Great Keppel Island

REVITALISATION PLAN

EXECUTIVE SUMMARY

Great Keppel Island

REVITALISATION PLAN

PROUDLY PREPARED BY

CQG Consulting

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WATG

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frc environmental
deep thinking. science.

WATER TECHNOLOGY
WATER, COASTAL & ENVIRONMENTAL CONSULTANTS

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EXECUTIVE SUMMARY

ES.1 Title of the Project

Great Keppel Island Resort Revitalisation Plan (hereafter "GKI Revitalisation Plan" or "Project").

ES.2 GKI Revitalisation Plan Objectives

The objective of the GKI Revitalisation Plan is to re-establish GKI (the Island) as a premier domestic and international tourist destination, whilst protecting and enhancing the Island's significant environmental values and World Heritage status.

The GKI Revitalisation Plan is underpinned by the following design objectives:

- to recognise and protect the Outstanding Universal Values (OUV) associated with the Island and surrounding Great Barrier Reef World Heritage Area (GBRWHA);
- to seek to ensure the ecological and sustainable development of the Project;
- to conserve the superlative natural phenomena and areas of exceptional natural beauty and aesthetic importance on the Island;
- to protect the biodiversity and terrestrial and aquatic ecosystem function of the Island and surrounding marine environment;
- to provide equitable, safe and convenient access to the Island by air and by sea;
- to ensure that the GKI Revitalisation Plan design is responsive to the effects of climate change, including sea level rise and storm surge impacts;
- to promote a built-form typology that:
    - integrates with and is subordinate to the natural environment in terms of scale, bulk, materials, and colour;
    - is passively and actively responsive to the Island's mild sub-tropical climate; and
    - complements the Queensland sub-tropical modern architectural design aesthetic.

- to respect and enhance the Island's existing landscape character and utilise endemic plant species where possible in revegetation and landscaping; and
- to provide physical infrastructure commensurate with the intended scale and density of development.

The principles of Ecologically Sustainable Development (ESD) have been a driving factor in the development of the GKI Revitalisation Plan. The cornerstone of the GKI Revitalisation Plan's ESD initiatives will be a commitment to the use of renewable energy by embracing one of Australia's most significant natural resources, its abundant sunshine. The GKI Revitalisation Plan has adopted an ambitious sustainability strategy to produce more clean renewable energy than it consumes each year. This is a specific and targeted response by the proponent to begin to address the issue of climate change.

Importantly, the GKI Revitalisation Plan primarily occupies lands previously disturbed by the former resort or rural pursuits.

Refer **Section 2.2.1** for further information on project objectives.

ES.3 Project Description

The Proponent proposes to create a low rise, eco-tourism resort on the Island referred to as the GKI Revitalisation Plan.

The GKI Revitalisation Plan includes the following elements:

- 575 hectares of environmental protection area (approximately 40 percent of the Island and 65 percent of Lot 21) to be rehabilitated and protected in perpetuity;
- construction of a new hotel at Fisherman's Beach comprising 250 suites, restaurants, reception, conference rooms, day spa and a range of resort recreation activities;
- marina at Putney Beach comprising 250 berths, emergency services facilities, ferry terminal, yacht club and dry dock storage. The marina is to be supported by an active mixed use hub comprising Eco Resort Apartments, cafes, restaurants and shops;
- dredging activities for construction of the marina and re-nourishment of Putney Beach;
- golf club and 18 hole golf course designed by Greg Norman Golf Course Design, integrated with essential habitat and ecological corridors. The golf course will also form an essential part of the wastewater re-use and treatment system;
- relocation of and extension to the existing airstrip to facilitate aircraft movements direct from Brisbane, Cairns, Sydney and Townsville;
- 750 Eco Resort Villas incorporating sustainable building design, rooftop solar panels and water tanks;

- 300 Eco Resort Apartments incorporating sustainable building design, rooftop solar panels and water tanks;
- submarine utilities connection between the Island and mainland comprising electricity, water and telecommunications services;
- utility and services area incorporating a waste collection facility, equipment service area, wastewater treatment plant, solar electricity generation and emergency backup electricity plant (and associated fuel storage);
- emergency service facilities for fire-fighting and police;
- resort worker accommodation;
- total water cycle management plan incorporating water sensitive urban design initiatives including but not limited to rooftop rainwater harvesting, bio-retention basins, constructed wetlands and grassed swales;
- establishment of appropriate buffer zones to ensure protection of sensitive environmental areas, including surrounding marine waters;
- establishment of the Great Keppel Island Research and Heritage Centre which will aim to deliver an improved understanding of the surrounding marine and terrestrial environments and to actively undertake conservation works to enhance the natural environment;
- preservation of Indigenous sites of significance (in consultation with Traditional Owners); and
- Restoration of the original Leeke's Homestead.

Refer **Figure ES.1 – Great Keppel Island Resort Revitalisation Plan**.

Refer **Figure ES.2 - Proposed GKI Research and Historic Centre**.

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Figure ES.1 GKI RESORT REVITALISATION PLAN

Figure ES.2 PROPOSED GKI RESEARCH AND HISTORIC CENTRE

The Proponent recognises the values of the GBRWHA and the need to ensure that the proposed action does not result, or have the potential to result, in unacceptable environmental impacts. Of particular importance is the need to ensure that the Project design, construction and operation would not have an unacceptable impact on the ecological and biological processes on the Island or the surrounding marine waters.

Following rejection of the previous resort redevelopment plan in 2009 by Federal Minister Garrett and concerns raised by the community, the Proponent engaged a team of specialists led by local consulting firm CQG Consulting to completely overhaul the Project. The Proponent has been working with its architects, planners, engineers, world heritage specialists, environmental scientists, community focus groups and government officers for a number of years on various iterations of the GKI Revitalisation Plan to develop a resort concept that could be considered suitable on an island within the GBRWHA. The GKI Revitalisation Plan is significantly scaled back in comparison to prior iterations and has been derived through a rigorous constraints-based approach to the ESD principles of the Island.

The GKI Revitalisation Plan seeks to ensure that the biodiversity of the GBRWHA is not adversely affected by the Project and that any identified environmental, cultural or social impacts are low risk and capable of being avoided, mitigated or offset.

The GKI Revitalisation Plan will meet all current environmentally sustainable tourism practices and aims to set a new benchmark via the EarthCheck Precinct Planning and Design Standard (based on Agenda 21 principles) for environmental management practices on islands in the GBRWHA.

Figures ES.2 and **ES.3** are artistic impressions of the proposed Fisherman's Beach and Clam Bay Precincts proposed by the Revitalisation Plan, respectively.

Figure ES.3 FISHERMAN'S BEACH PRECINCT VISUAL IMPRESSION[1]

Figure ES.4 CLAM BAY PRECINCT VISUAL IMPRESSION[2]

1. ***Figure ES.3*** *is an artistic impression only. Refer to* ***Section 3.2.2*** *for visual impact assessment.*
2. ***Figure ES.4*** *is an artistic impression only. Refer to* ***Section 3.2.2*** *for visual impact assessment.*

ES.3.1 Resort Operation

The three types of accommodation proposed as part of the GKI Revitalisation Plan are:

- Fisherman's Beach Hotel – providing fully serviced suites with a full array of resort amenities;
- Eco Resort Villas – providing a low-rise, climate responsive (active and passive), resort accommodation option. The Eco Resort Villas will be free-standing and positioned within the natural topography of the Island. Eco Resort Villas will include sustainability features including roof top solar panels, solar hot water, rainwater tanks and be designed to maximise natural solar access and natural ventilation. The Eco Resort Villas will be ideally suited for tourist families, or couples, comprising an open plan layout, verandah, two to three bedrooms and kitchen facilities. The architecture of the Eco Resort Villas will be focussed on ensuring that they blend into the natural landscape and that their visual impact from the marine waters and the Island itself will be minimised; and
- Eco Resort Apartments – providing alternative compact accommodation options, within a low-rise climate responsive built form. The Eco Resort Apartments will include similar sustainability features to the Eco Resort Villas. In contrast to the Eco Resort Villas, the apartments will provide guests with a more compact form of accommodation and be located around the marina and within proximity to the Fisherman's Beach Hotel.

The Fisherman's Beach Hotel will be managed by an internationally recognised hotel management group and discussions have already commenced between the Proponent and a number of very capable and experienced management groups. It is imperative that a reputable, experienced management group be appointed for the Hotel as this will be a focal point of the Resort.

The Eco Resort Villas and Eco Resort Apartments will be available to be purchased by individuals for holiday rentals and will be centrally managed by the Proponent from a management office located on the Island. Tourists wishing to make a booking at the Resort will either contact the management office or make a booking online through the website. The Resort will establish relationships with other domestic and international booking agencies and tourism offices to promote the Region and arrange bookings.

Permanent residential accommodation on the Island is not proposed in the GKI Revitalisation Plan and there is no plan to convert Lot 21 to freehold tenure.

ES.4 Key Changes to Revitalisation Plan Made During the EIS Process

The EIS process involved the collaboration of a range of technical experts to determine solutions which would ensure that any environmental impacts associated with the GKI Revitalisation Plan could be avoided, managed, mitigated or offset.

The EIS process commenced with a detailed environmental constraint mapping exercise to determine an appropriate development footprint of the Revitalisation Plan. This exercise involved a series of on-site ground truthing surveys to identify and map various environmental constraints including, but not limited to, the following:

- setbacks from beaches and storm surge;
- mapping of remnant Regional Ecosystems (RE) which have Conservation status of Endangered or Of Concern;
- mapping of remnant RE which have Biodiversity status of Endangered or Of Concern;
- areas of 'special' vegetation or habitat;
- protected marine and intertidal vegetation;
- buffers to vegetation, watercourses and wetlands;
- essential habitat of species scheduled under the *Nature Conservation Act* and *Environment Protection and Biodiversity Conservation Act*;
- fringing reefs, coral communities, wave-cut platforms, seagrass beds and intertidal wader bird habitats;
- areas of high scenic amenity or sensitivity;
- the OUV of the GBRWHA; and
- steep slopes.

Following the preparation of these environmental constraints, the Resort masterplanners were issued with a series of constraints maps and instructed to amend the Revitalisation Plan to avoid areas of high environmental significance. Some of the major design changes that were made to the plan as a result of the constraints mapping exercise include:

- significant scale back of the entire development;
- removal of villas above Wyndham Cove due to visual constraints;
- removal of buildings along the southern marina break wall due to visual constraints;
- removal of villas behind Leeeke's Beach due to environmental constraints;
- redesign of the layout within the Clam Bay Precinct to focus development in areas of low visual impact and low flora and fauna significance;
- re-alignment of the existing road behind the Leeke's Beach wetlands to further set the road back and increase the buffer to the wetlands;
- re-alignment of the marina entrance channel to minimise dredging requirements;

- relocation of the existing airstrip to the north east to provide an airstrip that will comply to current CASA standards. This relocation will also reduce the direct aircraft impacts to the existing dwellings along Fisherman's Beach, will improve the amenity of the proposed Fisherman's Beach villas as they will be located closer to the beach and will also reduce the overall development footprint of the villas within the Fisherman's Beach precinct; and
- redesign of the Fisherman's Beach hotel following the relocation of the airstrip.

