increasing weeds and pest infestation, recreational use and the expansion of the village along the coast. The coastal expansion of the village could have a harmful impact on the existing landscape character of Kubin. The protection of the pristine natural environment along the coastline should be addressed in all planning documents and processes relating to Kubin.

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

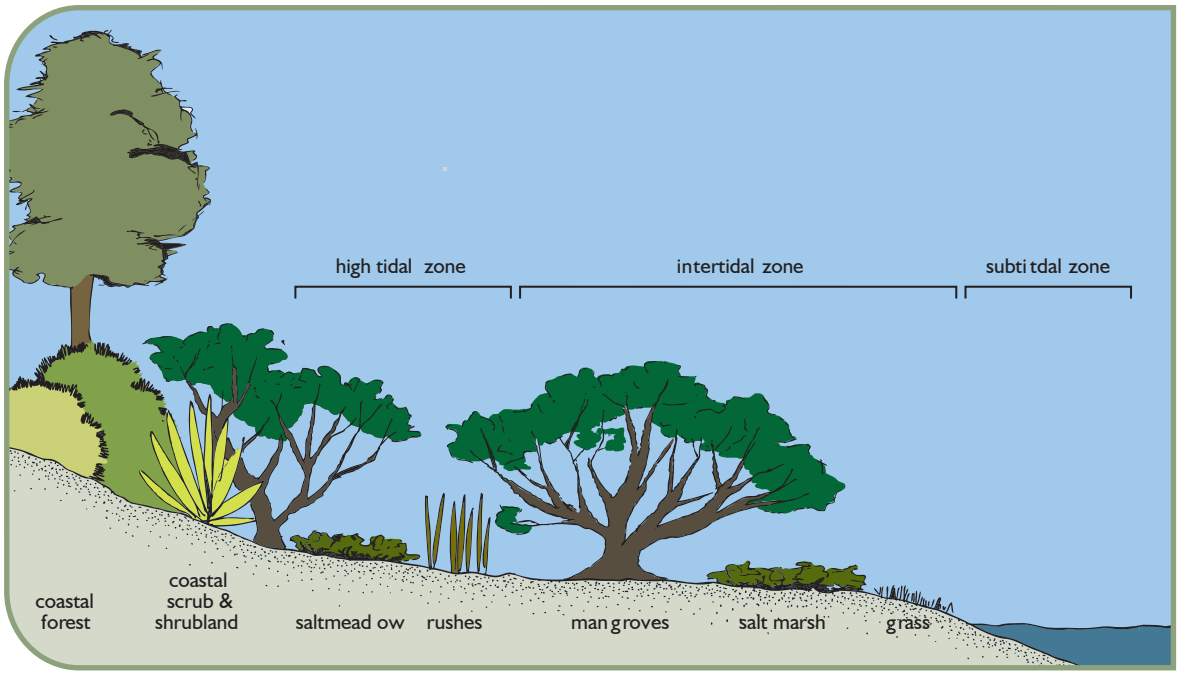
Land use planning can only make good decisions if the best information is available and is understood and supported by the community. The involvement of the community in the decision making process is essential for the successful implementation of any land use strategy.

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

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

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

Figure 2 The Coastal Zone



3.2.5 Land Use Strategies

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

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

3.2.6 Land Use Considerations

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

- Is the development in accordance with the Coastline Best Practice, Land Use Strategies and Sustainable Outcomes?
- Is the development in the village? If so, does it
  - complement existing and multiple-use of suitable sites
  - reflect and enhance the coastal character of the village and surrounding areas
  - incorporate ecologically sustainable design
  - maintain or improve the values of the coastline, the high scenic qualities and visual continuity
  - address the proposal's vulnerability to natural coastal processes (coastal recession, storm events and projected sea level rises)
  - address the impact of the proposal on water resources, environmental and social needs, infrastructure and population capacity
  - identify and protect important coastal assets of ecological, visual and cultural significance?

3.2.7 Sustainable Coastline Outcomes

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

3.2.8 Useful Resources

Legislation

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

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.derm.qld.gov.au/environmental_management/coast_and_oceans/index.html

Websites

Department of Environment and Resource Management
www.derm.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 the community to the impacts of climate change by:
  - recognising the importance of climate change on the sea and land environments of the community;
  - avoiding quick decisions now that will make it more difficult to manage climate change risks in the future; and
  - building understanding and capacity of the community to deal with the impacts of climate change on the tide and storm surge levels.

3.3.2 Overview of Current Situation

Due to the geographic location of the Torres Strait as the interface between the Coral Sea and the Arafura Sea, together with the regions shallow bathymetry, tides are extremely complicated varying widely particularly from east to west but can even vary significantly over a few kilometres.

The tide range is up to around 5 metres, with the highest tides occurring over the summer months (January - March).

This period coincides with the period of greatest likelihood of cyclone occurrence and storm surge adding to the potential for adverse inundation events.

Other factors also affect water levels throughout the region including regional wind driven gradients (these slope across Torres Strait and reverse seasonally), water density, as well as the El Niño southern oscillation, etc.

The low-lying nature of many islands means the region is particularly vulnerable to tropical cyclones and storms, as well as the potential impacts of climate change.

The tropical cyclone and storm impacts on communities are exacerbated by poorly developed coastal infrastructure, inappropriate development along coastlines, lack of scientific research and housing design.

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

The 2008 tide project did not obtain any new tidal data for either Kubin or St Pauls communities.

The tidal values are estimated based on Badu values.

Note that the Schlenker Mapping Datum of MSL differs between Badu, Kubin & St Pauls based on Ausgoid values. Table 1 shows the predicted tide levels.

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

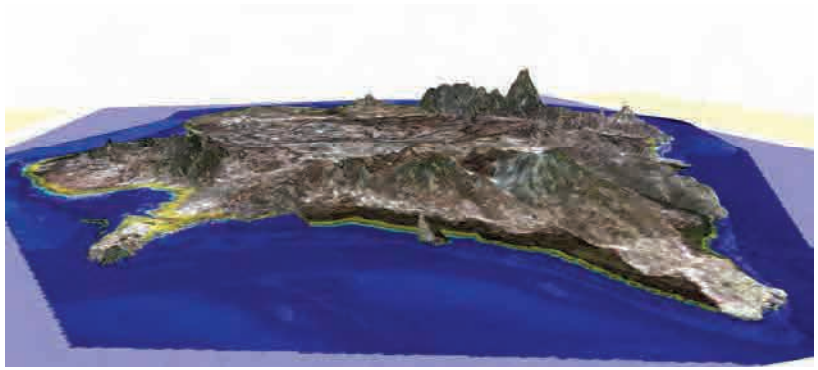
Table 1 Present and Predicted Tide Levels

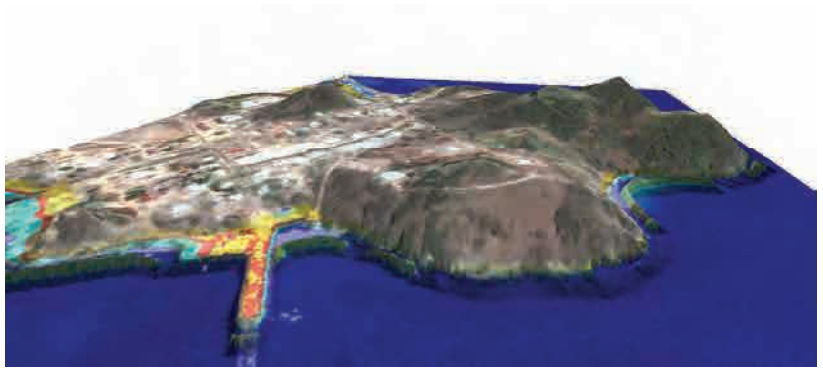
Description	Torres Strait Tidal Analysis MSQ2009 - LAT2008	Ausgoid AHD 2008	MSL2008	Schlenker Island Mapping c1998
Defined Storm Tide Event Draft DSTE	6.07	4.37		4.09
High Hazard Zone	5.07	3.37		3.09
Highest Astronomical Tide (HAT2100)	4.87	3.17		2.89
Top of Barge Ramp (approx)	4.95	3.25		2.97
Highest Astronomical Tide (HAT2008)	**4.07**	**2.37**		**2.09**
MHHW	3.66	1.96		1.68
Mean Sea Level MSL	2.20	0.50		0.22
LAT	0.00	-1.70		-1.99

Source: Derived from MSQ 2008 Tide Values on Badu, Schlenker 1998

Map 7 Coastal Management and Climate Change

For more detail, refer to Map No. 9964-802 contained in Maps.



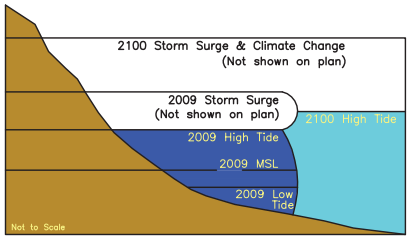


Elevations Table		Elevation(m)		
Description	Colour	(MSL) (schlenker)	Ausgeoid 2008	LAT2008 draft
Defined Storm Tide Event (draft)		4.08	4.37	6.07
Low Hazard Area (draft)		4.08	4.37	6.07
High Hazard Area (draft)		3.08	3.37	5.87
Predicted HAT (2100)*		2.88	3.17	4.87
Highest Astronomical Tide (HAT) (2008)		2.08	2.37	4.07
Mean High Water Mark		1.67	1.96	3.66
Mean Sea Level		0.21	0.50	2.20
Lowest Astronomical Tide (LAT) (2008)		-1.98	-1.70	0
Recommended Minimum Floor Height		4.08	4.37	6.07
Existing Coastal Management District				

Queensland Coastal Plan (Draft 2009)

*The QCP (draft) adopts 0.8m for sea level rise over the next 100 years, and a default Defined Storm Tide Event (DSTE) of Highest Astronomical Tide (HAT) 2008 + 2.0m. HAT levels do not include wave runup.
The DSTE includes an allowance for storm surge, wave runup and future sea level rise.

High Hazard Areas have more than 1.0m inundation.
Low Hazard Areas have less than 1.0m of inundationo.
Existing Default Coastal Management District is MHWS+40m or HAT 2009, whichever is greater.



Torres Strait Sustainable Land Use Plans

Kubin - Moa Island

Coastal Management & Climate Change

9964-802 2 of 2 25/03/10

For more detail, refer to Map No. 9964-802 contained in Maps.

3.3.3 Issues Overview

The Intergovernmental Panel on Climate Change (2007) has projected sea levels to rise by the end of the twenty first century by up to 0.8 metres. This projection allows for sea level rise due to ice melt and thermal expansion for various greenhouse gas emission scenarios and includes an allowance for accelerated ice melt, relative to 1990. The IPCC note higher rises cannot be ruled out owning to uncertainty about the potential for additional ice melt, with recent scientific papers also suggesting higher levels may be possible. Current consensus also indicates ongoing rise beyond 2100 is likely for many centuries, independent of actions to stabilised greenhouse gases.

Figure 3 shows how storm surges impact on the village.

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

Figure 3 Storm Surge Area

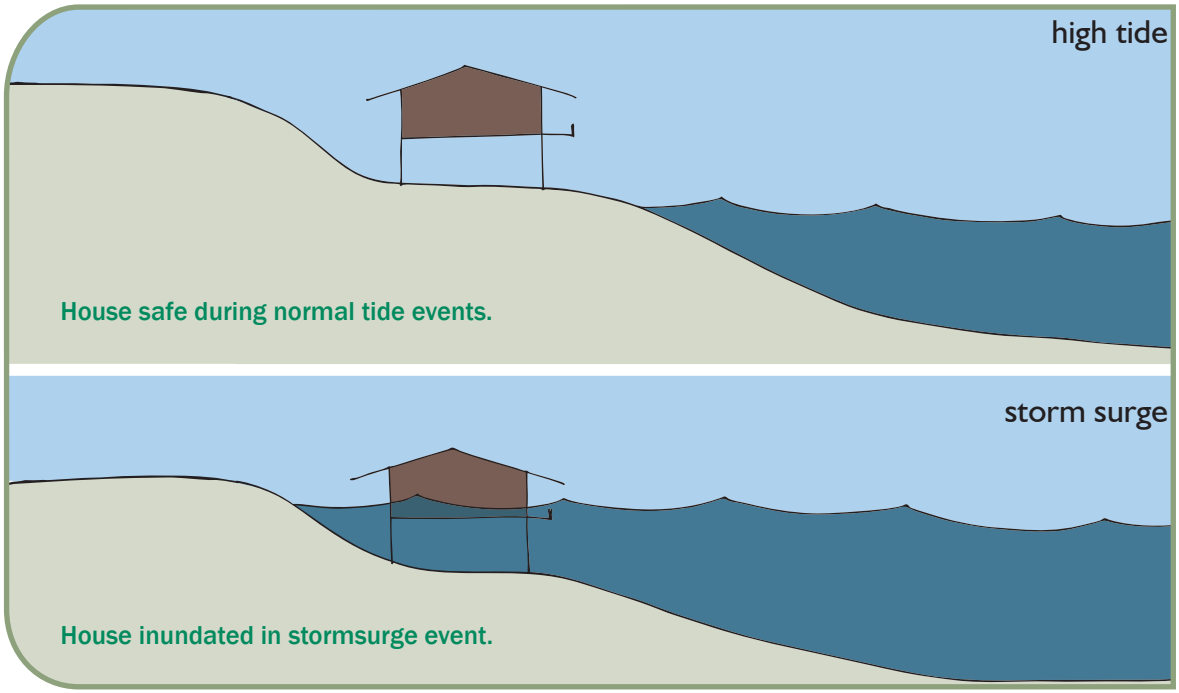
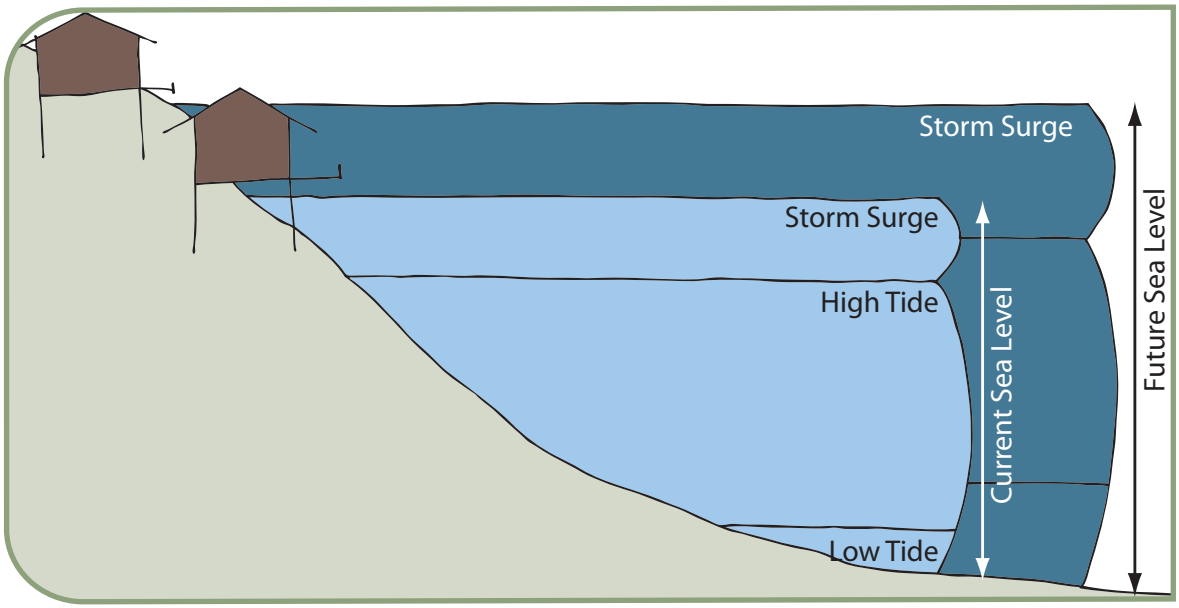


Figure 4 Climate Change and Sea Level Rise



Tidal information for Kubin is available from the predictions in the Seafarer Tide Charts published by the Australian Hydrographic Service 2009. The current island mapping is based on mean sea level (MSL(1999)).