Other important outcomes of the environmental constraints-based exercise are indicated below.

ES.4.1 Increased Environmental Protection Precinct

The Environmental Protection Precinct has been increased in area from 545 hectares to 575 hectares. This area will provide for the rehabilitation, ongoing maintenance, management and protection of the environment. It is proposed that this area have a 'Conservation' lease purpose (under a lands lease) requiring appropriate management by the Proponent.

ES.4.2 Improved Marina Design

Following meetings with Great Barrier Marine Park Authority (GBRMPA), the Department of Sustainability, Environment, Water, Population and Community (SEWPaC), Maritime Safety Queensland (MSQ) and a range of other stakeholder groups, extensive assessment of the marina was undertaken which included the preparation of a bathymetric survey, sub sea-bed profiling survey, core sampling of the marina footprint sediment and a series of on-site survey investigations throughout different seasons by marine ecologists. This assessment has resulted in the following improved marina design initiatives:

- the marina entrance channel has been re-aligned from the south-west to the north-west which has resulted in a reduced channel length of approximately 1,070 metres which has significantly reduced the volume of dredge material. **Figure ES.5 (Marina Entrance Channel Options)** illustrates the south-west and north-west entrance channels and clearly highlights the reduced channel length of the north-west option;
- an innovative approach to the construction of the marina break walls has been developed. The proposed engineering solution for the construction of the marina involves the dredge material to be re-utlised to fill geotextile tubes which will form the core of the break walls and the material required for the land reclamation. Beneficial re-use of the dredge material will eliminate the need for sea dumping and significantly reduce the amount of rock armour required to be transported to the Island;

- Putney Beach is currently experiencing significant shoreline erosion. The coastal engineering modelling has determined that the construction of the marina will reduce the rate of shoreline recession along Putney Beach in the short term and result in the increase in beach volumes along Putney Beach over the long term;
- Putney Creek currently leads into the proposed marina area and the mouth of the creek is regularly blocked by a sand bar. The natural hydrology of Putney Creek is believed to have been modified as a result of a number of previous land uses, including the construction of the existing airstrip. Following rigorous assessment by the aquatic scientists, flora and fauna experts, engineers and marina designers, it was determined that the most appropriate solution from an ecological, amenity and maintenance perspective would be to remove the sand bar and open the creek mouth so that the lower reaches of the creek become tidal. By reopening the Putney Creek mouth it will reinstate what is likely to be the natural hydrology prior to the construction of the existing runway and would lead to increased flushing of the creek. Furthermore, it will result in improved water quality within the creek and consequently enhanced ecosystem health and fishing productivity. A sediment basin trap has also been incorporated into the design to reduce siltation into the marina and reduce maintenance dredging; and
- in order to reduce the visual impact of the marina, a series of buildings which were proposed to be constructed along the marina break wall have also been deleted from the Plan.

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ES.5 MARINA ENTRANCE CHANNEL OPTIONS

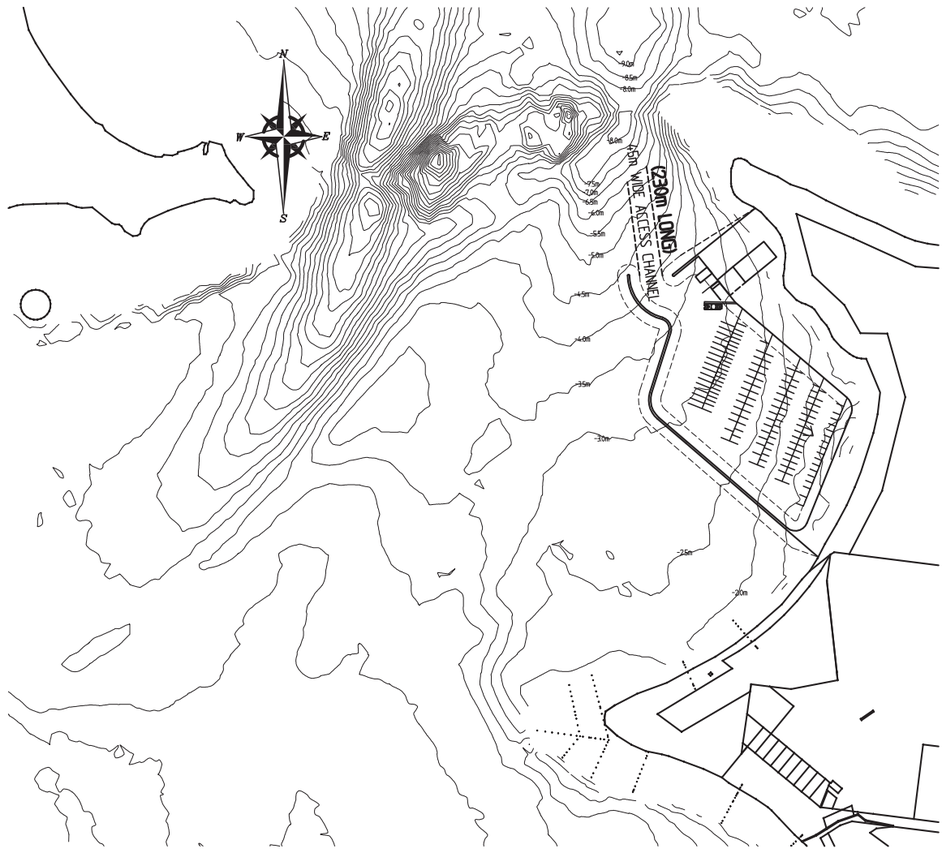
SOUTH WESTERN ENTRANCE CHANNEL OPTION

0 100 200 300 400 500m

SCALE 1:10000 (A3)

NOTES:

1. BASE DRAWING WITH CONTOURS FROM DRAWING No. 11001 FITZ 20x20 GRID DATED 28/02/2011.
2. ALL LEVELS ARE IN METRES AND REDUCED TO AUSTRALIAN HEIGHT DATUM (AHD). (CD. = -2.4m AHD)



NORTHERN ENTRANCE CHANNEL OPTION

0 100 200 300 400 500m

SCALE 1:10000 (A3)

International Marina Consultants

Consultants to the Marina Industry.

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Client: GKI RESORT PTY LIMITED

Project: GREAT KEPPEL ISLAND

Title: ENTRANCE CHANNEL OPTIONS

Revision:

Date:	16/12/2011
Drawing No.:	3100-SK12
Scale:	1:10000 (A3)
Drawn By:	W.L.
Designed By:	
Approved By:	

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ES.4.3 Innovative Wastewater Treatment Strategy

The golf course will provide an integral component of the Resort's sustainable wastewater treatment strategy. The Resort's wastewater is proposed to be treated to a very high standard and in most years, 100 percent of the treated wastewater will be recycled and beneficially reused for irrigation purposes on the golf course and other landscaped areas of the Resort. A comprehensive water and nutrient balance model demonstrates that the proposed recycled water irrigation scheme will not increase nutrient leaching or runoff rates compared to modelling of a no irrigation scenario.

As a result of the beneficial reuse of the wastewater on the golf course, emergency discharge of treated recycled water via an ocean outfall is almost entirely eliminated. The emergency discharge may only occur once every 10 years on average during periods of extreme wet weather. It should also be noted that during these periods of extreme wet weather, the Island is likely to be effected by sediment flows from the Fitzroy River.

ES.4.4 Confirmed Commitment for the Resort's Energy Use to be 'Carbon Positive'

AECOM Engineers and ARUP Engineers reviewed the energy requirement of the Resort throughout the EIS process and confirmed the Project commitment to provide a 'carbon positive' solution to the Resort's energy use through the application of roof top solar panels to the Resort buildings. This would result in the Resort generating more clean renewable energy than it actually consumes on an annual basis. In order to meet this objective, the Resort will install in excess of 24,000 roof top solar panels. By undertaking this initiative, the Resort will be actively seeking to make a positive contribution in response to the most important issue facing the long term survival of the Great Barrier Reef – climate change.

ES.4.5 Infrastructure Footprint

Throughout the EIS process, a concerted effort has been made to minimize the overall infrastructure footprint on the Island. As a result, the total infrastructure footprint (including all roads, buildings, airstrip and other impervious physical infrastructure) will represent approximately 3.52 percent of the Island.

ES.5 Project Proponent

The Proponent of the GKI Revitalisation Plan is GKI Resort Pty Ltd which is wholly owned by Mr Terrence Agnew whose principal trading company is Tower Holdings.

Tower Holdings contact details are:

Level 30, 100 Miller Street,
NorthSydney NSW 2060

Phone: (02) 9923 5700

Email: mail@towerholdings.com.au

Tower Holdings is a 100 percent privately Australian owned property investment and development company which has been operating for over 30 years in New South Wales, Queensland and Victoria. Tower Holdings has a proven track record in commercial, residential, hotel and accommodation property development and investment. **Table ES.1** represents part of the Proponent's property portfolio (excluding Great Keppel Island Resort).

Table ES.1 TOWER HOLDINGS PROPERTY PORTFOLIO

PROPERTY	LOCATION	DEVELOPMENT TYPE	DESCRIPTION	Value ($mil)
Apartments	185 Macquarie Street, Sydney, New South Wales	Residential	Tower Holdings successfully completed this residential project in 2006 which comprises 42 luxury apartments.	100
Republic Serviced Apartments	375 Turbot Street, Spring Hill, Queensland	Short-term Accommodation	Tower Holdings successfully completed the development of the Republic Serviced Apartments in 2002. The building contains 89 fully furnished hotel-type apartments above the Spring Hill Shopping Centre in the Brisbane CBD.	25
Tribeca Serviced Apartments	292 Boundary Street, Spring Hill, Queensland	Short-term Accommodation	Tower Holdings successfully completed the development of the Tribeca Serviced Apartment building in 2003. Tribeca Apartments Brisbane provides short term accommodation for the corporate business guest or leisure traveller.	20
Northpoint	100 Miller Street, North Sydney, New South Wales	Office (A-grade) / Retail Shopping Centre	Tower Holdings purchased the Northpoint office building in 2008. Northpoint is the tallest building in the North Sydney CBD and comprises approximately 36,000m² of floor area over 42 levels comprising A-grade commercial office space, and retail shopping centre.	300

The Proponent has developed an environmental policy (refer **Appendix I**) with the clear intent to protect and enhance the natural environmental and cultural heritage values of Great Keppel Island. The Proponent commits that the policy will be reviewed prior to the commencement of construction activities with input from the local conservation groups, the Island residents and environmental and cultural heritage specialists.

ES.6 Project Location

The GKI Revitalisation Plan is proposed on parts of GKI (the "Island"). Located 12 kilometres off the Central Queensland coast (refer **Figure ES.6**) GKI is one of 16 islands collectively known as the Keppel Group Islands, located within the southern part of the Great Barrier Reef World Heritage Area (GBRWHA) (refer **Figure ES.7**).

Fourteen of the Keppel Islands are designated National Parks and do not present opportunities for tourism development. Pumpkin Island (approximately eight hectares) and Great Keppel Island are the only islands of the Keppel Group not designated as National Parks.

Figure ES.6 LOCATION MAP

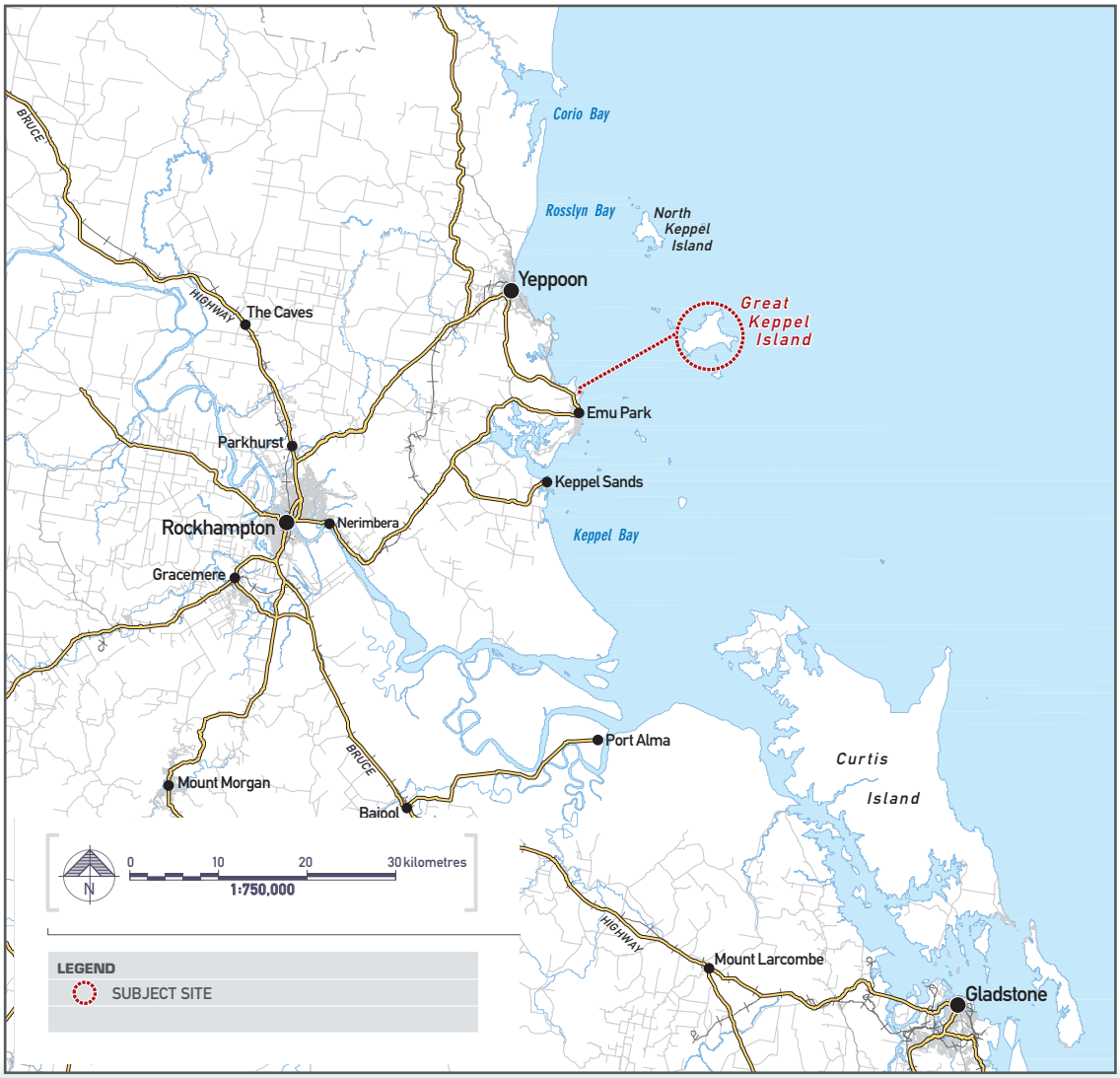
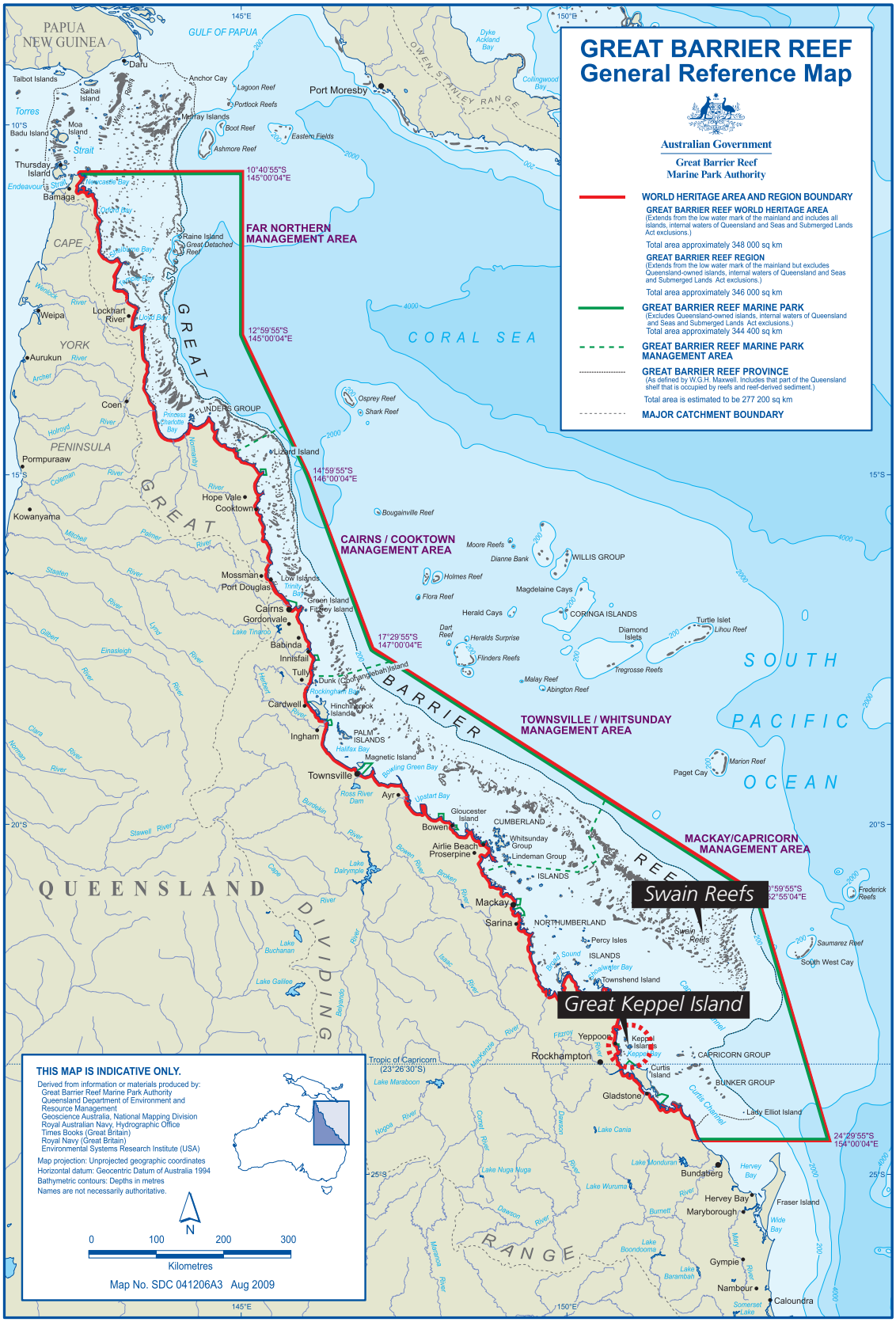


Figure ES.7 PROJECT LOCATION IN THE CONTEXT OF THE GBRWHA



Specifically, the GKI Revitalisation Plan incorporates State land leased by GKI Resort Pty Ltd and identified in **Figure ES.8.**

In addition to land currently leased by the Proponent, additional land leases and resource entitlements are required to facilitate the construction and operation of the GKI Revitalisation Plan. Additional land to which no current title exists is also required for the following GKI Revitalisation Plan elements:

- proposed marina in the Marine Services Precinct;
- proposed airstrip; and
- proposed utilities services corridor between the Island and mainland.

Refer **Section 3.2.1** for further details on land use and tenure.

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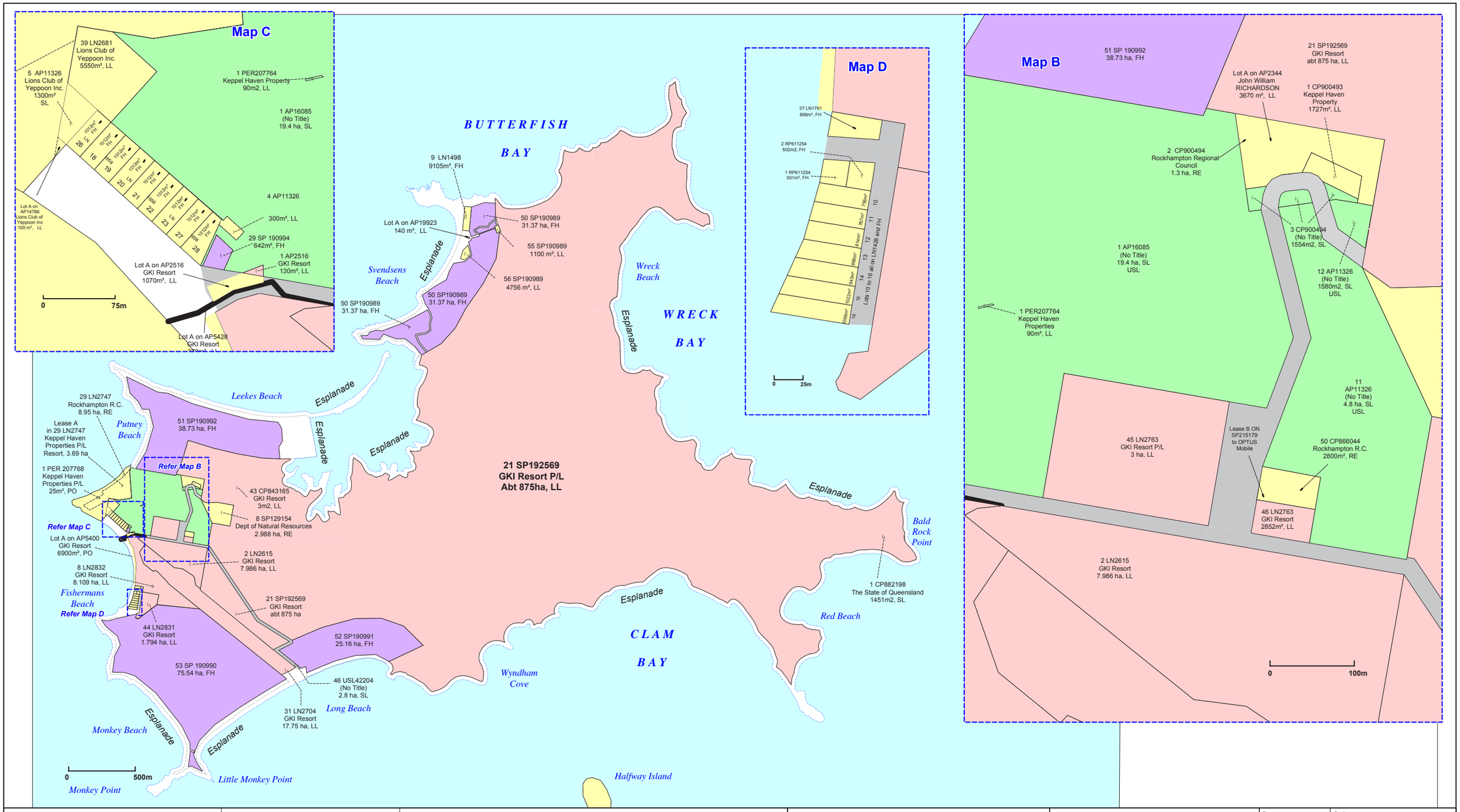
ES.8 LAND TENURE MAP



NOTES:

This map was created to assist with identifying the registered owners and property descriptions for allotments on Great Keppel Island, and it should not be used for any other purpos without the written consent of Schlencker Surveying.