The Seafarer Tidal Predictions were analysed to see how many times the predicted high tide reached the level of the top of the barge ramp each day.

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

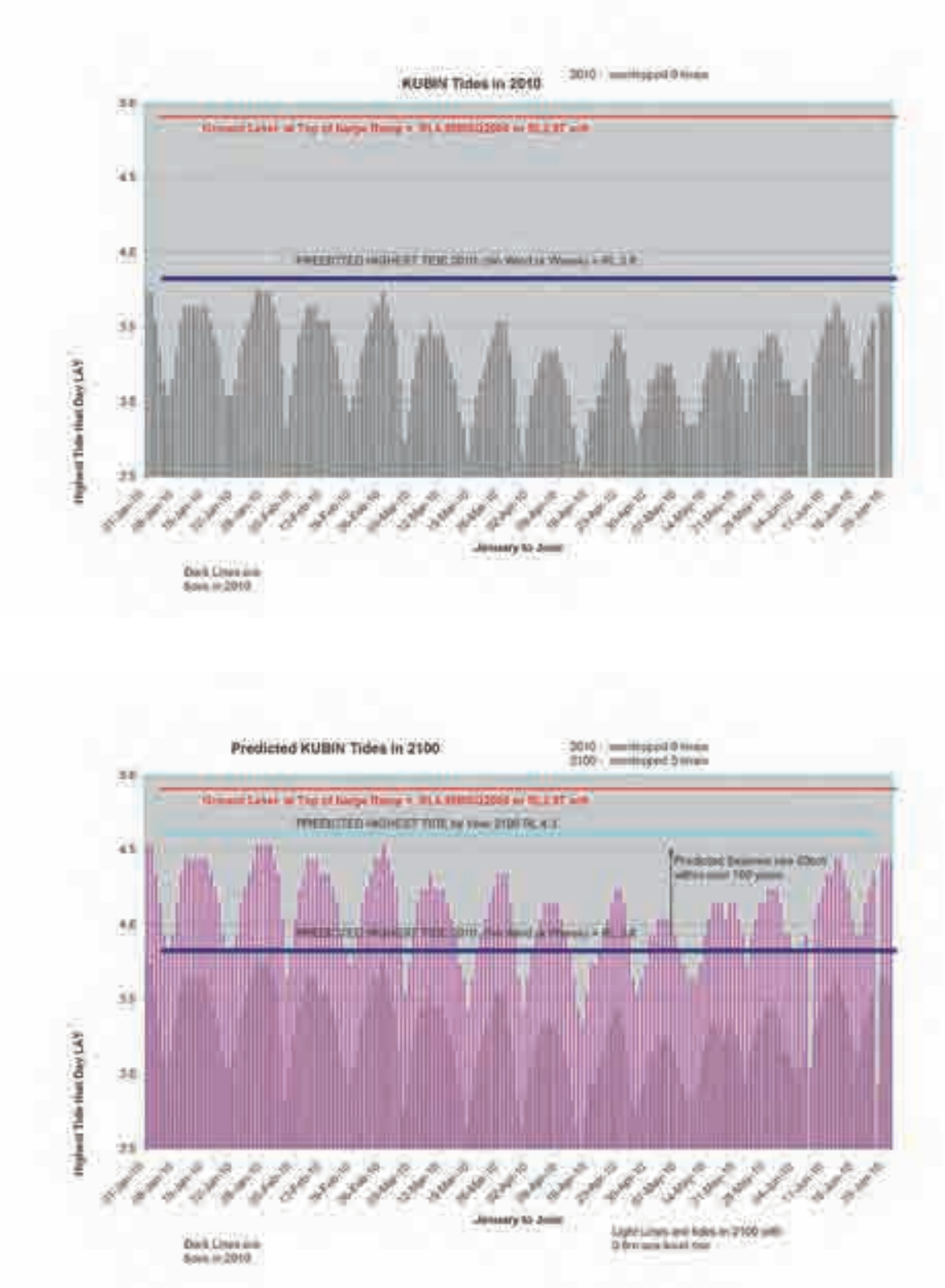
The current adopted amount for sea level rise over the next 100 years of 0.8 metres was then added to each high tide. When allowing for this sea level rise the predictions extrapolate to the top of the barge ramp being overtopped 0 (zero) days a year by the year 2100.

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 of 0.8 metres by 2100.

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

Figure 5 shows the present and predicted high tide occurrences.

Figure 5 Present and Predicted High Tide Occurrences



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

Kubin's coastal ecosystems and fringe landforms — among them, coastal flood plains, forests, dunes, berms serve as natural shock absorbers for protecting coastal infrastructure and land uses against tropical storms; they also provide critical storage capacities for storm surges and floodwaters. When the functioning of these coastal and fringe systems is threatened and damaged, Kubin'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 Kubin, this includes a combination of strategies that are addressed in the next section.

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.

The Kubin community has indicated a wish to continue living on the island. They are aware that:

- much of the island is low;
- flooding events may become more regular and more significant in the future due to climate change; and
- flooding will only happen occasionally, on the highest tides and when weather conditions are unfavourable, at least for the near future.

The people of Kubin are prepared to participate in a process of adapting to environmental and climate change that may include:

- not rebuilding in the same place if that place is subjected to erosion or inundation;
- not building new infrastructure in hazardous locations unless absolutely essential;
- moving the focus of the island village towards higher parts of the island;
- managing boeywadh (berms) with the intention of building them higher and wider;
- managing access tracks through the berms to ensure that water cannot enter the island interior; and
- allowing some parts of the island to erode, where that erosion is not causing harm to people, infrastructure or important cultural sites, while monitoring the situation.

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

3.3.4 Land Use Strategies

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

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

At Kubin, there is some land suitable for development. A multi-faceted approach is therefore required, which may include but is not limited to the following strategies:

- Discouraging:
  - temporary buildings such as converted sheds; \
  - structures used for the manufacture or storage of hazardous materials;
  - community infrastructure development such as shops or halls;
  - an increase in the number of people living, working or congregating on the island; and/or
  - an intensification of uses or works that are likely to increase the adverse impacts of tides and storm surges.
- Encouraging development to consider the physical coastal processes, in particular seeking to minimise:
  - erosion of adjacent coastal areas;
  - interference with the flow of water;
  - alteration of existing water flows; and
  - damage to existing coastal vegetation.
- The management and reduction of greenhouse gas emissions through improved community awareness, knowledge and behavioural changes.
- New house design and modifications to existing houses should incorporate mitigation measures, including:
  - provision of a 'refuge area' which is built on a concrete slab and includes reinforced masonry/concrete walls from the ground to the upper ceiling;
  - a 'strong area' that is generally a bathroom/toilet or laundry/toilet;
  - an upper floor living area;
  - habitable floor levels of a minimum 6.4 metres LAT 2008 (which is equivalent to the current HAT plus 2.0m for storm surge or where possible the equivalent allowance in 2100)

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

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

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

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

3.3.5 Land Use Considerations

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

- Is the development in accordance with the Tides and Storm Surge Best Practice, Land Use Strategies and Sustainable Outcomes?
- Is the development consistent with local and regional climate change response strategies?
- Where the development is proposed in an area identified as affected by tides and storm surges, is it:
  - accompanied by a detailed hydraulic study;
  - designed to resist water forces as a result of inundation;
  - designed to incorporate any recent sea level rise research that changes the current predicted sea level rise of 0.8 metres; and
  - designed to prevent the intrusion of floodwaters as a result of inundation?
- Does the development affect counter disaster operations?

3.3.6 Land Use Projects

To protect the environments at Kubin, 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.

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.derm.qld.gov.au/register/p01698aa.pdf

2006 King Tides in the Torres Strait Factsheet gives an overview of king tides in the Torres Strait 2006 and how the (Environmental Protection Agency) EPA uses this information is king tide predictions for the rest of the state.
www.derm.qld.gov.au/register/p01864aa.pdf

Queensland Storm Tide Information Resource Factsheet provides an overview of the Queensland Storm Tide Information Resource, which seeks to compile and consolidate all available storm tide information in Queensland into a single, stand-alone and portable resource.
www.derm.qld.gov.au/register/p02295aa.pdf

Preparation of a Shoreline Erosion Management Plan Guideline provide advice to local governments in preparation a Shoreline Erosion Management Plan to proactively plan for erosion management in erosion hotspot areas.
www.derm.qld.gov.au/environmental_management/coast_and_oceans/index.html

Websites

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

3.4.2 Overview of Current Situation

A network of watercourses is mapped on a 1:100,000 topographic map of Moa. Elevated areas of the island are concentrated in the north east through to the south east and this results in the presence of significant catchment areas dominated by Koey Koesa (Double Creek) and Palga Koesa (Tutalia Creek).

Larger lower reaches of streams appear to sustain flows throughout the year, whereas the majority upper reaches flow intermittently. Peak flow occurs during the wet season months and progressively diminishes during the drier months when rainfall reaches its minimum.

The network of watercourses is extensive and the ephemeral nature of the majority of these features, particularly on elevated or sloping land, makes them difficult to locate.

Those features located within the mapped 'disturbed' area surrounding Kubin are generally of low value as they often displayed broken or discontinuous connectivity due to developmental works, appear to be impacted by some anthropogenic influences (oil sheen or discolouration), and/or have very limited or weed infested vegetation on the banks.

In contrast, those features that are located away from the disturbed areas were generally of high value and often included intact, structurally sound and continuous riparian vegetation and looked to be relatively unpolluted.

Streams within the large catchments of Koey Koesa and Palga Koesa are particularly well isolated from development. The north western portion of Moa is a wilderness area of limited anthropogenic impact. Lower reaches of these waterways form complex estuarine habitats that are side by side within an array of different terrestrial habitats.

The combination of these factors means that the Koey Koesa and Palga Koesa catchments are an area of significant conservation value. The network of streams that contribute to these two catchments are therefore worthy of a heightened level of protection against potential causes of erosion and pollution in their upper reaches as this can have detrimental flow on effects down stream.

Map 6 shows the identified significant watercourses and habitats.

"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, 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.

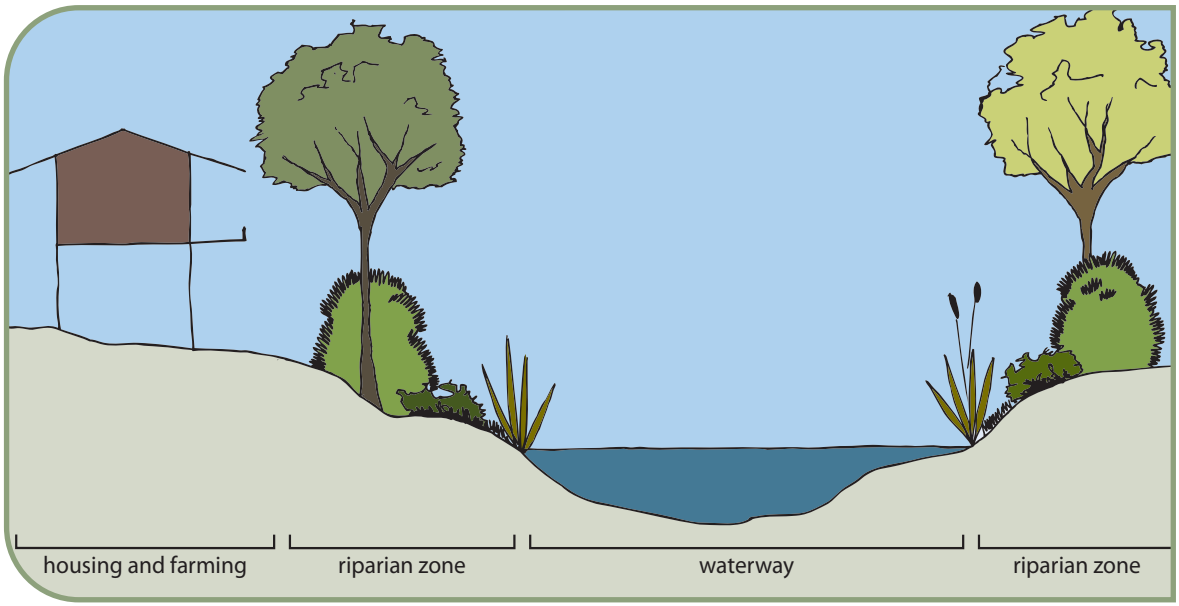
Figure 6 shows how if buffer areas are left between waterways and wetlands, it provides protection to the waterways and wetlands from the impacts of development.

3.4.4 Land Use Strategies

To minimise existing and future development impacts on Kubin'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 '3.1 Animals, Plants and Birds'.
  - be ecologically sustainable development;
  - maintain or improve the values of coastal estuaries, inlets, dunes, shorelines, high scenic qualities and retain visual continuity;
  - ddress 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 include controls on minimum elevations, setbacks and lot sizes, as well as maximum densities and site coverage.
- Development is not encouraged:
  - at the head waters of waterways and wetlands;
  - where it has detrimental impact on natural flow regimes and quality water systems;
  - in areas within 40 metres of waterways to provide a buffer between riparian areas and development; and
  - to utilise groundwater resources.

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"

3.4.5 Land Use Considerations

When assessing the impacts of future development on Kubin, 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 surge; and
  - implement management practices during and after development to protect waterways?

3.4.6 Sustainable Waterways and Wetland Outcomes

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

"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."

3.4.7 Useful Resources

Policies, Guidelines and Fact Sheets

Catchment and Water Quality provides an overview of the link between the health of a water catchment and water quality.
www.derm.qld.gov.au/factsheets/pdf/catchments/c2.pdf

Gully Erosion gives an overview of what is gully erosion and what we can do to minimise its impacts.
www.derm.qld.gov.au/factsheets/pdf/land/l81.pdf

How Healthy is your Waterway? Assessing stream bank vegetation describes how to find out if your waterways are healthy by ensuring a well vegetated riparian zone in order to minimise the impacts of erosion on water quality
www.derm.qld.gov.au/factsheets/pdf/river/r34.pdf

Overland Flow Water provides an overview of what is overland flow water and why it is important to manage overland flow.
www.derm.qld.gov.au/water/management/overland_flow/index.html

Strategic Plan for the Conservation and Management of Queensland's Wetlands sets out the state government's intent for the conservation, values and functions of wetlands.
www.derm.qld.gov.au/wetlandinfo/site/PPL/QldWetlandProgramme.html

Streambank Planting Guidelines and Hints describes what type of vegetation you should plant in riparian zones and where to plant it.
www.derm.qld.gov.au/factsheets/pdf/river/r31.pdf

Streambank Vegetation is Valuable provides an overview of why we need vegetation riparian zones along our watercourses.
www.derm.qld.gov.au/factsheets/pdf/river/r30.pdf

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 Works 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.derm.qld.gov.au/factsheets/pdf/river/r2.pdf

Websites

Department of Environment and Resource Management
www.derm.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 the community to the impacts of climate change by:
  - recognising the importance of climate change on the community's land, soil and slopes;
  - avoiding quick decisions now that will make it more difficult to manage climate change risks in the future; and
  - building understanding and capacity of the community to deal with the impacts of climate change on the community's land, soils and slopes.