This information is not regarded as survey accurate. Area figures shown are estimates only.

These notes are an integral part of this map.

SOURCE INFORMATION:

This map was prepared using the Digital Cadastral Database (DCDB). This DCDB data was supplied under licence by the Queensland Department of Environment & Resource Management, and is current to June 2011.

OWNERSHIP LEGEND:

- Woppabura People
- GKI Resort
- Other Land
- No Title
- Road Reserve
- Esplanade

Great Keppel Island Registered Owners and Property Descriptions (including Woppabura land)

SCHLENCKER SURVEYING
A.B.N. 54 516 250 722
SURVEYING, MAPPING & DEVELOPMENT CONSULTANTS
181 East St., ROCKHAMPTON
Ph: (07) 49 271744
Fax: (07) 49 223164
Also at BRISBANE & GOLD COAST

Drawn: DCE	Scale: As shown
Date: 23-6-2011	Parish: KEPPEL
Checked:	County: Livingstone
Date:	Ref: 5341-21

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ES.7 Project Rationale

Tourism is one of Australia's most important industries. In 2010, tourism contributed $33 billion (2.6 percent) to Australia's Gross Domestic Product (GDP) and directly employed in excess of half a million people or 4.5 percent of the total labour force. Tourism is also Australia's largest services export industry, generating around $23 billion in exports each year. In Queensland alone, the tourism industry employs some 118,000 people directly and a further 120,000 people indirectly, which accounts for almost 10 percent of the State's entire labour force.

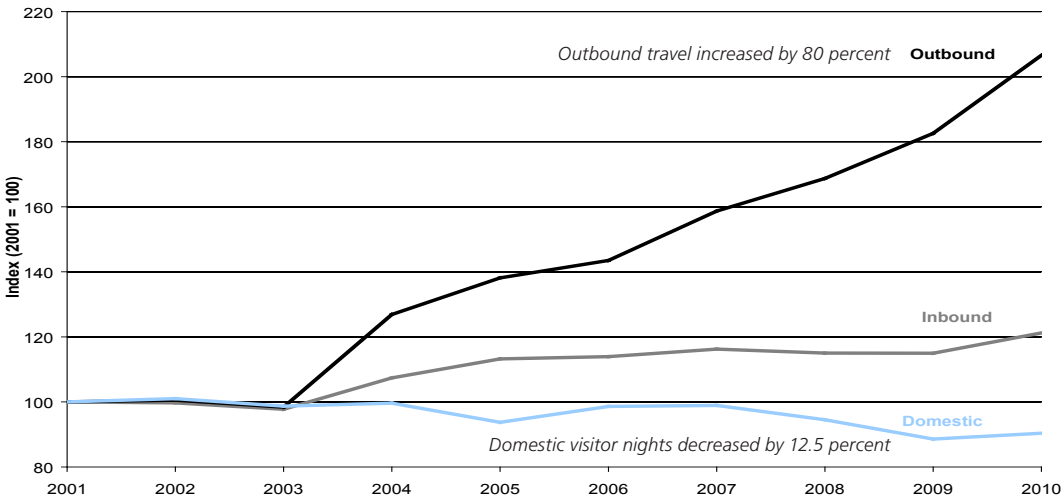
Queensland experienced a significant tourism boom throughout the 1970s and 1980s. It was throughout this time that many of the currently operating tourism resorts in tropical North Queensland, the Whitsundays and South East Queensland were built. However, over the previous decade, Queensland has seen a steady decline in its tourism sector.

Furthermore, according to the data released by Tourism Research Australia, tourism is diminishing in importance in the overall Australian economy and losing share in the global tourism market. A 14 percent reduction in Australia's global share in tourism was reported between 1995 and 2008. From 1997/98 to 2008/09, tourism's share of national GDP dropped from 3.1 percent to 2.6 percent, tourism's share of total employment declined from 4.9 percent to 4.5 percent and tourism's share of total exports declined from 11.6 percent to 9.0 percent.

The most concerning issue facing Australia's tourism industry is the fact that the domestic tourism sector has performed very poorly over the past decade. In the period between 2000 and 2009, the number of total domestic visitor nights fell by 12.5 percent while over the same period, Australian outbound travel grew by 80 percent. The result of this is that Australians are choosing to holiday abroad rather than within Australia at an increasing pace.

The widening disparity between domestic tourism and outbound tourism between 2001 and 2010 is presented in **Figure ES.9**.

Figure ES.9 INBOUND, OUTBOUND AND DOMESTIC OVERNIGHT TOURISM, 2001 TO 2010



Source: Australian Bureau of Statistics, Overseas Arrivals and Departures (cat. no. 3401.0); Tourism Research Australia, Travel by Australians.

The Australian Government commissioned Jackson Report (2009) clearly acknowledges this disparity between falling domestic tourism and rapidly increasing outbound tourism. The report concluded that: "*Australia cannot afford to let this tourism decline drift along unchallenged. To do nothing would pose serious risks to national growth, jobs, economic resilience and balance of payments*" (p.14).

The Proponent's research indicates that the fundamental reason for the decline in Queensland's tourism industry, and its continuing downward trend, is the lack of new investment in Queensland's tourism infrastructure which has failed to keep pace with the increased competition from South East Asia. The high dollar, recent floods and the Global Financial Crisis have all served to compound the problem, however, the fundamental issue has been the lack of new tourism investment.

Highlighting the lack of new investment in Queensland tourism is the fact that there has not been a major new tourism resort project built within the GBR since Hamilton Island and the Sheraton Mirage at Port Douglas. These projects were both completed over 25 years ago.

The GBR is undoubtedly Queensland's premier tourist attraction. Protection of Australia's natural assets and in particular the GBR and the GBRWHA has necessitated the requirement for all tourism development projects adjacent to the GBR to undergo a comprehensive environmental impact assessment and approval process. The need for significant up-front investment by developers to undertake these assessments and the uncertainty of approval timelines is likely to be a contributing factor to the decline in the domestic and foreign investment into Queensland tourism developments.

The Jackson Report further acknowledges that "*to compete in a competitive and rapidly changing environment, Australian tourism must focus on its supply-side and develop destinations that are attractive, intelligently priced, welcoming, easily accessible and well supported by surrounding infrastructure. This will only be achieved through product development.*"

A positive aspect of the current tourism data is the fact that Australians are continuing to holiday, however, the problem is that they are increasingly preferring to travel overseas rather than in the domestic Australian market. In order to reverse this trend and improve the Australian tourism sector, new tourism investment is required to compete with the international markets and make the case more compelling for Australians to holiday domestically rather than internationally. By improving the standard of the domestic tourism product, more Australians are likely to choose to holiday in Australia.

Improving the domestic tourism product in Australia will not only improve domestic tourism but also improve international tourism arrivals. In particular, Tourism Australia forecasts that the number of Chinese and Indian visitors to Australia are expected to double over the next decade.

The proposed GKI Revitalisation Plan will constitute the most significant new tourism investment in Queensland for over 20 years and will provide Australian tourists with a genuine alternative to travelling overseas. The Project will have the potential to re-invigorate the struggling Queensland and Australia tourism industry and specifically, will serve to diversify and strengthen the tourism industry in Central Queensland.

ES.7.1 Economic Benefits

The proposed GKI Revitalisation Plan will add significantly to the variety of Queensland's GBR and coastal island attractions, improving the economic diversity and social opportunities of the Region.

The GKI Revitalisation Plan is forecast to provide the following substantial economic effects:

- a direct capital injection in the order of $592.5 million;
- an average of around 2,274 visitors, staff and residents on the Island each day. This is comparable to the peak daily visitation of the Island in the early 1990's;
- forecast annual expenditure of $83 million per annum on the Island by its visitors and employees;
- a substantial increase in total visitor days in the Region;
- provision of a significant number of local business opportunities in the Region;
- diversification of the Capricorn Regional economy through promotion of the regional tourism industry, making the Region less reliant on the commodity price–driven mining and agricultural industries;
- privately–funded infrastructure development provided at no direct cost to Government;

- significant increases in Local and State Government revenue through rates, headworks charges, property transaction duties, land tax and payroll tax; and
- forecast economic impact on the Gross Regional Product of the Fitzroy Region of $458 million from construction, and around $75 million per year when fully operational.

ES.7.2 Employment Benefits

The GKI Revitalisation Plan is also predicted to provide substantial employment opportunities. In total, the GKI Revitalisation Plan is expected to create approximately 1,055 operational jobs each year and an average of 427 construction jobs over the 12 year construction period, making it one of the largest employment generators in the whole Capricorn Region. The breakdown of the expected employment creation is as follows:

- an average of 263 (direct) construction–related jobs each year during the 12 year construction period, with total full-time equivalent jobs generated representing 3,160 person years of employment;
- through flow–on or multiplier effects, the creation of around 164 additional full–time equivalent construction jobs on the mainland, predominantly in Rockhampton and Yeppoon;
- once fully operational, an estimated base of 685 (direct) persons employed on the Island in full-time, part-time and casual jobs, equivalent to 485 full-time employees; and
- including flow-on and multiplier effects, around 1,055 full-time, part-time and casual jobs generated in the Capricorn Region once the Project is fully operational.

These benefits would be delivered at a critical time for the Region as the number of unemployed persons in this Region is higher than the State average.

Refer **Section 1.3** for further information on Project rationale, and **Chapter 5** for further information on economic impacts.

ES.8 History of European Settlement on GKI

The Island is unique in that it has a long history of occupation, largely due to it being one of the most accessible of over 900 GBR islands and coral cays. Significant grazing activities were undertaken on the Island from the 1860's until the 1970's, with a peak operation of up to 4,000 sheep. In addition, cattle, goats, pigs and other livestock were introduced to the Island to diversify these agricultural pursuits. As a consequence of these agricultural activities, the naturalness of large parts of the Island was altered through vegetation clearing and other disturbances, including the proliferation of a feral goat population which still exists today. The primary area of disturbance was in the central valley of the Island between Clam Bay and Leeke's Beach.

Tourism activities on the Island commenced as far back as 1935 by James Morris with the building of four basic cabins located at Fisherman's Beach. Mr Morris and his brothers constructed a jetty at Fisherman's Beach around 1960, which was later destroyed by a cyclone and never rebuilt. Light planes were also introduced to the Island at this time and Long Beach was utilised as a landing strip. The early resort suffered from a lack of secure water supply and poor accessibility to and from the mainland. Consequently, Mr Morris was forced to sell the Resort to Tom Green in 1966. Mr Green expanded the Resort to 21 units and negotiated with Trans Australian Airlines (TAA) to construct the airstrip which was completed in 1967 and is still in place today. At this time, the Resort was closed to day visitors and as a result Livingstone Shire Council set aside a recreation reserve on the Island for the public.