3.5.2 Overview of Current Situation

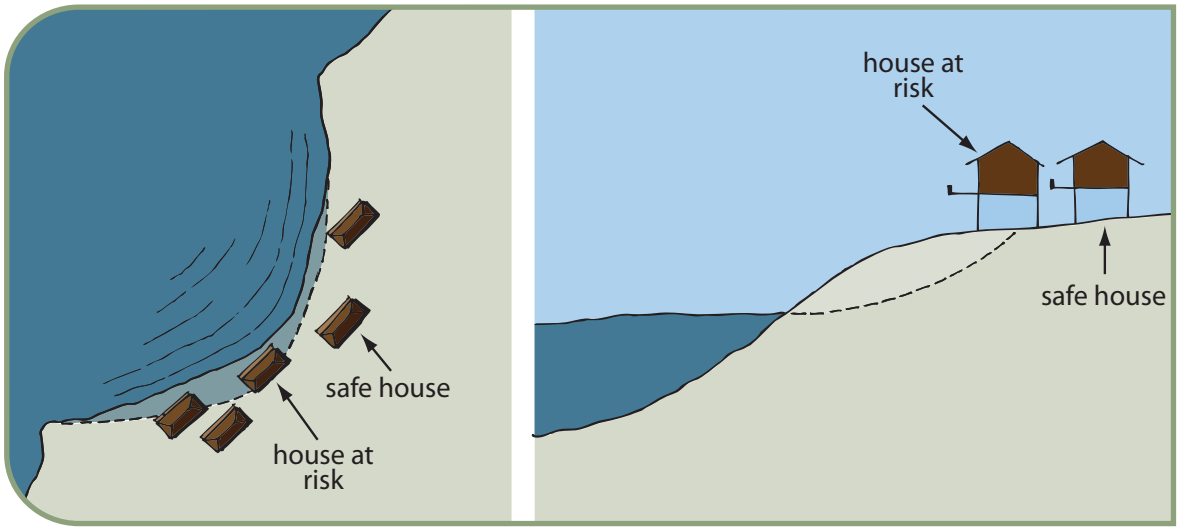
Moa is primarily a flat island, however there is extensive development concentrated on the headland around Kubin. The extensive vegetation cover over parts of the island has meant that erosion is not a major issue. However if the vegetation is cleared for development or garden plots, then the potential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

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

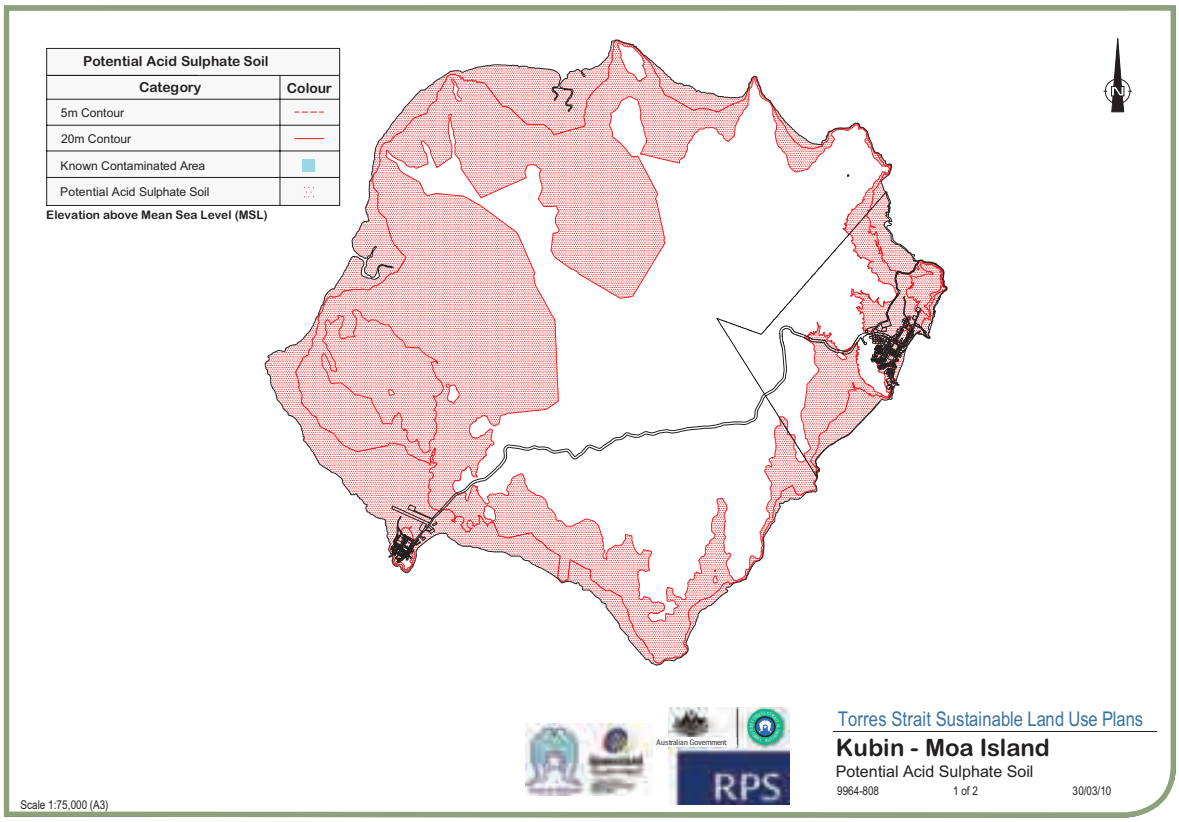
Figure 7 shows where the 'coastal erosion zone' can occur when there is no seawall.

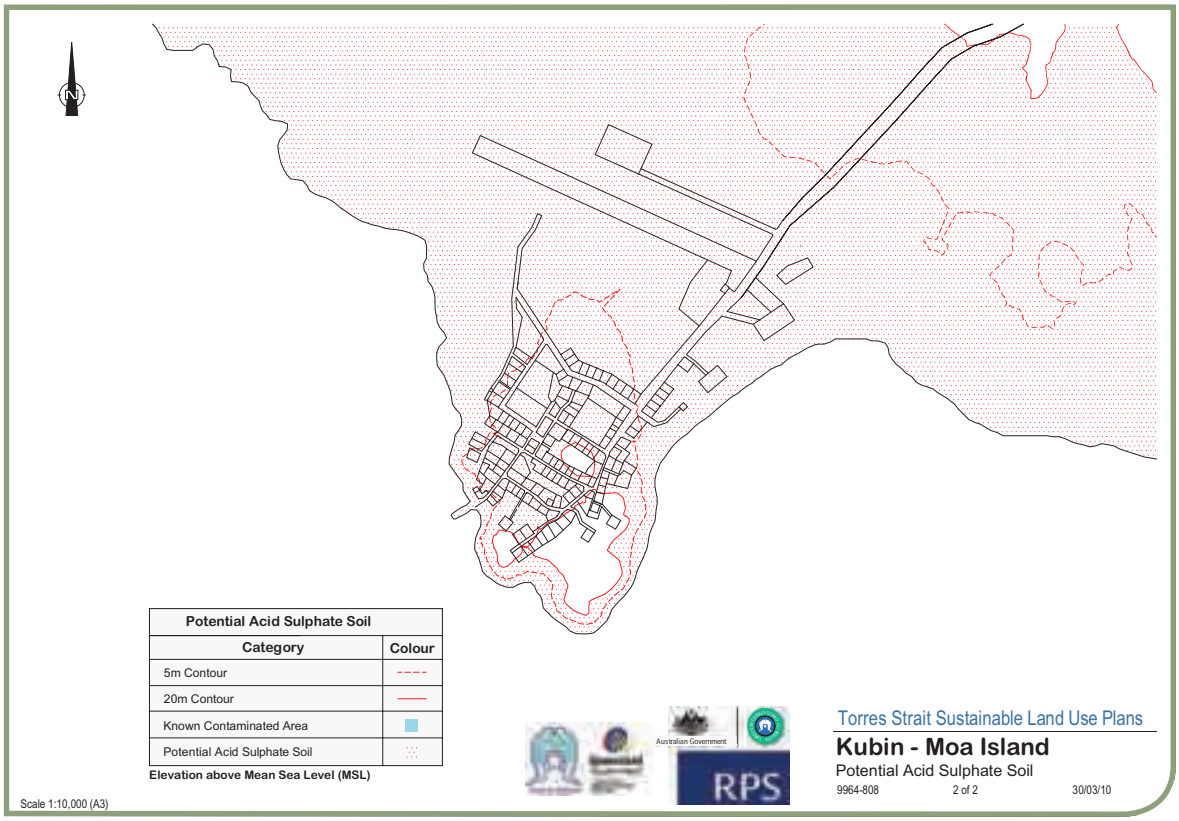
There is a lack of data available on soil types on Kubin. However, as parts of Kubin are below 5 metres AHD, there is the potential for acid sulfate soils to be present.

Figure 7 Coastal Erosion



Map 8 Potential Acid Sulfate Soils





For more detail, refer to Map No. 9964-808 contained in Maps.

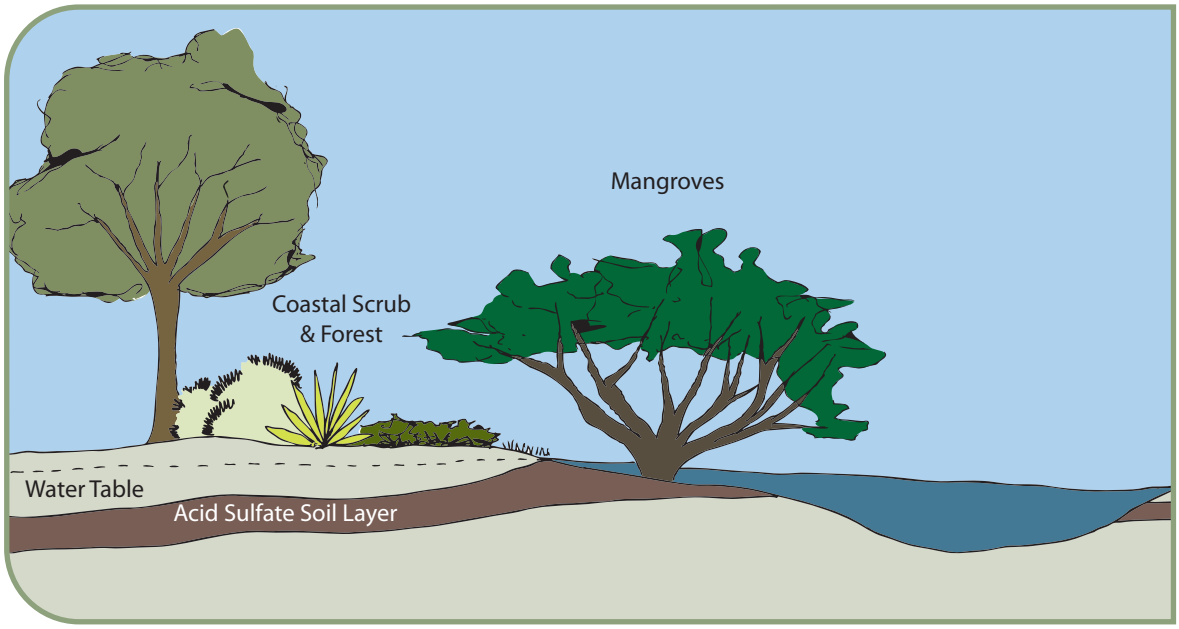
"Acid sulfate soils are naturally occurring soils and sediment containing iron sulfides, most commonly pyrite. When acid sulfate soils are exposed to air, the iron sulfides in the soil react with oxygen and water to produce a variety of iron compounds and sulphuric acid. Initially a chemical reaction,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

Acid sulfate soils can result in the corrosion of concrete, steel and some aluminium alloys used in buildings, drainage systems and roads. The use of acid sulfate soil material as site fill material or in embankments can affect plant growth and block 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

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

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

1. Erosion problems may occur at Kubin where buildings have been erected on or near a sandy beach system that are subject to natural phases of erosion and linked to the longer-term changes in climate. Also, modifications to the beach line such as rock walls, boat ramps and retaining walls have disrupted the natural sediment pathway and therefore the existing beach areas are being denied sand deposition.

2. The second impact on the erosion measures is climate change related to global warming. An increase in the frequency of major coastal storms or a rise in sea level can accelerate beach erosion.

3. The third impact on the high erosion prone areas is the loss of protective vegetation from fires, vehicle tracks (four-wheel drives) and pedestrian traffic.

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

3.5.4 Land Use Strategies

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

- All development should include landscaping and/or revegetation plans that are in accordance with the Best Practice, Land Use Strategies and Sustainable Outcomes of Section 3.5.
- Not encourage any new development along the coast particularly in those areas adjacent to the areas identified as 'high erosion prone'.
- The use of vehicles on the beach or sandy flats as any form of thoroughfare is discouraged.
- Adequate services and access must be provided where development is located on steep slopes.
- Development proposed in areas at or below 5 metres AHD, an acid sulfate soil investigation is to be undertaken and where necessary, an environmental management plan is prepared.
- Highly erodible or unstable soils are to be left in their natural condition to prevent erosion, sedimentation and water quality degradation problems.
- During construction of a development, soil erosion and sedimentation control measures must be in place prior to and during construction and maintenance.

3.5.5 Land Use Considerations

When assessing the impacts of future development on Kubin, 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?\ If the development is adjacent to the areas identified as 'high erosion prone', does it address its impact on the identified area?
- Where development occurs on land below 5 metres AHD are the acid sulfate soils disturbed when excavating or otherwise removing soil or sediment, extracting groundwater or filling land? If so, is the development proposal accompanied by a report on an:
  - acid sulfate soil investigation;
  - environmental management plan; and
  - ongoing management program for treating disturbed acid sulfate soils and drainage waters?

3.5.6 Sustainable Land and Soils Outcomes

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

3.5.7 Useful Resources

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

What is Bank Erosion talks about what is bank erosion and how it is caused.
www.derm.qld.gov.au/factsheets/pdf/river/r2.pdf

Gully Erosion gives an overview of what is gully erosion and what we can do to minimise its impacts.
www.derm.qld.gov.au/factsheets/pdf/land/l81.pdf

Acid Sulfate Soils in Queensland explains what acid sulfate soils are, how they are formed, where they occur and what happens when they are disturbed.
www.derm.qld.gov.au/land/ass/index.html

Identifying Acid Sulfate Soils describes the scientific process for identifying is acid sulfate soils are in the soil.
www.derm.qld.gov.au/land/ass/identifying_ass.html

Managing Acid Sulfate Soils provides an overview of the techniques that can be used to manage acid sulfate soils if they are disturbed.
www.derm.qld.gov.au/factsheets/pdf/land/l62.pdf

Coastal Erosions introduces what is coastal erosion and what are the causes of coastal erosion.
www.bom.gov.au/pacificsealevel

Websites

Department of Environment and Resource Management
www.derm.qld.gov.au

OzCoasts
www.ozcoasts.org.au

3.6 Bushfire

3.6.1 Best Practice

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

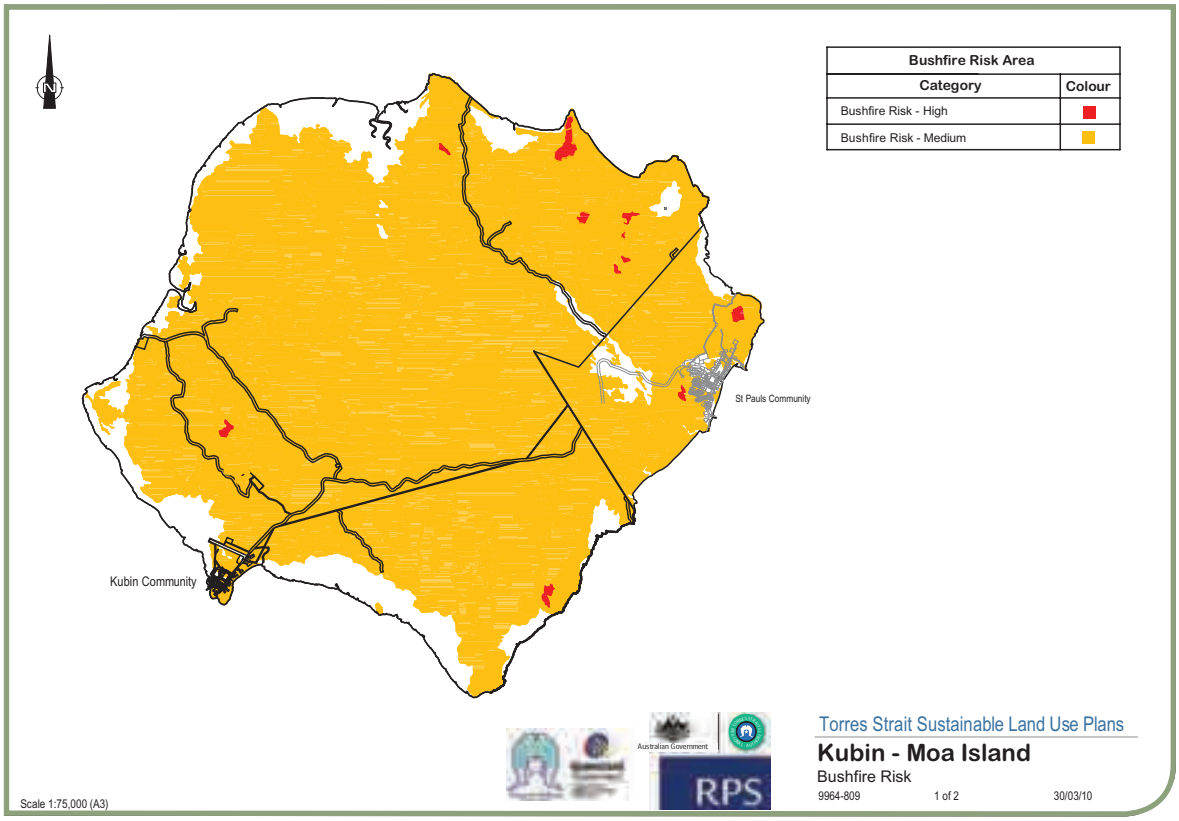
3.6.2 Overview of Current Situation

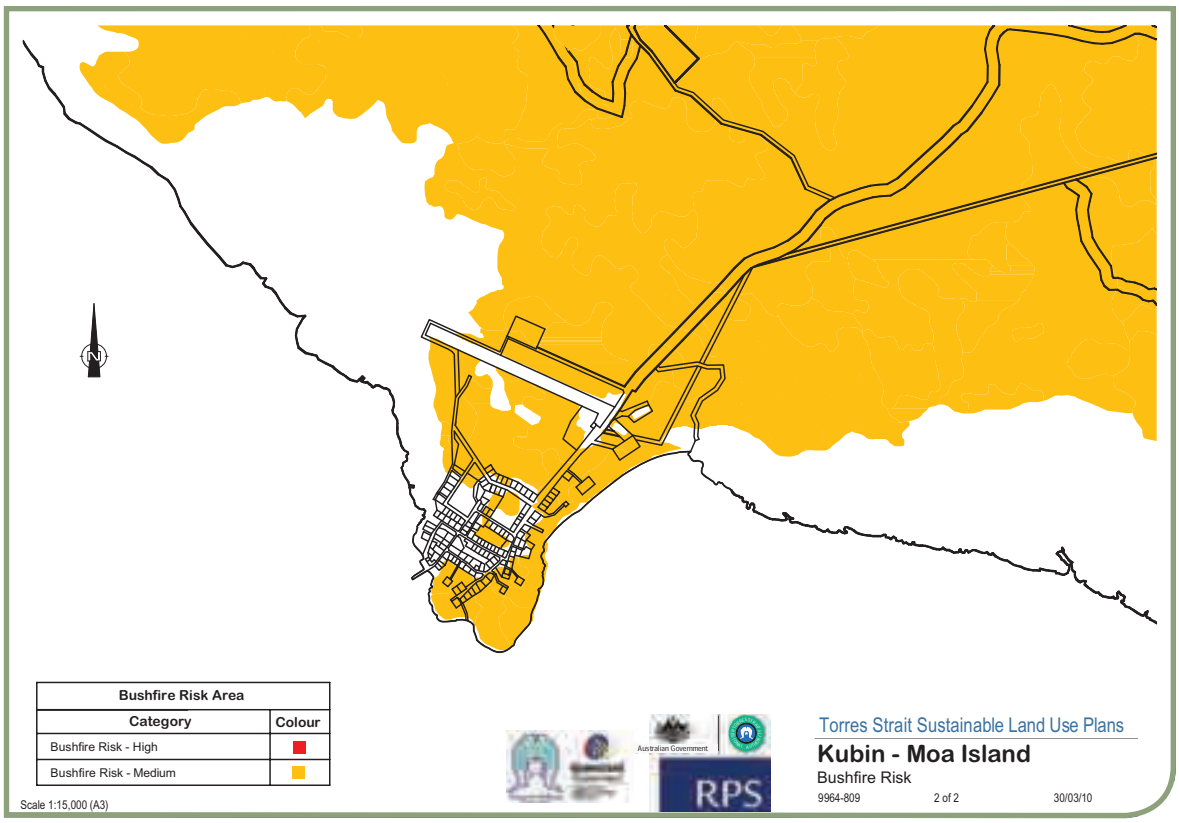
Kubin is extensively covered with natural vegetation. These areas are subject to bushfire. The presence of human occupation raises the likelihood and frequency of fire, which may significantly alter the ecological characteristics of Kubin. Inappropriate burning of the forests could cause the margins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

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

Map 9 shows the location of bushfire hazard areas.

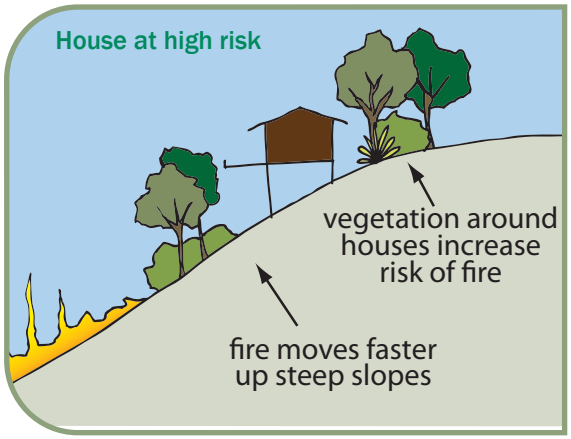
Map 9 Bushfire Risk

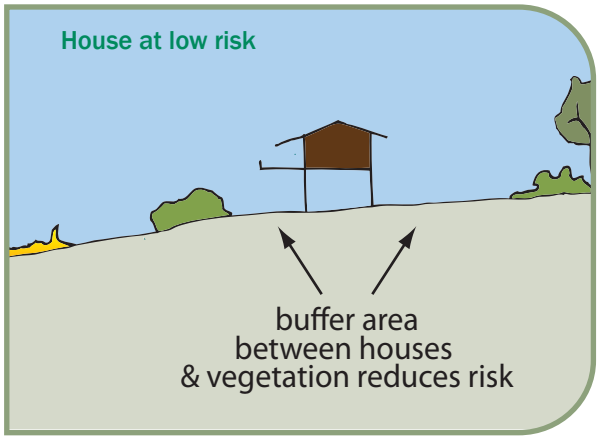




For more detail, refer to Map No. 9964-809 contained in Maps.

3.6.3 Issues Overview





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

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

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

3.6.4 Land Use Strategies

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

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

3.6.5 Land Use Considerations

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 medium bushfire risk; and
  - the risk to people and property?
- Is the development constructed of appropriate materials?
- Are appropriate firebreak setbacks provided between buildings and structures, including houses and infrastructure and bushfire risk areas?
- Is there adequate water supply and pressure and other appropriate infrastructure to protect a building or infrastructure from a fire?
- Does the development have a bushfire management plan, which includes the type of fire regime required to manage the ecological processes within the natural environments?

3.6.6 Land Use Projects

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

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

3.6.7 Sustainable Bushfire Outcomes

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

3.6.8 Useful Resources

Policies, Guidelines and Fact Sheets

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

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.
http://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 the community's cultural heritage by:
  - recognising the importance of climate change to the community's cultural heritage;\
  - avoiding quick decisions now that will make it more difficult to manage climate change risks in the future; and
  - building understanding and capacity of the community to deal with the impacts of climate change on the Island's cultural heritage

4.2 Overview of Current Situation

The entire island of Moa is an area of significant cultural heritage value to the Traditional Owners and the people of Kubin, the Mualgal.

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, including the former settlement at Poid;
- middens;
- wells and springs, e.g. Zangagudan;
- storyplaces, e.g. The Seven Blind Brothers;
- horticultural sites; and
- Goba's Grave;

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

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

Map 10 shows the traditional place names for Kubin.

Map 10 Traditional Place Names (Kubin)

NOTE:

Scale 1:7,500 (A3)

This community contains 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 Native Title Prescribed Body Corporate (PBC) will assist developers to identify local areas and objects of significance, and avoid or mitigate disturbance. The TSRA, through the its LSMU and Native Title Office can assist in contacting the relevant PBCs. The TSIRC would also be able to help with identifying the correct PBC contacts. Further information about the Act can be obtained from the Cultural Heritage Coordination Unit, Queensland Department of Natural Resources and Water.

Australian Government

RPS

Torres Strait Sustainable Land Use Plans

Kubin - Moa Island

Cultural & Heritage Significance

9964-807 1 of 2 30/03/10

NOTE:

Scale 1:7,500 (A3)

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Australian Government

RPS

Torres Strait Sustainable Land Use Plans

Kubin - Moa Island

Cultural & Heritage Significance

9964-807 2 of 2 30/03/10

For more detail, refer to Map No. 9964-807 contained in Maps.

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

4.3 Issues Overview

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

On Kubin, 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 Kubin'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 Kubin'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.

Land Use Strategies

To protect Kubin'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 Kubin's cultural heritage.

4.4 Land Use Considerations

When assessing the impacts of future development on Kubin, 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?
- Kubin is a significant area of cultural heritage to the community, so have all appropriate persons and State agencies been consulted?
- Does the development have an agreed cultural heritage management plan for the affected area and/or site?
- Where the development threatens a cultural heritage item, does it have a disaster mitigation plan? If it does, does it address where disturbance is unavoidable, the temporary relocation of the implement to a safe place?
- Does the development threaten the integrity and setting of heritage items through water run off, soil erosion or soil movement?

4.5 Land Use Projects

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

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

4.6 Sustainable Indigenous Cultural and Heritage Outcomes

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

4.7 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.derm.qld.gov.au/cultural_heritage/legislation/duty_of_care.html

Cultural Heritage – Your Duty of Care explains the duty of care provisions under the Aboriginal Cultural Heritage Act 2003.
www.derm.qld.gov.au/factsheets/pdf/cultural_heritage/ch16.pdf

Cultural Heritage provides an overview of the Torres Strait Islander Cultural Heritage Act 2003.
www.derm.qld.gov.au/cultural_heritage

Aboriginal and Torres Strait Islander Cultural Heritage Places introduces the different types of cultural heritage places and sites e.g. middens, grinding groves etc.
www.derm.qld.gov.au/cultural_heritage/significant_places/records_management.html

Cultural Heritage Management Plan explains what a cultural heritage management plan is and when one is required.
www.derm.qld.gov.au/cultural_heritage/legislation/cultural_heritage_management_plans.html

Cultural Heritage Database and Register explains what the cultural heritage database and register is and how entries are processed.
www.derm.qld.gov.au/factsheets/pdf/cultural_heritage/ch5.pdf

Cultural Heritage Studies provides an overview of why it is important to include sites of cultural significance on the cultural heritage register.
www.derm.qld.gov.au/factsheets/pdf/cultural_heritage/ch6.pdf

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

David, B, Manas, L. and Quinnell, M. (eds) (2008). Gelam's Homeland: Cultural and Natural History on the Island of Moa. Memoirs of the Queensland Museum (Cultural Heritage Series) 4(2).

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

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

Teske, T. (1991). Island of Torres Strait: Kubin Village: Moa Island. Qld: Far Northern Schools Development Unit

Websites

Department of Environment and Resource Management
www.derm.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 wellbeing 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 Kubin has increased in the past ten years as indicated in Table 2.

As confirmed by the figures in Table 2, in the last decade (1996-2006), Kubin's population increased by around 19%.

In 2006, the total population of Kubin was 219, a decline of 0.9% (2 persons) from the 2001 Census (221).

The growth rate was -0.2% or ?? persons per year in the 5 years between 2001-2006.

The growth rate was 2.2% over the 10 years to 2006.

The estimated population in 2010 was 237 persons.

The 2006 Census indicates following population characteristics:

- A median age of 24.5 years.

Population growth on Kubin is primarily driven by the availability of housing and income.

Whilst many island people may wish to return to Kubin to live, they are constrained by a shortage of housing and a lack of opportunities for income generating employment. Housing is considered by Council to be the primary factor in the determination of population growth.

Table 2 Population Growth

Year	Population	Growth / Year (%)	Population Density: persons/km^2
1996	177	NA	NA
2001	221	(4.5)	NA
2006	219	-(0.02)	1.4

Source: ABS, 1996, 2001 and 2006.

Table 3 Population Characteristics

	Persons	%	Queensland Average
Population under 15yrs	80	40%	20%
Population 15 - 24yrs	29	15%	14%
Population 25 - 45yrs	57	28%	28%
Population 45 - 65yrs	27	14%	25%
Population over 65yrs	7	3%	13%
Total	200	100%	

Source: data from ABS 2006 community profile series

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

5.1.3 Land Use Strategy

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

5.1.4 Sustainable Population Outcomes

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

5.1.5 Useful Resources

Websites

Australian Bureau of Statistics (Census data)
www.abs.gov.au

5.2 Housing

5.2.1 Best Practice

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

5.2.2 Overview of Current Situation

The average allotment size at Kubin is approximately 1350m^2. Council considers this to be larger than is necessary, and the preferred size for future residential allotments is 1,000m^2.

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

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

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

The visitors accommodation is a guesthouse located on the beach to the south-east of Kubin.

Family Composition

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

- 10 couples with no children;
- 23 families with children under 15 years;
- nil families with children over 15 years;
- 9, one parent families with children under 15; and
- nil, one parent families with children over 15 years.

Household Composition

The 2006 Census indicates the following characteristics about Kubin households:

- 52 households of which 8 consist of two people, 8 consist of three people, 15 consist of four people, 4 consist of five people and 8 consist of six or more people;
- 9 lone person households; and
- an average household size of 3.4 persons per dwelling.

Housing Rental and Ownership

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

- 3 households paying rent to a State or Territory housing authority

- 36 households paying rent to a housing cooperative. community or church group;
- 8 households paying rent to a non-stated landlord;
- no household paying a housing loan repayment;
- 3 privately owned dwellings (either fully owned or being purchased); and
- the average rent is $90 per week. [2]

From the 2006 Census data, Kubin has an average household size of 3.4 persons per dwelling. [3] 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

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

Refer to Section 5.3 Sustainable Community Expansion for more information.

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

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

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

2 In comparison, in Queensland, 31.6% of the population rent a house (predominately via either a real estate agency or third party), with an averagely weekly rent of $200.00.
3 In comparison, in Queensland, the average household size is 2.6 persons per dwelling.