In 1971, the Resort was sold to a consortium of John Van der Borgh, John Moore and John Nathan who increased the Resort's capacity to 60 guests and 30 staff. The consortium also bought the former grazing lease enabling the Resort to have access to the entire Island.

Photograph ES.1 FERAL GOATS

Between 1973 and 1975, TAA acquired the Resort and specifically targeted the youth market with an extremely successful advertising campaign "Get Wrecked on Great Keppel Island". The Resort was upgraded to accommodate 250 guests. Day visitation to the Island also increased significantly during this period and by mid-1975, the Island was attracting up to 1,000 day visitors per day during peak periods.

In 1982, a change in marketing strategy sought to broaden the target market to include families and the Resort capacity was upgraded to accommodate 360 guests.

Qantas acquired TAA and the Great Keppel Island Resort in 1992. Around the year 2000, the Resort was sold to two private investors, Ron Hancock and Bevan Whitaker and was managed by Accor Asia Pacific under the Mercure resort brand. The Resort was then acquired by Conitiki which once again focussed on the youth market and discouraged local day visitors. At this point, the direct involvement with an airline operator into the Resort ceased. This combined with the lack of new infrastructure investment meant that the Resort's viability began to decline.

The increasing infrastructure costs and declining occupancy rates led to a continuation in the decline in the Resort viability.

In 2007, the Resort was sold to the Proponent, GKI Resort Pty Ltd. At the time of purchase, the Resort relied on diesel generators, desalinated water treatment and an outdated wastewater treatment plant. Access to the Island was by way of beach landings for ferries and light aircraft. Significant capital expenditure and marketing was spent by the Proponent on upgrading the Resort within the first six months of ownership to improve its performance. This included a full renovation of the staff accommodation, installation of new information technology throughout the Resort, opening of a sales and marketing office in Brisbane, acquisition of a barge and barge site at Rosslyn Bay and general upgrades throughout the Resort. However, as a result of the poor standard of accommodation throughout the Resort together with the difficult access to the Island, the occupancy rate remained low. As a result of being economically unviable in its current state the Resort was closed in February 2008 and remains closed to date.

ES.9 Project Area Existing Land Uses

The Island boasts remarkable white beaches and scenic backdrops that create a unique sense of place and a destination of choice for Island based recreation (refer **Photograph ES.2** and **Photograph ES.3**).

Photograph ES.2 VIEW OF LONG BEACH, GKI

Photograph ES.3 RECREATION ON FISHERMAN'S BEACH, GKI

There are currently two budget tourist accommodation facilities owned by other entities that continue to operate on the Island. There are also other facilities which are privately owned and are located on land outside the proposed Project area including:

- nine premises located on the northern part of Fisherman's Beach which are privately owned freehold title properties. These premises include a mix of residential, commercial/retail operations and holiday accommodation facilities;
- approximately 10 premises located on the southern part of Fisherman's Beach which are also privately owned freehold title properties. These properties include a mix of residential housing and holiday accommodation facilities;
- a private residence and accommodation facility is located on Svendsen's Beach;
- approximately 190 hectares of land on the Island was transferred by the State Government to the Woppaburra Land Trust in 2007; and
- all of these properties rely on diesel and solar generated electricity and bore water and rainwater for potable water supply.

The former resort which is part of the Project area, is located at Fisherman's Beach and at the time of its closure comprised 190 guest rooms, 200 staff accommodation units, swimming pools, bars and golf course (refer **Photographs ES.4 - ES.7**). The former resort facilities are in a state of disrepair and are currently security fenced for public safety.

Photograph ES.4 AERIAL VIEW OF FORMER RESORT (HOTEL, AIRSTRIP AND VILLAS)

Photograph ES.5 FORMER RESORT GOLF COURSE (IN ITS OPERATIONAL STATE)

Photograph ES.6 AERIAL VIEW OF FORMER RESORT (HOTEL)

Photograph ES.7 AERIAL VIEW OF FORMER RESORT FACILITIES (STAFF ACCOMMODATION)

Access to and from the Island is currently available by ferry from Rosslyn Bay. There is currently no jetty facility on the Island, requiring all water transport to land on the beach including the direct transfer of passenger, vehicles and goods directly onto the sandy foreshore (refer **Photograph ES.8 – ES.9**).

Photograph ES.8 FERRY LANDING (FISHERMAN'S BEACH)

Photograph ES.9 BARGE LANDING (FISHERMAN'S BEACH)

There is also an existing airstrip on the Island which can accommodate small light aircraft (refer **Photograph ES.10**).

Photograph ES.10 EXISTING AIRSTRIP (BETWEEN FISHERMAN'S AND LEEKE'S BEACH)

Transport networks on the Island consist of a series of tracks and trails linking the key facilities in proximity of Fisherman's Beach. There is limited vehicle access across the Island (refer **Photograph ES.11**), which is only accessible by four wheel drive vehicle, light buggies, or by bushwalking in most cases.

Photograph ES.11 ISLAND ACCESS ROAD EXAMPLE

The central part of the Island is occupied by the State Heritage listed Leeke's Homestead, which is set at the fringe of an expansive cleared area subject to historical agricultural operations (refer **Photograph ES.12** to **Photograph ES.13**).

Photograph ES.12 CLEARED CENTRAL PART OF ISLAND

Photograph ES.13 CLEARED CENTRAL PART OF ISLAND

ES.10 Project Infrastructure

ES.10.1 Energy

The former resort generated its energy via diesel generators located at the main resort in an unattenuated industrial compound. Now decommissioned, the former resort's energy system was noisy, inefficient and relied solely on the burning of fossil fuels.

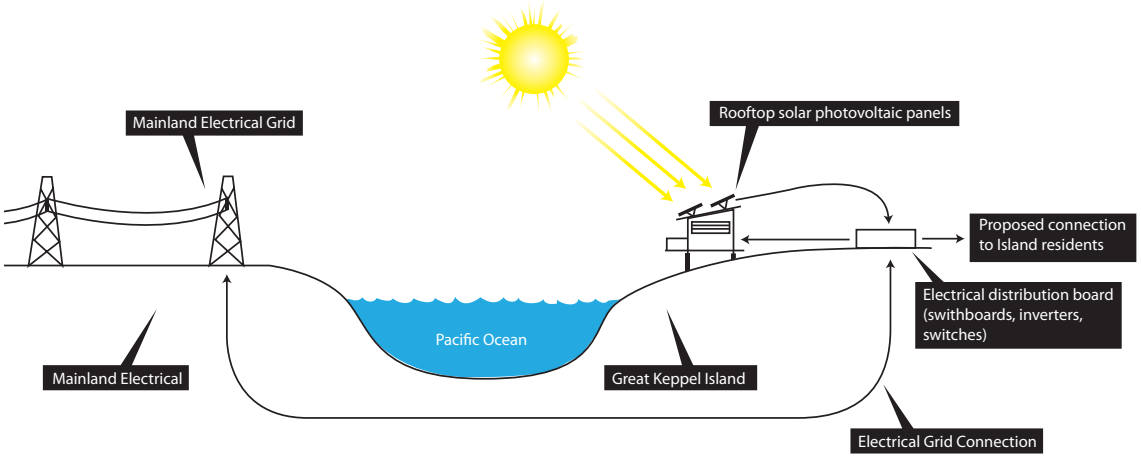
The GKI Revitalisation Plan has adopted an ambitious sustainability strategy to position it as Australia's first carbon-positive island resort that will produce more energy than it consumes each year. Embracing one of Australia's most significant natural resources – its abundant sunshine – the Proponent is committed to achieving a carbon positive status through the installation of solar photovoltaic panels on the rooftops of Eco Resort Villas, Fisherman's Beach Hotel and Eco Resort Apartments.

In lieu of a battery storage facility, the Resort will include a connection to the mainland electrical grid. During sunlight hours, the Resort's expansive solar photovoltaic system will feed excess electricity into the national electrical grid, in effect providing carbon-free electricity to Australian customers. Once the sun sets, the Resort will then draw power in reverse to supply its electrical loads at night.

The "carbon positive" aspect of the design is based on the goal of ensuring that the quantity of "feed-in" electricity provided to the grid is greater than the electricity drawn from the grid at night.

Further information regarding the renewable energy strategy is provided by ARUP (2011, refer to **Appendix AH**).

Figure ES.10 ELECTRICAL GRID CONNECTION FOR THE PROPOSED SOLAR PHOTOVOLTAIC INSTALLATION FOR THE GKI RESORT



Source: 'RENEWABLE ENERGY ANALYSIS REPORT' (2011) - ARUP

In order to achieve 'carbon positive' status, the Resort has proposed to install a photovoltaic system of the following size:

- Proposed Photovoltaic System Size - 5.9MW
- Proposed number of panels - 24,320
- Total Carbon Positive Resort-wide Buffer - 5 percent
- Total Carbon Emissions Offset - 12,693,150kgCO2/year
- Annual Generating Potential - 12,444MWh/year

The proposed energy infrastructure concept will require the installation of a submarine power cable between the Island and the mainland. A detailed hydrographic survey and ecology survey have been undertaken to determine the most appropriate route of this cable. Further information regarding the cable route and construction methodology is contained in **Section 2.3.2.7**. To date, discussions have commenced with the mainland energy provider, Ergon Energy and a formal Connection Enquiry has been lodged. Preliminary advice has been received from Ergon along with a range of potential commercial options.

ES.10.2 Water Cycle Management

The GKI Revitalisation Plan has been developed in accordance with the principles of Water Sensitive Urban Design (WSUD). WSUD is a holistic approach to the planning and design of urban development that aims to minimise negative impacts on the natural water cycle and protect the health of aquatic ecosystems. It promotes the integration of stormwater, water supply and sewage management at the development scale.

WSUD represents a fundamental change in the way urban development is conceived, planned, designed and built. Rather than using traditional approaches to impose a single form of urban development across all locations, WSUD considers ways in which urban infrastructure and the built form can be integrated with a site's natural features. In addition, WSUD seeks to optimise the use of water as a resource through the following key principles:

- protect existing natural features and ecological processes;
- maintain the natural hydrologic behaviour of catchments;
- protect water quality of surface and groundwaters;
- minimise demand on the reticulated water supply system;
- minimise treated sewerage discharges to the natural environment; and
- integrate water into the landscape to enhance visual, social, cultural and ecological values.

The proposed water cycle management strategy for the GKI Revitalisation Plan developed in accordance with WSUD principles aims to:

- minimise demand on limited water resources, particularly potable water supplies, by maximising water use efficiency and maximising the use of alternative water supplies (e.g. rainwater, treated effluent, harvested stormwater) for non-potable purposes;
- maximise the beneficial reuse of wastewater and reduce the volume of wastewater requiring disposal;
- ensure wastewater is adequately treated to a standard 'fit for purpose' prior to reuse or disposal to reduce the risk of potential environmental and public health impacts;
- ensure the collection, storage and reuse or disposal of wastewater during construction and operation of the GKI Revitalisation Plan does not adversely impact on the natural environment or communities on and off the Island;
- ensure stormwater is adequately treated to reduce the risk of potential impacts on the environmental values of receiving waters;
- ensure stormwater is managed to maintain existing hydrologic behaviour by providing appropriate detention where necessary to ensure non-worsening of peak discharge velocities;

- ensure water cycle management infrastructure, including stormwater quality improvement devices, detention basins and treated effluent storages, is designed and located to integrate into the landscape to enhance visual, social, cultural and ecological values; and
- continually improve the process for managing water supply, wastewater and stormwater associated with the GKI Revitalisation Plan by conducting regular audits to identify opportunities to reduce, reuse or recycle waste, including wastewater, and to prevent environmental harm.

The Proponent acknowledges that valuable water resources on the Island were poorly managed during operation of the former resort and has committed to a strategy that will provide water security for the GKI Revitalisation Plan. This strategy will significantly reduce the potential for impacts on water resources in the future and enable groundwater aquifers damaged in the past to be restored.

ES.10.3 Water Supply

The EIS assessed a range of water supply options including desalination, large dams, bore water, rainwater harvesting, mainland connection and treated wastewater. The preferred water supply strategy involves the following:

- mainland water pipeline connection for potable water;
- rainwater tanks/harvesting for non-potable water; and
- treated wastewater for irrigation water.

The desalination and large dam options were discounted due to environmental impacts. The EIS studies determined that there are four aquifers on the Island which have the potential to yield a significant sustainable water supply of 460 kilolitres per day. However, due to the potential for saline intrusion and the negative public perception in regard to groundwater use on the island, it was decided that the groundwater aquifers will not be used throughout the operation of the Resort. Only one of the aquifers will be used for a short term only in Stage 1 construction until the mainland pipeline is connected. Following this, the groundwater aquifers will not be used throughout the duration of the operation and construction of the Resort.

Based on an evaluation of available water resources, the most suitable means of providing water supply to the GKI Revitalisation Plan will include a combination of the following:

- a mainland water supply connection via a new pipeline installed within the Utility Services Corridor;
- installation of rainwater storage tanks for all resort buildings to capture and reuse roof water for non-potable purposes (e.g. toilet flushing, washing machines and garden watering);

- installation of stormwater harvesting and storage facilities throughout the Resort area, and reuse of harvested stormwater for landscape irrigation and hardscape hose down (subject to further assessment in the design stage);
- reuse of recycled water produced from effluent generated by the Resort for irrigation of the golf course and possibly other landscaped areas; and
- incorporation of stormwater harvesting ponds within the golf course to capture runoff and reuse for irrigation of the golf course.

ES.10.4 Stormwater Infrastructure

The proposed stormwater management strategy for the GKI Revitalisation Plan incorporates a series of detention basins and bio-retention systems which will be installed to:

- attenuate peak discharge flow rates to lower than existing levels for all standard average recurrence interval storm events from one year to 100 years;
- facilitate infiltration of increased surface runoff volumes into highly permeable, sandy subsoils mimicking the natural groundwater recharge process that occurs on the Island; and
- intercept and temporarily store surface flows from small runoff events to avoid any increase in the number of small runoff events discharging to ephemeral waterways that could potentially alter in-stream ecology.

Detention structures will comprise low impact designs utilising low grassed or vegetated mounds enclosing open space that can be readily incorporated as part of the landscape design for the Project.

Best practice vegetated bio-retention systems, including basins, swales and infiltration areas will be installed to remove gross pollutants, sediments and nutrients from stormwater flows prior to discharge. Modelling demonstrates that proposed stormwater quality improvement measures will readily achieve required annual pollutant load reduction targets and will result in no worsening of stormwater pollutant concentrations compared to modelling of the pre-developed catchment.

It is also proposed to permanently reopen the mouth of Putney Creek to tidal movements which will improve the health of the aquatic ecology, increase fisheries productivity and flushing to prevent the formation of eutrophied conditions that may contribute to algal blooms and subsequent odour nuisance. To achieve this, a lined discharge channel will be constructed below the boardwalk and esplanade, with a sediment basin incorporated towards the upstream end of the new channel. This will reduce the potential for silting up of the marina basin thereby reducing the need for ongoing maintenance.

ES.10.5 Wastewater Infrastructure

The proposed strategy to manage wastewater generated by the GKI Revitalisation Plan, will involve:

- a wastewater collection system designed to minimise groundwater infiltration, thus reducing treatment costs, along with sewage pumping stations;
- an Island-based wastewater treatment plant (or treatment plants) designed to treat wastewater to a standard suitable for reuse;
- beneficial reuse of almost 100 percent of recycled water produced by Island-based wastewater treatment plants for irrigation of the golf course and other landscaped areas around the Resort; and
- a wet weather storage facility with a capacity to account for projected increases in rainfall intensity as a result of climate change, which will be incorporated into the golf course design.

A comprehensive water and nutrient balance has been modelled and demonstrates that the proposed recycled water irrigation scheme will not increase nutrient leaching or runoff rates compared to modelling of a "no irrigation scenario". Modelling of nutrient concentrations in groundwater at the point of discharge to Leeke's Creek has demonstrated compliance with relevant water quality objectives. Modelling of possible emergency discharge of recycled water via ocean outfall has also demonstrated that nutrient levels will achieve compliance with relevant water quality objectives within a very small mixing zone and are therefore unlikely to impact on ecological communities.

By maximising beneficial reuse of wastewater and ensuring such reuse is undertaken in a manner to prevent adverse impacts on the environment or human health, the GKI Revitalisation Plan will establish a benchmark in sustainable tourism development within the GBRMP.

ES.11 Legal Framework, Decision-Making Authorities and Advisory Agencies

The EIS has been prepared under the *State Development and Public Works Organisation Act 1971* (SDPWO Act) Project of State Significance process. Additionally, the EIS has been prepared in response to the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) non-bilateral process pursuant to the following controlling provisions to which the Project has been declared a "controlled action":

- World Heritage properties (sections 12 and 15A);
- National Heritage places (sections 15B an 15C);
- Great Barrier Reef Marine Park (sections 24B and 24C);
- Listed threatened species and communities (sections 18 and 18A);
- Listed migratory species (sections 20 and 20A); and
- Commonwealth marine areas (sections 23 and 24A).

The EIS addresses matters for the individual assessments of both the Queensland and Australian Governments.

As a component of the Project involves an activity that requires a permission under the Great Barrier Reef Marine Park Regulations 1983 (GBRMP Regulations), the referral under the EPBC Act is taken to be an application under the GBRMP Regulations. A single integrated assessment will be undertaken to support decisions under both the EPBC Act and *Great Barrier Reef Marine Park Act 1975* (GBRMP Act).

The objective of the Environmental Impact Assessment (EIA) process under State and Commonwealth legislation is to integrate environmental management with planning for projects and establish a process for:

- ensuring the Proponent assumes primary responsibility for protection of any environmental values that may be affected by their projects;
- addressing environmental management through the life of projects;
- forming a basis for statutory decisions on whether a project meets ecologically sustainable development principles, and if so, relevant environmental management and monitoring conditions; and
- incorporating community and stakeholder views in assessment and decision making processes.

State and Commonwealth legislation and their applicability to the GKI Revitalisation Plan is identified in **Section 1.8**, including relevant advisory agencies.

ES.11.1 Plan of Development

The SDPWO Act recognises the need for high level public notification and consultation and the desire to avoid duplication in relation to the assessment process for significant development projects. In this regard the framework of the SDPWO Act integrates the EIS process with the Integrated Development Assessment System (IDAS) pursuant to the *Sustainable Planning Act 2009* (SPA). Therefore, the office of the Coordinator-General may make recommendations about other approvals required for the Project under the SPA, and may state conditions to be attached to the approvals under the SPA. The public notification period under the EIS Part 1 is taken to fulfil the referral and notification stages for certain development applications under the SPA. This means that separate public notification under the SPA will not be required.

The associated assessment of the development approval is to be conducted under the Integrated Development Assessment System (IDAS) pursuant to Queensland's SPA, with some exceptions.

The GKI Revitalisation Plan involves 'development' pursuant to Chapter 1, Part 3 of the SPA, as it constitutes a material change of use of premises, as well as associated operational works.

Given the anticipated construction period for the Project (12 years) and the complexity of the GKI Revitalisation Plan, a Material Change of Use Preliminary Approval overriding the Livingstone Planning Scheme 2005 pursuant to Section 242 of the *Sustainable Planning Act 2009* (SPA) is necessary to give guidance to the assessment of future individual development applications that will realise the GKI Revitalisation Plan.

A preliminary approval may comprise a 'Plan of Development' which may vary the effect of the Planning Scheme by specifying:-

- exceptions to the type of development that may take place within the GKI Revitalisation Plan of Development Area; and
- codes (including new codes) which form part of the common material against which subsequent development applications within the GKI Revitalisation Plan of Development Area will be assessed.

The proposed GKI Revitalisation Plan of Development is provided as **Appendix N** and comprises:-

- Map 1 – Precinct Plan that organises the Plan of Development area into four precincts:
    - Environmental Protection Precinct;
    - Marine Services Precinct;
    - Fisherman's Beach Precinct; and
    - Clam Bay Precinct.
- Map 2 – Development Parameters Plan that identifies elements pertaining to the type and location of development;
- A purpose statement and overall outcomes for precincts;
- Tables of Assessment which alter the level of assessment of development;
- A Place Code which provides additional and/or overriding assessment provisions for development within the GKI Revitalisation Plan of Development area; and
- An indicative list of required approvals, including necessary approvals subsequent to any material change of use preliminary approval under the SPA is provided in **Appendix G – Project Approvals**.

ES.11.2 Submissions

Written submissions in relation to the Queensland government assessment process and all State Government matters will be received by the Office of the Coordinator General (CG) until the date specified by the CG. Submissions should be forwarded to:

Post: Office of the Coordinator-General
Attention: EIS Project Manager
Great Keppel Island Project
Significant Projects Coordination

PO Box 15517
City East Qld 4002

Written submissions in relation to the Australian government assessment process regarding matters of National Environmental Significance will be received on behalf of the Department of SEWPaC until the date specified by the Minister. Submissions to SEWPaC should in fact be sent directly to Tower Holdings, who will then forward them onto SEWPaC. Submissions should be forwarded to:

Email: mail@towerholdings.com.au
Fax: 02 9923 1233

Post: Tower Holdings Pty Ltd
Level 32, Northpoint, 100 Miller Street,
NORTH SYDNEY
NSW 2060

ES.12 Outline of Alternative Options

As the Island is an historical tourist destination, no consideration of alternative sites for the Resort on other islands (or on the mainland) is considered warranted. **Section 1.5** of the EIS broadly considers the social, economic and environmental impacts and benefits of six Project alternatives, including:

- **Option 1– No Action**: reflects the existing situation on the Island, with no action being undertaken to re-establish the former resort;
- **Option 2 – Resort Refurbishment**: represents the reinstatement and refurbishment of the former resort, with no expansion beyond the established footprint of the former resort;
- **Option 3 – GKI Resort Upgrade**: represents a broader expansion of the former resort with no marina (jetty to be provided only) or airport upgrade;
- **Option 4 – Resort Revitalisation Plan –** refer **Chapter 2** for full Project description; and
- **Options 5 and 6 - Previous Concept Options -** represents a description of two previous development concept plans which are significantly larger than the current Revitalisation Plan.