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 Kubin, 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 the nominated investigation area, is all necessary infrastructure in place and operational for the development to proceed?
- Are all existing serviced lots utilised prior to developing new lots?

5.2.6 Sustainable Housing Outcomes

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

5.2.7 Useful Resources

Policies, Plans & Guidelines

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

www.dip.qld.gov.au/population-forecasting/indigenous-population-trends.html

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.abs.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 2 persons/year, being an additional 23 people between 2009-2019 and a high rate of 7 persons/year, being an additional 75 people between 2009 and 2019. In summary, in 2019, the population of Kubin is predicted to be between 241-293 people.

Table 3 shows the estimate population growth and housing demand for Kubin over the next 10 years.

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

- a low growth rate of 1.0% which will generate:
  - an extra 24 persons over ten years;
  - an additional 5 houses over ten years; and
  - additional housing need of 0.5 houses per year at an average of 5 persons per household.
- a high growth rate of 3.0% which will generate:
  - an extra 80 persons over ten years;
  - an additional 16 houses over ten years; and
  - additional housing need of 1.6 houses per year at an average of 5 person per household.

Table 4 Estimated Population Growth and Housing Demand

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	addit. persons	addit. houses at 5pph
Low growth 1.0%	232	235	237	239	242	244	247	249	252	254	257	24 persons over ten years	5 houses over ten years
High growth 3.0%	232	239	247	254	262	269	278	286	294	303	312	80 persons over ten years	16 houses over ten years

Source: ABS 2006

5.3.2 Issues Overview

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

There are 27 vacant serviced lots within Kubin. A further 5 vacant serviced lots exist along Gerainelgau Yabu Street, however development of these is discouraged due to low water pressure (Lots 87,88,140,141 & 142).

Population age statistics indicate that family homes will still be required for at least the next five years.

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

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

Using Existing Serviced Lots

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

- Gerainelgau Yabu – Lot 86;
- Mualgau Yabu – Lot 67;
- Mepau Yabu – Lots 17,94 & 95;
- Meimalgau Yabu – Lots 18,19,20,148,150 & 155;
- Italgau Yabu – Lots 27,28,54 & 55;
- Kanian Yabu – Lots 81,170,171 & 175;
- Wagalgau Yabu – Lots 157,159,160,161,162 & 180; and
- Newilgau Yabu – Lots 33 & 181.

Several vacant lots exist but have been placed in the conservation zone as they are steeper than the State Policy of 15% (being lots 138,139,30,31,32,90,138 & 139).

The existing serviced lots will cater for an additional people, which is above the predicted population of Kubin of 312 for 2019.

Increase Residential Density

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

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

Expansion of the Residential Areas

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

There is adequate vacant land available north & west of lots 113-116 that can be developed. All services are required but the area can be connected to the new sewer reticulation without an expensive new sewer pump station (further development towards the airstrip would be at a later stage requiring a new sewer pump station).

Investigation Area – Road Extension Lots 117-128

The extension of the unnamed road in front of Lots 113-116 would provide 12 extra lots. These are already sewered and would require water, power and a road upgrade.

This investigation area will need to address as a minimum the following:

- water, power and road services;
- acid sulfate soils;
- bushfire risk;
- impact on cultural heritage; and
- impact on vegetation and habitat corridors.

Investigation Area – Towards Airstri

North of Lots 113-123 is area that can be developed to provide approximately 23 vacant lots and will require all services. Further expansion after this may require an additional sewer pump station.

This investigation area will need to address as a minimum the following:

- water, power, road and sewer services;
- acid sulfate soils;
- bushfire risk;
- impact on cultural heritage; and
- impact on vegetation and habitat corridors.

Investigation Area – Sportsfield

The existing sportsfield at Meimalgau Yabu (Street) is located in a great position, being close to the school and the community. It is currently unformed and care must be taken that future sports facilities are located so as not to encroach upon the possible sportsfield.

The community wishes to develop this land as a proper sportsfield. It is well suited to this as it is flat and can accommodate a 70m x 120m rectangular football field.

Any buildings or grandstand should be built close to Mualgau Yabu so as not to encroach upon the future playing fields. Over time, the community may consider closing the road adjacent to Lots 128 & 129 to provide a larger sports area.

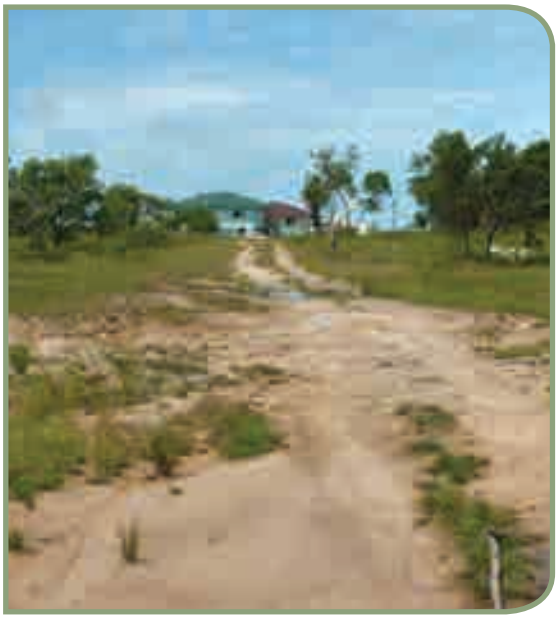
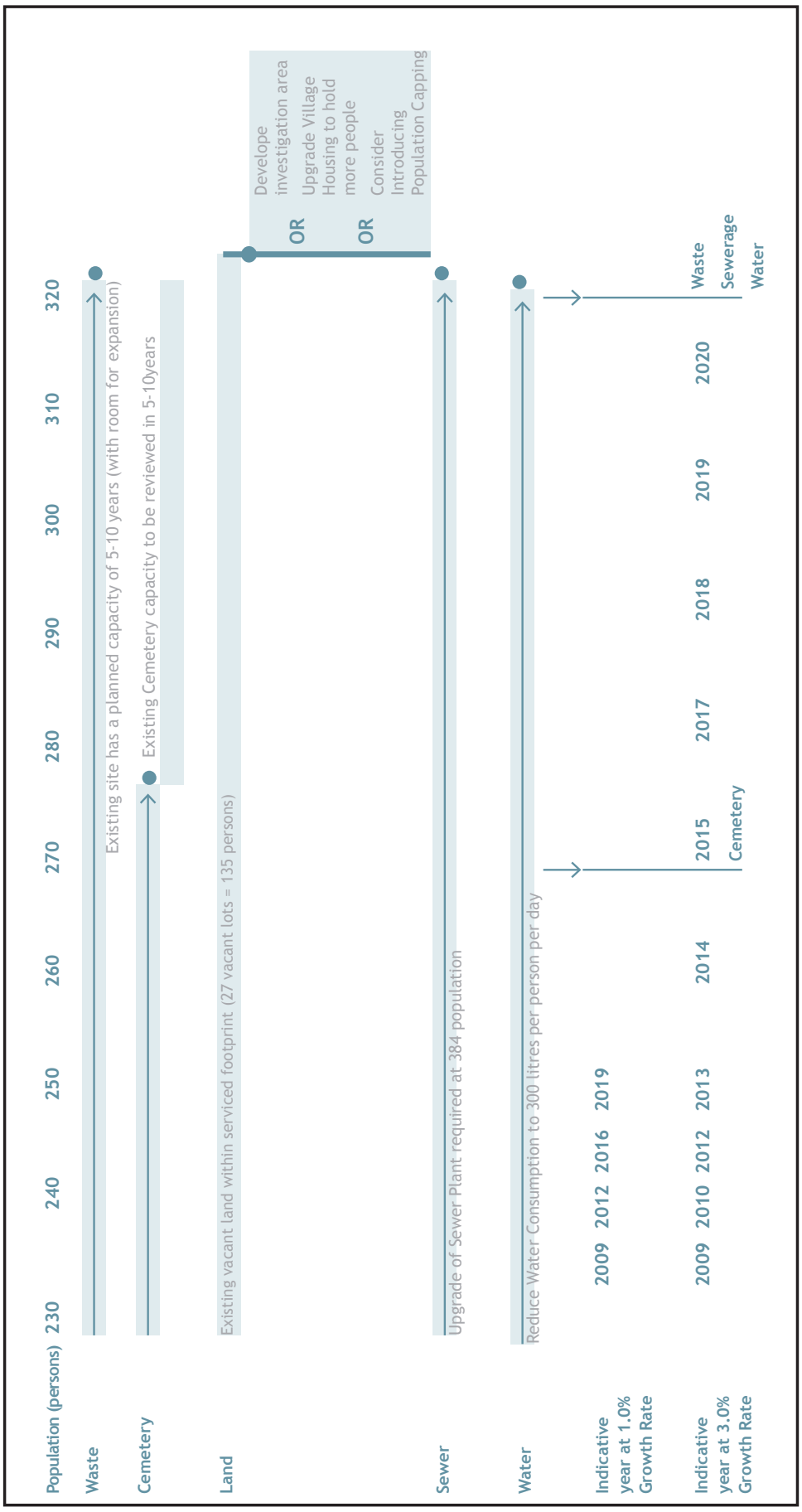


Figure 9 Infrastructure Capacity Relative to Population Growth



5.3.3 Land Use Strategies

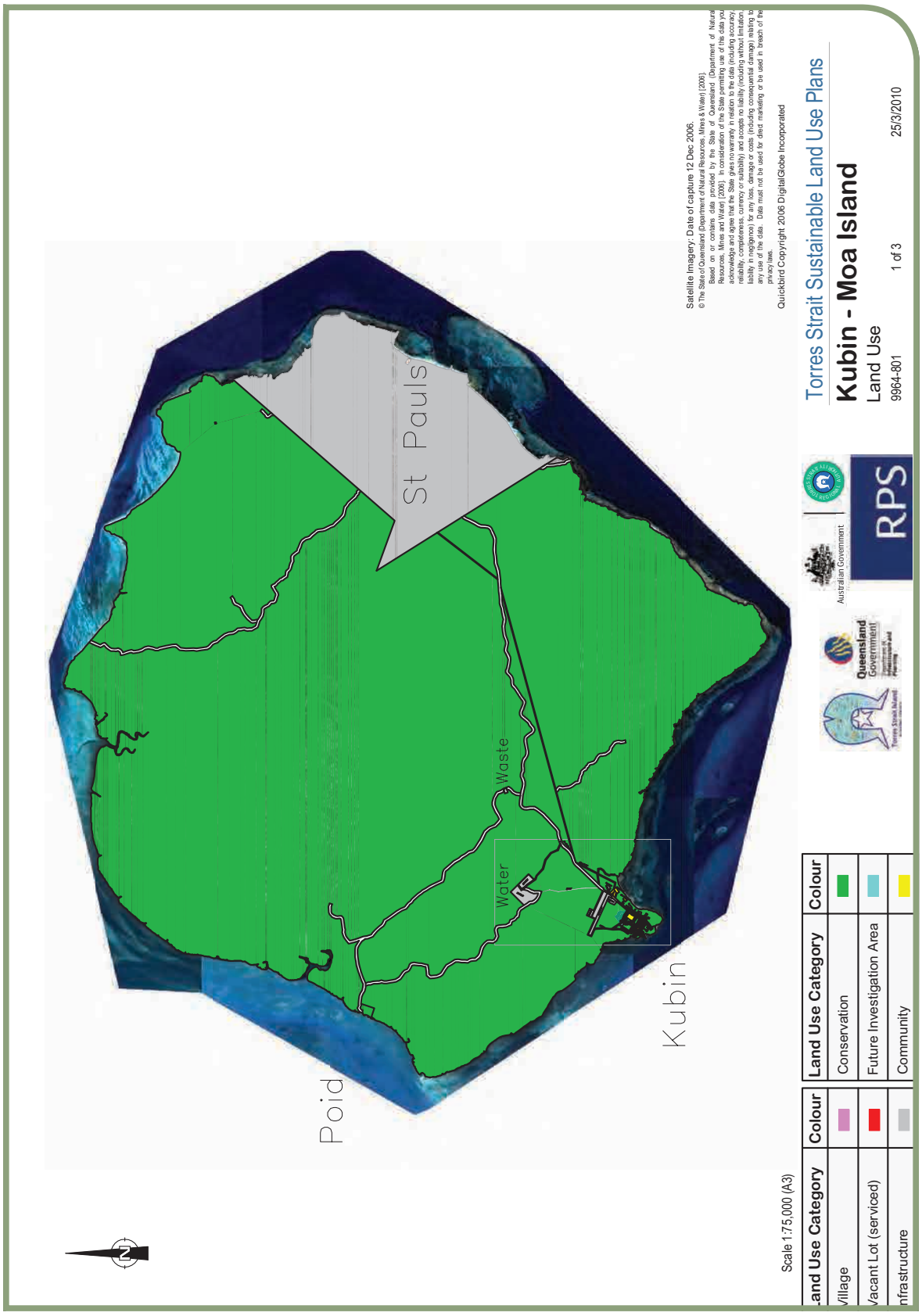
The population trends and profiles and infrastructure limitations mean that the land use strategies must be developed to:

- Manage the total population trend in a way that retains urban and island character.
- Identify and locate land suitable for urban development in non-coastal areas. One investigation area has been identified with three other areas extending the existing village.
- Provide choice in housing form and affordability in appropriate locations.
- Increase the residential density in the village without comprising the amenity and character of the village and increasing the risk to natural hazards such as storm surge and tides.
- The area around the oval should be formalised to provide a community sports oval. Note that it is only just possible to fit a 100m x 70m sports oval in this area. Inappropriate development in this area could jeopardise this sporting precinct.
- Development of land adjacent to the school and lot 129 is possible. However this hilltop is vegetated and may be better used and preserved as open space to retain the trees.