The GKI Revitalisation Plan (Option 4) provides for the greatest balance between social and economic benefits whilst also providing a balanced outcome in terms of its environmental impacts which is addressed in detail in **Chapter 3** of the EIS.

Additionally, a detailed analysis of alternatives considered for the two key transport infrastructure components of the Project is provided: the marina and the airstrip (refer **Section 1.5.2**).

ES.13 Construction

The proposed construction timeframe for the GKI Revitalisation Plan is expected to occur over a period of 12 years. Indicative construction timeframes in the Project Schedule (refer **Appendix S**) will be dependent on statutory approval timeframes as well as the time required to undertake detailed design and physical construction of the identified stages (refer **Table ES.2**). Construction timeframes will also be affected by economic market cycles throughout the development period.

Table ES.2 SUMMARY OF THE STAGES OF DEVELOPMENT

Infrastructure Component	Year	Description of Works
Transport infrastructure	2013	Decommission existing runway
	2013-2015	Construct marina facility
	2013-2015	Construct ferry terminal
	2013-2015	Construct barge facility
	2013-2015	Construct runway and airport terminal
	2014-2023	Construct roads
	2014-2023	Construct public walkways and bicycle tracks
Services infrastructure	2014	Decommission existing fuel storage
	2014	Decommission existing wastewater treatment plant
	2013	Construct power supply to island
	2013	Construct water supply to the island
	2013-2022	Construct wastewater treatment facilities
	2013-2022	Construct power and water reticulation systems
Social infrastructure	2015-2023	Landscaping
	2015	Sport and recreation oval
	2015-2019	Environmental protection areas
	2014	Research Centre
	2014	Police Centre
	2014	Passive open space areas
Tourism infrastructure	2013	Decommission existing resort
	2013-2014	Construct Marine Services Precinct, Eco Resort Apartments (150 apartments), Fisherman's Beach Hotel, Staff Accommodation
	2015	Construct Fisherman's Beach Precinct Eco Resort Apartments (75 apartments), Fisherman's Beach Precinct Eco Resort Villas (75 villas)
	2015-2016	Construct Golf Course and Golf Resort Facility
	2016	Construct Fisherman's Beach Precinct Eco Resort Apartments (75 apartments), Fisherman's Beach Precinct Eco Resort Villas (75 villas)
	2017	Construct Fisherman's Beach Precinct Eco Resort Villas (75 villas)

Table ES.2 SUMMARY OF THE STAGES OF DEVELOPMENT (CONTINUED)

Infrastructure Component	Year	Description of Works
	2018	Construct Fisherman's Beach Precinct Eco Resort Villas (75 villas)
	2019	Fisherman's Beach Precinct Eco Resort Villas (83 villas)
	2020	Clam Bay Precinct Eco Resort Villas (75 villas)
	2021	Clam Bay Precinct Eco Resort Villas (75 villas)
	2022	Clam Bay Precinct Eco Resort Villas (75 villas)
	2023	Clam Bay Precinct Eco Resort Villas (75 villas)
	2024	Clam Bay Precinct Eco Resort Villas (67 villas)

Note: Timeline assumes EIS approval in 2012

A sequenced construction process will be undertaken to minimise adverse impacts on water quality, watercourses and other environmental values. Each sequenced construction stage will include the completion of bulk earthworks, access roads and infrastructure (stormwater system, water reticulation, treated effluent, sewer reticulation, power and telecommunications) prior to the initiation of building works. Prior to construction commencing on the site for each stage, the Principal Contractor will be required to prepare, and have approved by the Rockhampton Regional Council, an Erosion and Sediment Control Management Plan (ESCMP). The plan will detail measures to be adopted by the contractor such as sediment basins, silt traps, sediment fences and other measures to avoid or minimise the deposition of sediment runoff on the receiving environment.

Decommissioning of the former resort will be undertaken progressively, with select infrastructure to be utilised in early construction stages until connection to mainland infrastructure (water, electricity and telecommunications) is made. Initial construction water supply will be obtained from two production bores in the Long Beach Aquifer, captured roof water and stormwater and recycled effluent.

ES.13.1 Marina Construction

Detailed environmental investigations were undertaken to assess the potential environmental impacts which may arise from the construction of the marina (refer **Section 3**).

Through active encouragement by the GBRMPA, a number of innovative engineering and design solutions have been incorporated into the marina design by specialist marine designers.

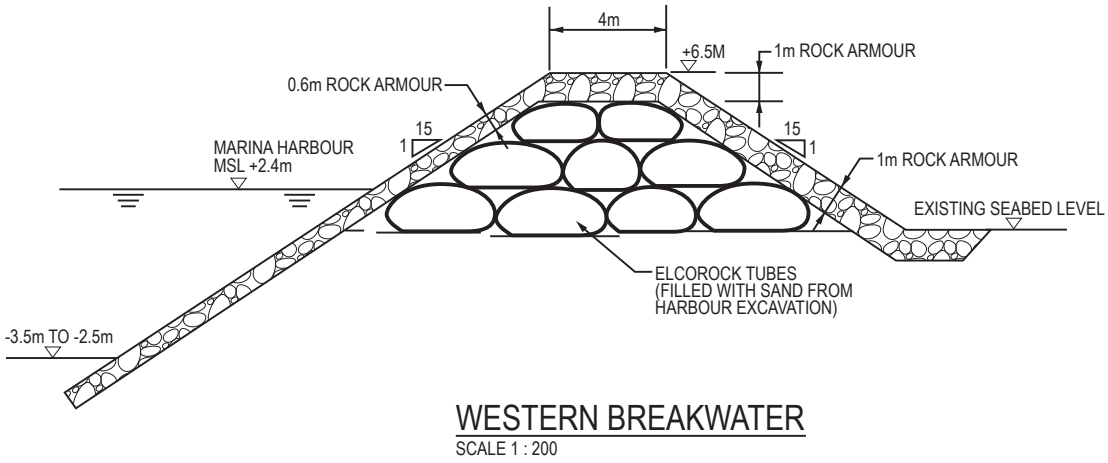
Three key areas were identified during the EIS process which would reduce potential environmental impacts from the marina construction. These included:

- design of an alternative entrance channel route to reduce the length of the entrance channel;
- assessment of alternative construction options to reduce the amount of rock armour that would be required to be transported to the Island for the breakwall construction; and
- implementation of construction methods to prevent the need for sea disposal of dredge material.

Detailed hydrographic surveys and seabed contours which were developed by coastal engineers, confirmed that there is a navigatable channel from the north of the marina which would allow the entrance channel to be re-aligned from the south-west to the north-west. The result of this re-alignment has reduced the length of the entrance channel from the original design by over 1,070 metres, significantly reducing the volume of material to be dredged.

The proposed engineering solution for the construction of the marine facility involves all of the marina basin dredge material to be re-utilised to form the core of the breakwaters and to provide the majority of the material required for marine facility land reclamation. The proposed construction method proposes the breakwater cores to be constructed with geotextile containers filled with sediment excavated from the marina basin. **Figure ES.11** is a conceptual diagram of the breakwater design incorporating the use of sediment filled geotextile tubes.

Figure ES.11 Conceptual Illustration of Western Breakwater Cross Section Utilising Geotextile Containers



SOURCE: 'MARINA AND VESSEL MANAGEMENT ASPECTS' (2011) – INTERNATIONAL MARINA CONSULTANTS

Beneficial re-use of all of the marina dredge material will eliminate the need for sea dumping. Furthermore, it will reduce the need for a quarry on the Island and will significantly reduce the amount of rock which will need to be transported to the Island to construct the marina.

Geotextile containers are extremely robust and are designed to be filled with sand, soil, gravel, recycled material, treated materials or a combination of the above such that they form a stable, durable container.

Refer **Section 2.3** and **Appendix U** for further details on construction aspects of the GKI Revitalisation Plan.

ES.13.1.1 Great Barrier Reef Marine Park Boundary

The proposed Great Keppel Island marina is located seaward of Putney Beach and is located within the Great Barrier Reef Marine Park. The proposed marina area is intended to be retained within the Great Barrier Reef Marine Park and State Coastal Marine Park following its construction. While the Draft EIS is out for public review, the Proponent will work with the Commonwealth assessment agencies to ensure that the marina design will not change the boundary of the Marine Park. In the event that the EIS is approved, a detailed set of construction drawings will be prepared and submitted to GBRMPA, along with all other necessary regulatory departments, which will be required to be approved prior to any construction works commencing on the marina. These drawings will include construction details demonstrating specifically how the marina structures will minimise environmental impacts and ensure that there are no changes to the boundary of the GBRMP as defined by the *Great Barrier Reef Marine Park Act 1975 (Commonwealth)*.

ES.14 Existing Environment, Potential Environmental Impacts and Mitigation Measures

ES.14.1 Climate Change

The Proponent engaged OPUS International Consultants Pty Ltd to prepare a climate change assessment report for the EIS – refer **Appendix X.**

Potential climate change impacts incorporated into the design of the GKI Revitalisation Plan to ensure built infrastructure is either located to avoid these impacts or is able to adapt and become resilient to these climatic change impacts:

- buildings designed to latest design standards which have allowed for projected increases in wind speeds and cyclonic intensity;
- locating built infrastructure above projected storm surge levels accounting for sea level rise;
- stormwater and wastewater infrastructure designed for maximum flows accounting for increased rainfall intensity; and
- ensuring sustainable water supplies will be available despite a decrease in average rainfall and increased average evaporation rates.

To minimise the carbon footprint of the GKI Revitalisation Plan, the following measures will be implemented:

- primary electricity supply will be derived from solar photovoltaic cells installed on the roof tops of villas, with supplementary and emergency electricity sourced from standby diesel generators and mainland electricity cable connection. Sufficient solar panels will be installed to meet the energy demands of the GKI Revitalisation Plan plus a five percent buffer on peak demand expectations, with excess energy generated to be returned to the mainland grid via submarine cable;
- buildings will be designed to minimise energy consumption for heating and cooling by maximising use of natural ventilation and solar access; and
- proposed buildings and infrastructure will be located to minimise the clearing of native vegetation. As part of the GKI Revitalisation Plan, planting of vegetation will occur to offset losses in biodiversity and carbon sequestration capacity.

Aspects of the Great Barrier Reef Tourism Climate Action Plan have also been incorporated into the proposed GKI Revitalisation Plan to reduce the ecological footprint and maintain the resilience of the surrounding ecosystems of the Island to climate change, including:

- establishment of a Research Centre within the Keppel Island Group;
- funding of the research centre and associated research and educational activities; and
- conducting regular monitoring of water quality and the condition of coral reefs and coastal ecosystems.

The GKI Revitalisation Plan will be designed and constructed to both mitigate the adverse impacts of predicted climate change while also minimising the Project's contribution to global greenhouse gas emissions.

Refer **Section 3.1** for further information on climate change and associated impacts and mitigation measures.