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

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

Map 11 Land Use

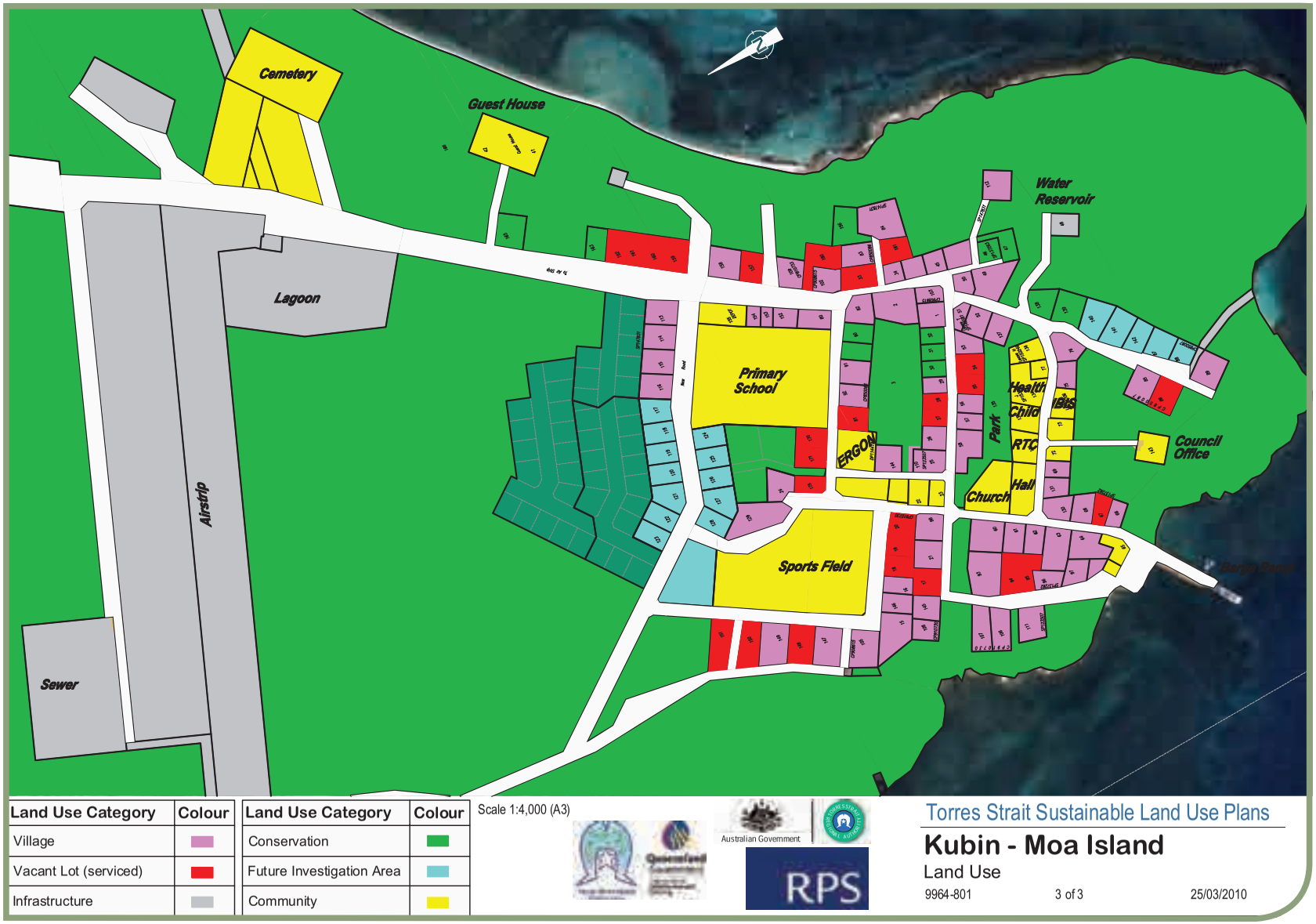


For more detail, refer to Map No. 9964-801 contained in Maps.

Map 12 Land Use (Village)

For more detail, refer to Map No. 9964-801 contained in Maps.

For more detail, refer to Map No. 9964-801 contained in Maps.



Land Use Category	Colour	Land Use Category	Colour
Village		Conservation	
Vacant Lot (serviced)		Future Investigation Area	
Infrastructure		Community	

Scale 1:4,000 (A3)

Australian Government

RPS

Torres Strait Sustainable Land Use Plans

Kubin - Moa Island

Land Use

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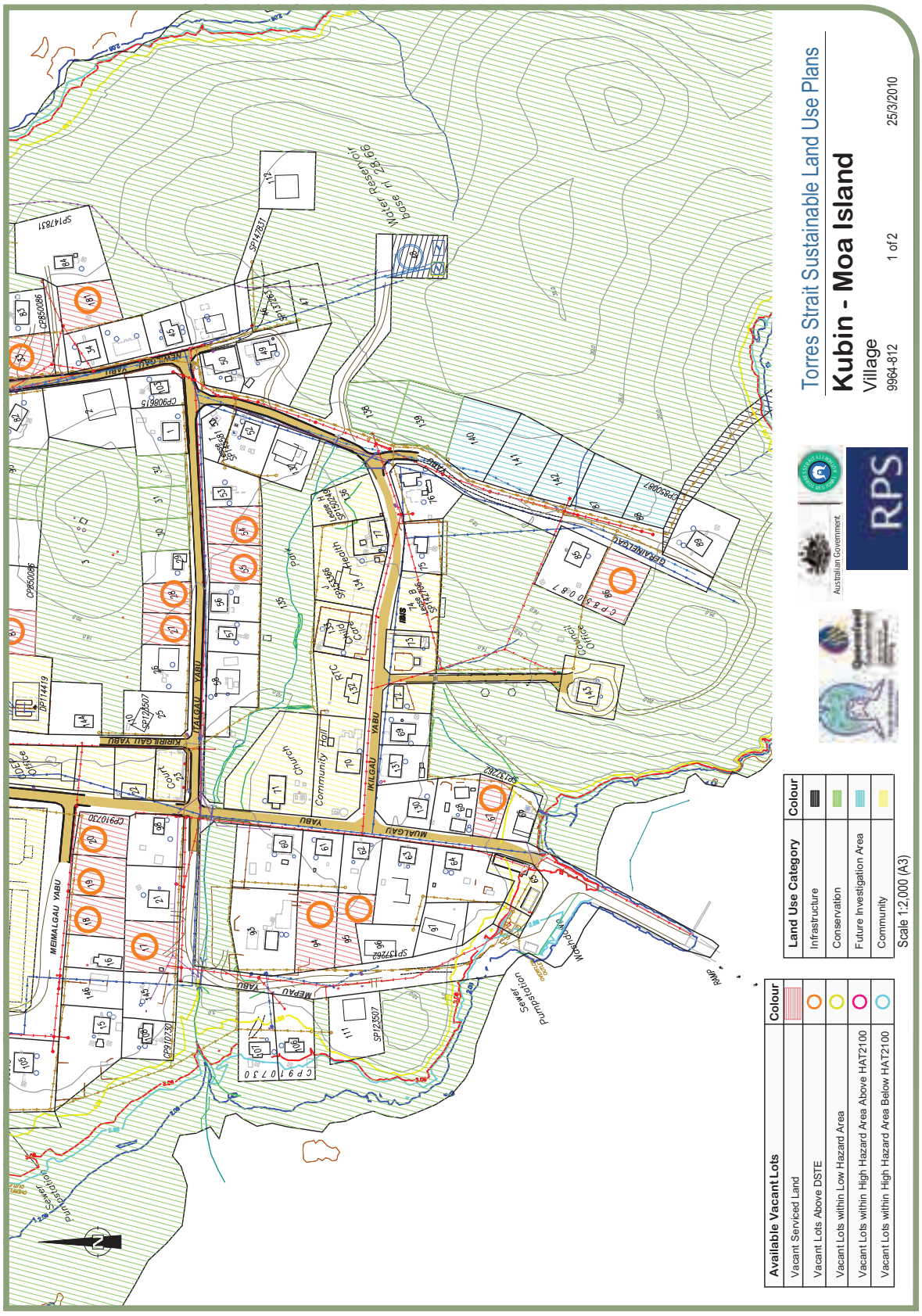
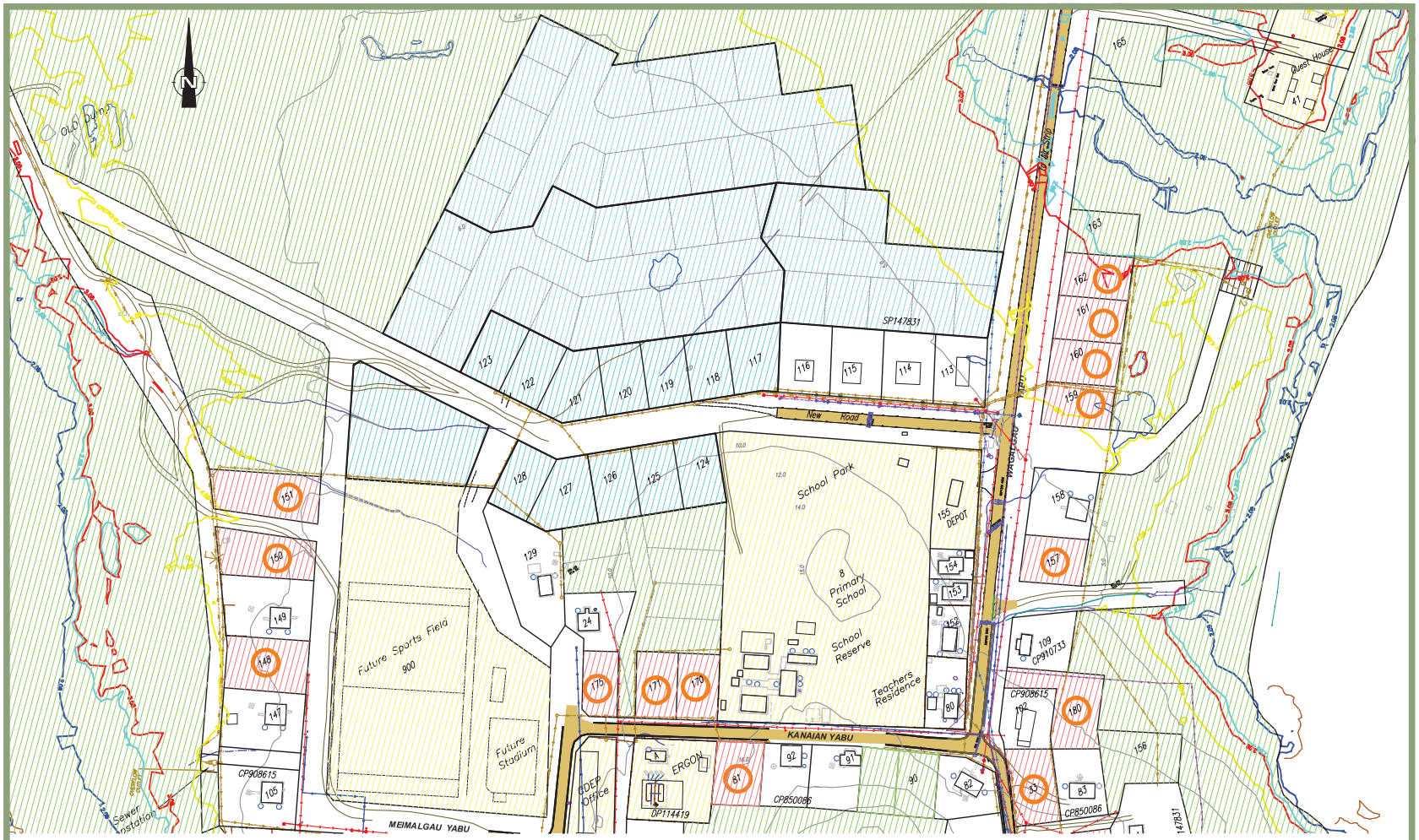
Map 13 Village



For more detail, refer to Map No. 9964-812 contained in Maps.

For more detail, refer to Map No. 9964-812 contained in Maps.



Scale 1:2,000 (A3)

Available Vacant Lots	Colour
Vacant Serviced Land	
Vacant Lots Above DSTE	
Vacant Lots within Low Hazard Area	
Vacant Lots within High Hazard Area Above HAT2100	
Vacant Lots within High Hazard Area Below HAT2100	

Land Use Category	Colour
Infrastructure	
Conservation	
Future Investigation Area	
Community	

Australian Government

RPS

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Kubin - Moa Island

Village

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5.3.4 Land Use Considerations

When assessing the impacts of future development on Kubin, 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 Kubin?
- Is the development consistent with the strategies developed to address development growth?
- Does the development satisfactorily address its impact on the water supply and the central sports precinct?

5.3.5 Land Use Projects

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

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:

- 70 people living on Kubin are employed;
- an average household weekly income of $828.00;
- an average individual income of $354.00;
- 22.9% of those working were between the ages of 15 to 24 years;
- 72.9% of those working were between the ages of 25 to 54 years; [4]
- 29.7% of Community (over 15 years) undertake some form volunteer work in the 2006 Census. Volunteer work in the 2006 Census is someone who worked for an organisation or a group doing unpaid voluntary work in the 12 months prior to the Census;
- 23.1% of those undertaking volunteer work were between the ages of 15 and 24 years; and
- 63.1% of those undertaking volunteer work were between the ages of 25 and 54 years. [5]

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

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

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

Table 5 Employment Sectors

Employment Industry	Construction	Public Administration & Safety	Education & Training	Health Care & Social Assistance	Wholesale Trade	Retail Trade	Other	Not Stated
People	0	30	4	3	0	0	0	0

Source: : ABS 2006

Training and Education

From the 2006 Census, 97 people were studying or undertaking some form of further education program or training. This is 44.3% of the total population. Of those undertaking education:

- 5.2% were attending pre school;
- 43.3% were attending primary school;
- 7.2% were attending secondary school;
- 14.4% were attending a technical or further educational institution;
- 9.3% were attending university or tertiary institution; and
- 20.6% were undertaking another form of educational program or training. [6]

The 2006 Census also shows that those that left school were over the age of 15, 38.6% left after completing Year 12, with another 24.6% leaving after completing Year 10. This means that 78.1% completed schooling after the age of 15 years. [7]

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

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

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

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

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

RTC

Table 6 Community Facilities

Facility	Provided (✓ = Yes; ✗ = No)	Location
Pre school	✓	Within School
Primary School	✓ (12 students)	Lot 8
Health Care Centre	✓	Lot 134
High school	✗	
Child Care Centre	✓	Lot 133

Table 7 Retail and Public Office Facilities and Services

Facility	Provided (✓ = Yes; ✗ = No)	Location
Administration offices/Workshop	✓	Lot 155
Community hall	✓	Lot 70
Guest House	✓	Lot 41
Contractor Accommodation	✓	Lot 42
Churches	✓	Lot 71
SES depot	✓	
Supermarket (IBIS store and or Convenience store)	✓	Lot 74
Banking facilities	✓	
Custom Depot	✗	
Police Station	✗	

Table 8 Recreational Facilities

Facility	Provided (✓ = Yes; ✗ = No)	Location
Picnic Grounds	✓	
Sports Oval	✗	See proposed sports precinct at Lot 900
Sports courts	✓	Lot 23

Childcare

Healthcentre

Sports Precinct

5.4.3 Issues Overview

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

The community needs to accommodate services for convenience goods and services that meet the normal daily needs of its residents (e.g., food, personal services and prescription drugs). At the same time, due to the limited land supply, a mix of uses need to be balanced and contribute to the sense of a complete neighbourhood offering a variety of housing types, supporting convenience commercial, job opportunities, schools, parks and open spaces.

The area around the oval should be formalised to provide a community sports oval. Note that it is only just possible to fit a 100m x 70m sports oval in this area. Inappropriate development in this area could jeopardise this sporting precinct.

Development of land adjacent to the school and Lot 129 is possible. However this hilltop is vegetated and may be better used and preserved as open space to retain the trees.

5.4.4 Land Use Considerations

When assessing the impacts of future development on Kubin, 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 the community 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.abs.gov.au

Guesthouse

Infrastructure

Providing and managing infrastructure is a key issue facing the Torres Strait and Kubin 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 on the community by:
  - recognising the importance of climate change on the community's water infrastructure;
  - avoiding quick decisions now that will make it more difficult to manage climate change risks in the future; and
  - building understanding and capacity of the community to deal with the impacts of climate change on the island water infrastructure.

6.1.2 Overview of Current Situation

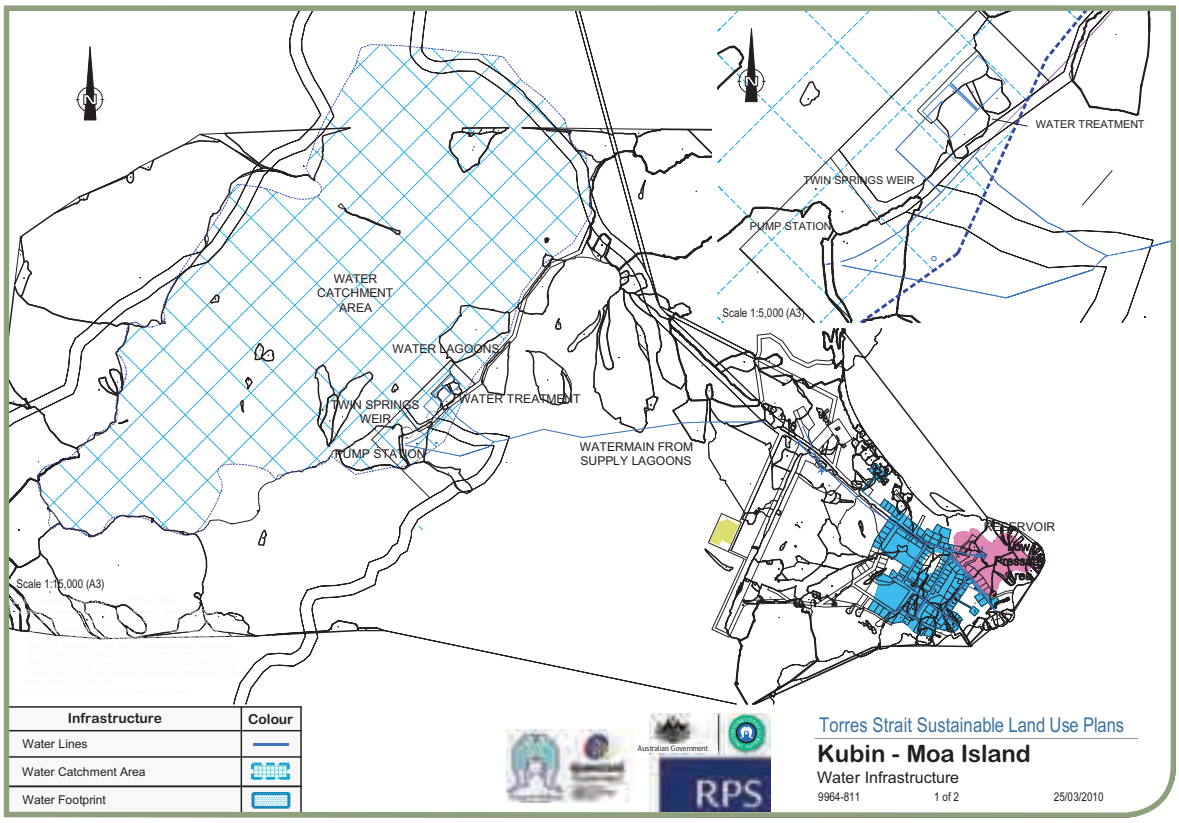
The existing water infrastructure has the following features:

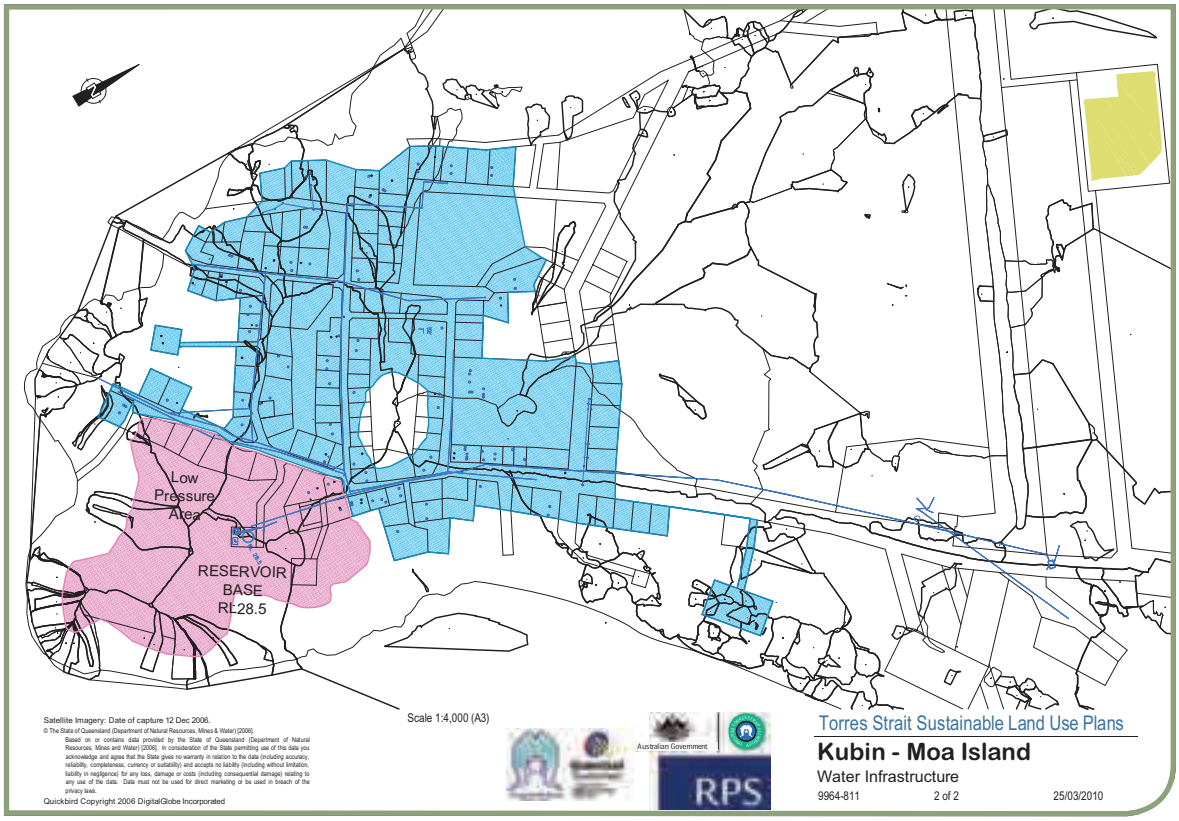
Source:	Water on Kubin is sourced from: • rainwater collected from the covered area of the storage lagoons located 2 km north of the airstrip; • an infiltration gallery/well system near the lagoons • a creek source near the lagoons
Treatment:	Water is treated via sand filtration and chlorination at the treatment plant located adjacent to the lagoons.
Storage:	Collected rainwater is stored the lined and covered storage lagoons. Water from the creek weir and the well is also stored in the lagoons before treatment. After treatment, water is pumped to the elevated 490kL concrete reservoir located on the hill to the south of the town area.
Delivery:	Potable water is delivered to the community from the reservoir via 100mm underground mains. All facilities are connected to the mains via branch lines and all facilities are individually metered.
Capacity:	The main source of water comes from the water collected on the covered area of the storage lagoons and the Twin Springs well and weir. The catchment area that supplies the well and weir is approximately 370ha (3000m x 1500m). The area of the lagoons is 8000m2 (135m x 65m). Based on the adopted design rainfall of 1,100mm/year, the average yield of the lagoons is around 11 ML per annum. The lagoon storage volume is approximately 20 ML. The annual safe yield for the well/infiltration gallery system is 19 ML and the annual safe yield for the weir is 44 ML giving a total annual safe yield from the underground sources of 63 ML. The combined water supply for a design year is therefore approximately 74ML. For the current estimated population of 218 people and the adopted average daily consumption rate of 300L/person per day, the average yearly demand for water is 23.9 ML. Accordingly, the water supply from the lagoons and well system is considered adequate for the existing population and for future growth. The total existing elevated water storage capacity is 490 kL. For the design population estimate of 218 persons and the adopted average daily consumption rate of 300L/person per day, there is approximately 7.5 days storage capacity, which is considered sufficient to meet water demand during periods of treatment plant breakdown and/or maintenance.
Usage:	The estimated current population is about 218 people. The most recent water consumption data indicates an average water consumption of 340l/person/day. There is scope to reduce water consumption towards the target of 300 litres per person per day.

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

Figure 10 shows the water scheme process.

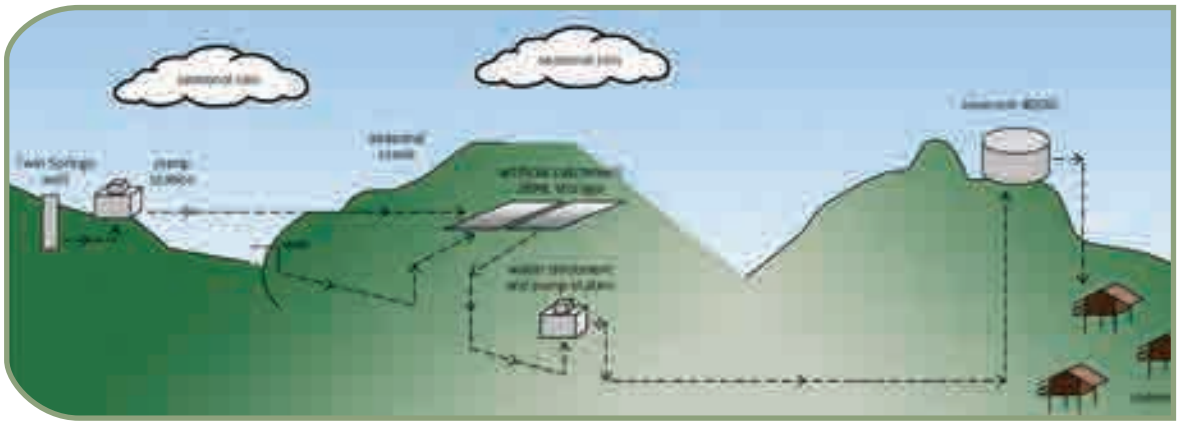
Map 14 Water Infrastructure





For more detail, refer to Map No. 9964-811 contained in Maps.

Figure 10 Water Scheme



6.1.3 Issues Overview

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

Existing Population	2009	= 218 persons
Predicted Population	2019	(Low Growth Estimate of 1.0% = 241 persons)
Predicted Population	2019	

Water supply at Kubin is currently at a level where the collected rainwater and groundwater is sufficient to meet the current demand. This situation should remain provided the island receives average yearly rainfall and the water consumption remains below the accepted target of 300 L/person/day. If the system is maintained correctly and the well production is managed in accordance with the acceptable yield limits, the system should be capable of providing adequate water for the next ten years assuming either a low or high growth population increase

Consequently, future expansion in the short term and long term can be adequately accommodated within the capacity of the existing system.

Any future expansion will require the obvious extension to the reticulation mains. The height of the existing reservoir should be adequate to provide sufficient head pressure to all potential development areas.

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

6.1.4 Land Use Strategies

To minimise the impact of water infrastructure on the natural and man made environments and to ensure that the current and future efficiency and effectiveness of Kubin 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 achieved by using water efficiently and managing consumer behaviour and demand for water.

6.1.5 Land Use Considerations

When assessing the impacts of future development on Kubin, 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; and
  - are water saving devices proposed?
- Is the water catchment area (if one exists) affected by the development?
- Is the development located within the area serviceable by current infrastructure? If not, is the required additional infrastructure adequately funded?

6.1.6 Sustainable Water Infrastructure Outcomes

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

6.2 Sewer

6.2.1 Best Practice

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

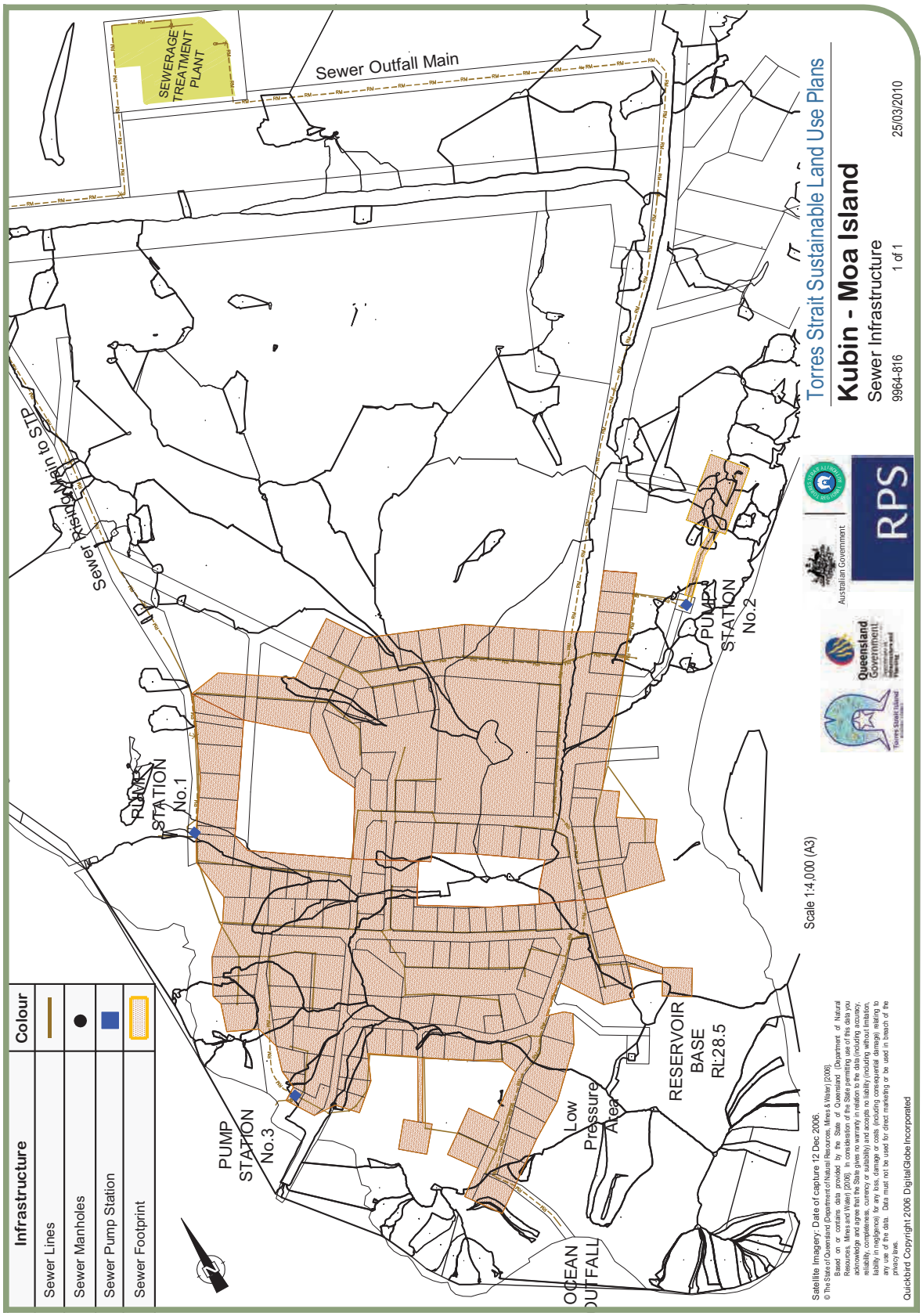
6.2.2 Overview of Current Situation

The existing sewerage infrastructure was completed in mid 2008 and has the following features:

Collection:	Sewage is collected via a reticulated gravity sewage collection system serving the town area.
Transfer:	Sewage from the reticulation system is collected in three pump stations (located within the town area) and pumped via a rising main to the Sewerage Treatment Plant.
Treatment:	Sewage is treated at the Sewerage Treatment Plant located on the northern side of the runway at the western end. The treatment plant comprises a series of open treatment lagoons and has been designed to treat effluent to a secondary level The existing treatment plant has been designed for a capacity of 480 people.
Discharge:	Treated effluent is pumped from the Sewerage Treatment Plant to an ocean outfall located at a remote site at the southern side of the main hill. The outfall enables the treated effluent to be dispersed to the open water.
Usage:	The treatment plant has been in use since early 2009 and has sufficient capacity to safely treat the wastewater from Kubin for at least the next ten years.

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

Map 15 Sewer Infrastructure



For more detail, refer to Map No. 9964-816 contained in Maps.

6.2.3 Issues Overview

The new treatment plant has sufficient capacity the treat effluent for a population of 480 persons. Consequently, there is sufficient capacity to meet the sewerage treatment needs well into the future.

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

The sewerage design population is predicted not to be reached until well after 2019.

Effluent Re-use

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

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

6.2.4 Land Use Strategies

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

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

6.2.5 Land Use Considerations

When assessing the impacts of future development on Kubin, 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?

6.2.6 Land Use Projects

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

6.2.7 6.2.7 Sustainable Sewer Infrastructure Outcomes

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

6.2.8 Useful Resources

Policies, Plans & Guidelines

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

www.dip.qld.gov.au/plumbing/2.html

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

6.3.2 Overview of Current Situation

Unlike many of the Torres Strait island communities, Kubin has space available for waste disposal. In 2006/2007, an upgrade of the existing waste disposal facilities was undertaken at specified communities, which in some instances required closure of the existing tips and provision of new landfill sites. The upgrades were intended to improve capacity and efficiency on the sites.

Kubin currently has a waste depot located approximately 4 kms east of the community. The waste depot is setback approximately 3kms from the coastline and is surrounded by vegetation that has high habitat value.

Waste is currently collected by a minipactor rubbish truck and deposited in within a fenced compound. The method of disposal is by Trench-and-cover.

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 trenches 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 Kubin immediately east of the new existing waste depot. This is the most suitable location on Kubin. At this stage, it is premature to investigate the impacts of this expansion, but the effect upon vegetation, habitat, Cultural Heritage and traditional ownership will need to be addressed when the expansion becomes necessary.

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

6.3.4 Land Use Strategies

To minimise the impacts of waste infrastructure on Kubin'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 Kubin.
- 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 Kubin, 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 Kubin at the end of the project addressed?

6.3.6 Land Use Projects

The following projects are recommended to be undertaken:

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

6.3.7 Sustainable Waste Infrastructure Outcomes

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

6.4 Electricity

6.4.1 Best Practice

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

6.4.2 Overview of Current Situation

Electricity is supplied to Kubin from a central power station located in the town area within the commercial section. The power station also supplies electricity to St Pauls community.

The generation, distribution and supply of electricity is undertaken by Ergon Energy on behalf of the state government.

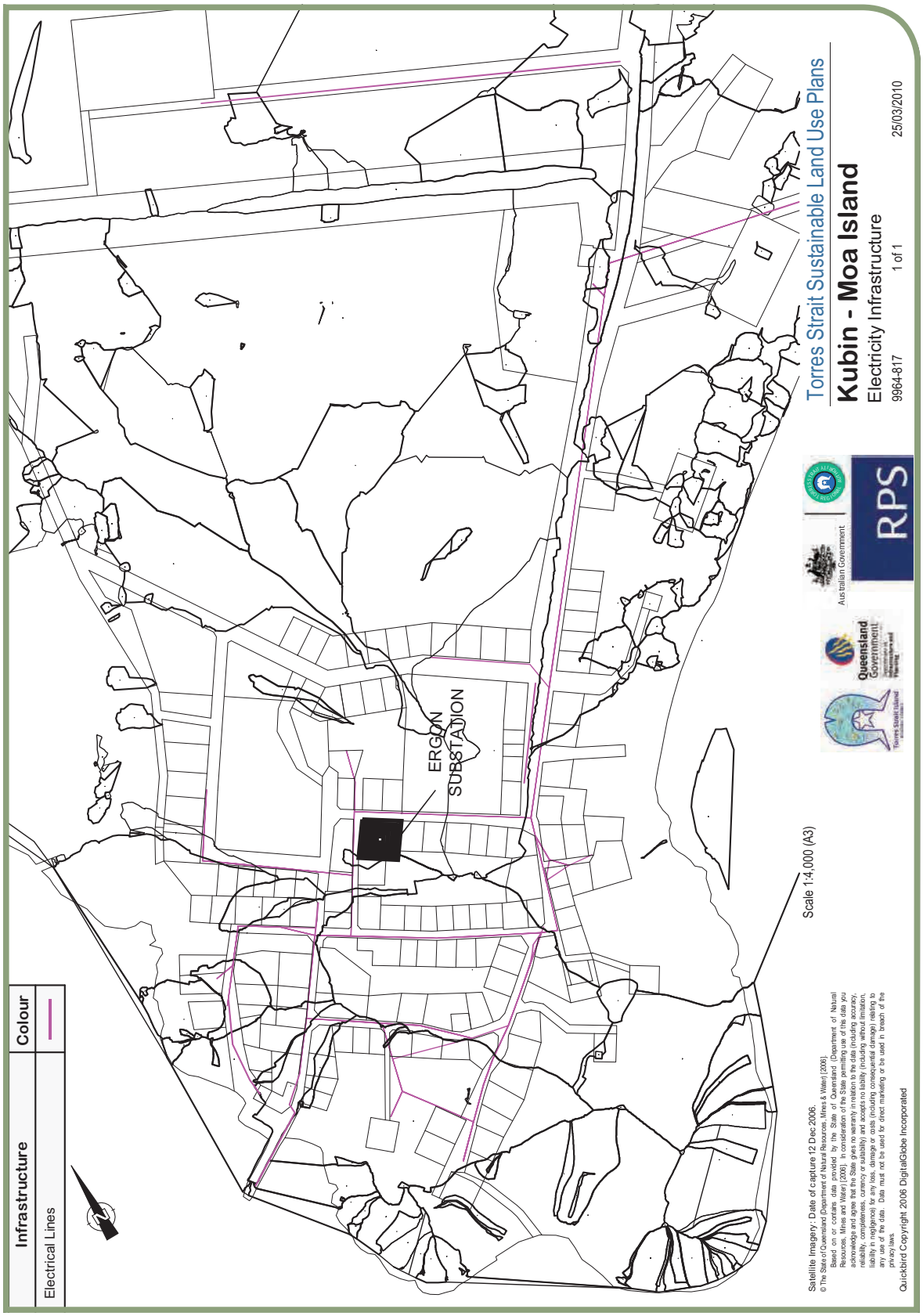
Electricity is generated through multiple diesel generator sets (gensets), which are sized to match the load as it fluctuates during the day. The gensets are modular and interchangeable and as such, are relatively easy to repair or relocate without disturbance to the continuity of electricity supply.

The cost to generate electricity on remote islands is significantly higher than the income received from the consumers, between a factor of 5–10. The State Government Community Service Obligation, as an equalised tariff, covers the difference in generation costs and income.

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

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

Map 16 Electricity Infrastructure



For more detail, refer to Map No. 9964-817 contained in Maps.

6.4.3 Issues Overview

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

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

From a land use perspective, gradual increase in population and the corresponding increase in demand is generally met by the inherited scalability in the system, i.e. the modular gensets can be reshuffled to suit. Large-scale increases in demand might require the upgrade of a switching and distribution infrastructure. Any new development away from the main powerlines may require a contribution to Ergon for the installation of powerlines/transformers etc, however this is generally considered on a case-by-case basis.

The power station at Kubin is unlikely to be considered for relocation in the medium to long term, however. if a new site is required in the future , an analysis of potential noise levels should be undertaken to avoid background diesel generator noise pollution in existing and future 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 Kubin, 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

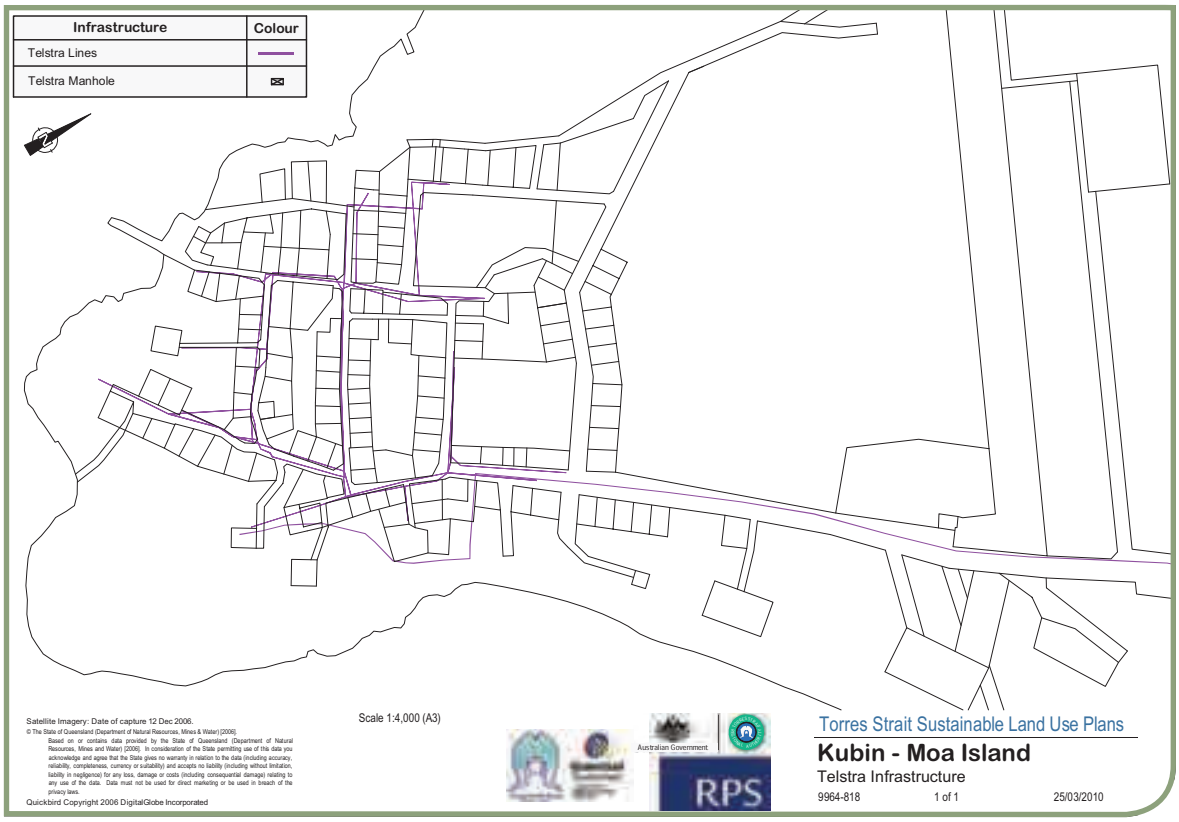
- Telecommunication facilities are expensive to install and consideration must be given to the proximity of existing telecommunication infrastructure when planning future development.
- The land around a telecommunication facility or service should be integrated and maintained to protect the land and 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 the community by:
  - recognising the importance of climate change on existing and future telecommunication facilities or services;
  - avoiding quick decisions now that will make it more difficult to manage climate change risks in the future; and
  - building understanding and capacity of the community to deal with the impacts of climate change on the Islands natural environments.

6.5.2 Overview of Current Situation

A Telstra tower is located on Masgi Road, east of the village prior to the basketball courts. There is mobile phone coverage over Kubin.

Map 17 shows the location of telecommunication infrastructure

Map 17 Telstra Infrastructure



For more detail, refer to Map No. 9964-818 contained in Maps.

6.5.3 Issues Overview

There are no known issues regarding telecommunications on Kubin.

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

6.5.4 Land Use Strategies

The following strategy is recommended:

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

6.5.5 Land Use Considerations

When assessing the impacts of future development on Kubin, 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 the community's road infrastructure by:
  - recognising the importance of climate change on the existing and future road infrastructure on the community;
  - avoiding quick decisions now that will make it more difficult to manage climate change risks in the future; and
  - building understanding and capacity of the community to deal with the impacts of climate change on the community's road infrastructure.

6.6.2 Overview of Current Situation

The majority of roads on Kubin are constructed at varying widths and are sealed. The roads can generally be trafficked in all weather, except for short periods of localised flooding.

The main road connecting the airstrip to the Kubin community is a main thoroughfare for distribution of goods. This road has been sealed with bitumen.

The 2006 Census indicates the following statistics:

- 11 privately owned vehicles;
- 38 households did not have a vehicle;
- 11 households had one vehicle; and
- Nil households had two vehicles.

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

6.6.3 Issues Overview

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

6.6.4 Land Use Strategies

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

- All development proposals must include landscaping and/or revegetation plans that are in accordance with the Best Practice, Land Use Strategies and Sustainable Outcomes outlined in this Plan.
- Transport planning considers the risk of natural hazards such as cyclones, tides, storm surges and acid sulfate soils with transport infrastructure located and designed to avoid or minimize the impact of such events.
- A 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.
- The beaches along the northern and southern coasts not be used by any form of vehicle.
- Encourage alternative forms of transportation around the community such as bicycle, scooter to reduce the reliance on petrol driven vehicles. This would also improve the problem of disused and abandoned vehicles consuming valuable space in the dump.

6.6.5 Land Use Considerations

When assessing the impacts of future development on Kubin, 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 of this land use plan?
- Does the development integrate the land use, efficient movement of people and goods and growth for Kubin?
- If the development is in a natural hazard area or adjacent to the northern and southern coastline, is the road located and designed to avoid or minimize the impact of such events?
- If a new street or road is proposed,
  - does it provide for vehicles, pedestrians and cyclists adequately
  - is it highly connected within the development, with the surrounding area and between settlements
  - does it propose road signage in keeping with Kubin's signage network?

6.6.6 Sustainable Road Infrastructure Outcomes

- The integration of land use and an efficient, safe and sustainable road network that minimises adverse impacts on the environment and reflects the needs of the community.
- Development encourages lower impact modes of travel such as walking and cycling
- All vehicles bought onto the community are to be removed from the island after construction is completed.
- All road infrastructure is inspected regularly and maintained to ensure that 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 the community.
- Reduce the impacts of climate change the community's drainage system and infrastructure by:
  - recognising the importance of climate change on the community's drainage system and infrastructure;
  - avoiding quick decisions now that will make it more difficult to manage climate change risks in the future; and
  - building understanding and capacity of the community to deal with the impacts of climate change on the community's drainage system and infrastructure.

6.7.2 Overview of Current Situation

As the village is located in a hilly area, there are several major drainage channels:

- From the Council office to the barge ramp;
- In the central area behind the Health Centre, RTC, Community Hall and Church. This was upgraded in 2009 to improve drainage flows; and
- South of the guesthouse to the beach.

6.7.3 Issues Overview

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

6.7.4 Land Use Strategies

The following strategy is recommended:

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

6.7.5 Land Use Considerations

When assessing the impacts of future development on Kubin, 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. Down stream catchment and adjoining properties?

6.7.6 Sustainable Drainage Infrastructure Outcomes

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

6.8 Air Access

6.8.1 Best Practice

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

6.8.2 Overview of Current Situation

The aircraft facilities at Kubin comprise of a 1,000m long by 60m wide airstrip located on the central flat area of the Island. Other facilities include a 20 metres wide sealed runway, helicopter landing area, sealed apron and waiting building.

Regular air services exist between Kubin and some of the surrounding islands.

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

6.8.3 Issues Overview

Lighting of the airstrip would provide safe access to the island at night time, in emergencies and in bad weather, however it may be cost prohibitive and contribute to increase in energy consumption of the island.

Land surrounding the airstrip represents a sensitive and valuable resource. It is critical that the land use planning process considers the implications of incompatible land uses on the operations of the airstrip and associated facilities.

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 Projects

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

6.8.6 Land Use Considerations

When assessing the impacts of future development on Kubin, 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?

6.8.7 Sustainable Air Infrastructure Outcomes

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

6.9 Sea Access

6.9.1 Best Practice

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

6.9.2 Overview of Current Situation

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

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

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

Issues Overview

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

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

6.9.3 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.

6.9.4 Land Use Considerations

When assessing the impacts of future development on Kubin, 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 the desalination plant is it a compatible land use for port activities?

6.9.5 Sustainable Sea Access Outcomes

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

RPS

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