ES.14.2 Topography, Geology and Soils

Topography on the Island is dominated by two north-west to south-east trending ridges (refer **Section 3.2**). The southern ridgeline is relatively steep and is dominated by Mt Wyndham with a maximum elevation of approximately 175 metres AHD. Elevations along the northern ridgeline range between approximately 75 metres AHD in the north-west and 155 metres AHD in the south-east. These ridges extend to the beaches to form rocky headlands and cliffs. A series of sandy beaches and beach ridges exist between the headlands.

Coastal sand dunes exist between Wreck Bay and Butterfish Bay on the eastern side of the Island, as well as in the south-west area of the Island between Long Beach, Fisherman's Beach and Putney Beach. A flat to undulating topography is present in the dune sand areas. The topography becomes slightly undulating on the eastern side of the Island towards Wreck Bay.

A valley exists in the central area of the Island between the two major ridges. It falls from an elevation of approximately 65 metres AHD behind Clam Bay to sea level at Leeke's Beach in the north-west.

The topography of the Island is not expected to require significant alteration for development of the Project.

Published geological maps for the Rockhampton Region (Dept of Natural Resources, Mines and Water, 2006) indicate that the Island is primarily underlain by the Carboniferous aged Shoalwater Formation of the Curtis Island Group (refer **Section 3.2**). There is no direct fossil evidence in the Shoalwater Formation and none is documented in Murray (1975) or Kirkegaard *et al*. (1970). Due to the age of the formation, as well as the periods of metamorphism and deformation that occurred, it is considered unlikely that significant fossil specimens would be present on the Island.

ES.14.3 Land Contamination

Areas of land contamination are likely to exist on the Island due to historic land use practices, including a former (now closed) council landfill above Putney Creek. Those areas of land contamination within the Project area will be investigated further and be subject to remediation as required prior to construction. Future proposed activities are unlikely to cause significant contamination if the mitigation measures proposed in the proposed Environmental Management Plan (EMP) (refer **Appendix O**) are implemented. If the EIS is approved, the Proponent will be required to adopt appropriate practices to endeavour to avoid future contamination of soils or sediments on the Island and identify, remediate and manage existing and potential land contamination (including post decommissioning) within the Project area.

Implementation and maintenance of erosion and sediment control techniques during the construction phase will serve to mitigate potential impacts of wind and water/rainfall erosion / or sedimentation to local waterways. Erosion and Sediment Control Plans will include supporting specifications for each area of soil disturbance in accordance with current best practice environmental management; including IECA (2008) and EPA (2008).

As no acid sulfate soil (ASS) action criteria were triggered during the assessment, ASS management measures are not considered necessary within the proposed Project areas assessed by Douglas Partners (**Appendix Z(iv)**).The potential for acid generation by disturbance of ASS during earthworks and construction is therefore considered to be negligible, however, it will be further investigated in each earthworks area prior to construction activities commencing.

Refer **Section 3.2.5** to **3.2.6** of the EIS for further information.

ES.14.4 Iconic Values

The Central Capricorn Coast is an iconic place under the Iconic Queensland Place (IQP) Act, (now repealed) and includes "the Keppel Group of Islands that form an integral feature of the natural inshore seascape". The purpose of the IQP Act is "*to protect places with characteristics or qualities in their natural or built environment that reflect or contribute in a substantial way to Queensland's character.*"

The Iconic Places values of the Island relate to the naturalness of this group of islands as part of the inshore seascape i.e., as seen from the Capricorn Coast mainland across Rosslyn Bay. The IQP Act defers to the applicable planning scheme to enforce protection of identified iconic places. The applicable scheme is the Livingstone Shire Planning Scheme which includes (s 3.22) a *Great Keppel Island Code* with overall outcome (i) related to character and landscape values. While the proposed Project will occupy a footprint more extensive than envisaged by the Livingstone Shire Planning Scheme it will nonetheless be:

- "*…integrated with the natural environment facilitating visitor's enjoyment of the Island's natural character"* as intended by the Code (s 3.22 (i) (B));
- consistent with s.3.22(i)(C): "*well designed, sensitive to climatic conditions and provides for the protection of dominant landscape features, including forested ridgelines, rocky outcrops and foreshore areas*"; and
- all the dominant forested ridges will remain free of development, and will remain as natural skylines.

ES.14.5 Scenic Amenity and World Heritage Values

The Proponent engaged Chenoweth Environmental Planning and Landscape Architecture to prepare the visual assessment technical report for the EIS – refer **Appendix AL**.

Great Keppel Island, the largest island in the Keppel Group of islands offshore from Yeppoon and Emu Park in Central Queensland, is visually prominent across Rosslyn Bay, and is an important part of the character and identity of the Capricorn Coast. Importantly, the Island is also part of the GBRWHA , the listing of which was based on international criteria including outstanding universal aesthetic values.

As detailed in **Appendix AL**, the GBR provides some of the most spectacular scenery on Earth and is of exceptional natural beauty. The GBR meets World Heritage Criterion (vii): "*to contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance*". The listed aesthetic values of the GBR of relevance to continental islands include:

- the vast extent of the reef and Island systems which produces an unparalleled aerial vista;
- islands ranging from towering forested continental islands complete with freshwater streams, to small coral cays with rainforest and unvegetated sand cays;
- coastal and adjacent islands with mangrove systems of exceptional beauty; and
- the rich variety of landscapes and seascapes including rugged mountains with dense and diverse vegetation and adjacent fringing reefs.

Many of the potential risks of significant visual impact have been addressed in the design phase of the GKI Revitalisation Plan. The natural landform of the Island allows the Project to be split into three separate precincts, each with visual impacts confined by ridges and headlands. the GKI Revitalisation Plan will continue to focus on the former resort node at Fisherman's Beach, which is already in a developed and non-natural state. Most of the development areas will require little re-shaping of the natural landform (apart from the marina and airstrip), native vegetation will be retained between and through the precincts, natural forested skylines will be retained and the built form will be modest and largely below the local tree canopy levels. Low density development of this nature has a generally low risk of causing significant visual impacts.

As part of the GKI Revitalisation Plan, it is proposed to remove the existing white roofed hillside villas. These white roofs are currently visible from the mainland and their removal will improve the visual impact of the existing development on the Island.

Chenoweth Environmental Planning and Landscape Architects concluded that the GKI Revitalisation Plan would have little impact on World Heritage aesthetic values, and these limited impacts will be mainly associated with a discrete node of shoreline development at the marina and to a lesser extent with some golf course villas visible at the far end of the central valley. These visual impacts will be restricted to relatively confined arcs of view, because the Island landform offers opportunities for 'visual absorption' in the central valley between two ridges, and opportunities for a marina 'tucked' behind Putney Point. There will also be visual impacts associated with the Fisherman's Beach Precinct, an existing development node within the GBRWHA. **Photograph ES.14** and **ES.15** provides Fisherman's Beach and Putney Beach photomontages of the GKI Revitalisation Plan.

The minor visual impacts listed above will be offset by enhanced accessibility and World Heritage values presentation opportunities afforded by the improved accessibility of the Island.

Refer **Section 3.2.2** for further information on scenic amenity and associated impacts and mitigation measures.

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Photograph ES.14 PUTNEY BEACH GKI REVITALISATION PLAN PHOTOGRAPH MONTAGE

Photograph ES.15 FISHERMAN'S BEACH GKI REVITALISATION PLAN PHOTOGRAPH MONTAGE

To see more detail please zoom into image.

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ES.14.6 Lighting

Lights from the Fisherman's Beach Precinct, including the proposed hillside Eco Resort Villas, will be visible from Rosslyn Bay and the mainland. Providing the lights are seen as a distant 'twinkling' rather than a bright glare, they will be consistent with the existing character and degree of development of the Island as seen from the bay and mainland, and to that extent are consistent with the Iconic Places values of the Keppel Group of islands.

The main lighting impacts will be associated with the Marine Services Precinct, and even with appropriate mitigation this area will be a brightly lit node of night-time activity. The visual impacts will be largely confined to the immediate setting of Putney Beach and the passage, so few people apart from Island residents and visitors will be affected.

Lighting mitigation measures are also proposed in **Section 3.3.4** to mitigate lighting risks to the marine environment.

ES.14.7 Terrestrial Flora and Fauna

The Proponent engaged Chenoweth Environmental Planning and Landscape Architecture to prepare the terrestrial flora and fauna assessment report for the EIS – refer **Appendix AB** and **Section 3.3**. Central Queensland Environmental Surveys and CQG Consulting also conducted rapid vegetation assessments.

ES.14.7.1 Flora and Vegetation

Flora surveys conducted during the wet and dry seasons resulted in 273 documented ground observations including 31 detailed secondary sites. Threatened species with the potential to occur on the Island were targeted during these assessments. The assessments also enabled the mapping of regional ecosystems at a scale of 1:10,000 and refinement of the Department of Environment and Resource Management's (DERM's) (now known as DEHP) wetland mapping.

No flora species scheduled under State or Commonwealth legislation were recorded during the assessments. A number of locally significant species were recorded, but all of these species are abundant on the Island and design considerations will ensure their persistence.

Vegetation mapping confirmed the presence of the Commonwealth listed "Littoral Rainforest and Coastal Vine Thickets of Eastern Australia" outside of areas affected by the development proposal. This mapping also concluded that whilst some areas are non-remnant, owing to historical clearing, that there are patches of "Of Concern" regional ecosystems. As much as practical, the development will avoid these areas and confirmed wetlands, however, some impacts cannot be avoided completely. Analysis of impacts indicates that the proposed clearing will have an overall minor impact on representation of individual vegetation associations within the GBRMP islands. Impacts to "Of Concern" remnant vegetation will be mitigated through the use of environmental offsets off the Island and the establishment of the 575 hectare Environmental Protection Precinct on the Island.

The design has avoided direct impacts on the significant vegetation associated with the Leeke's Estuary and provides buffers to waterways draining into this complex.

The Proponent has committed to several mitigation measures, such as integration of landscaping predominated by plants indigenous to the Island, and a monitoring program that will enable ongoing adaptive management of vegetation communities.

Refer **Section 3.3** for further information on terrestrial flora and associated impacts and mitigation measures.

ES.14.7.2 Fauna and Habitat

Detailed fauna assessments undertaken by Chenoweth Environmental Planning and Landscape Architecture in wet and dry seasons in addition to water studies and targeted surveys for nesting Beach Stone Curlew provided the most comprehensive study of the Island's fauna assemblages undertaken to date.

The studies confirmed that the Leeke's Estuary provides habitat for a diversity of fauna including migratory and threatened bird species. The terrestrial environments support habitat for mostly common species and whilst some migratory species utilise these habitats it is not regarded as highly significant for these species.

There will be no direct impacts on the 57.5 hectares Leeke's Estuary as a consequence of the GKI Revitalisation Plan with roads setback at least 40 metres from the edge of the wetland and all other development setback at least 200 metres. A minor area (1.3 hectares) of mangrove and saltwater couch is associated with the mouth of Putney Creek, accounting for two percent of this vegetation type on the Island. The beaches fringing the Island include a mixture of sandy and rocky shores that serve as foraging habitat for marine and some migratory bird species. The proposed marina will result in the loss of approximately 2.8 per cent of this foraging habitat from the Island.

While the development will result in the direct clearing of terrestrial forested habitats, based on the findings of the fauna assessment this will not result in the direct loss of habitat of threatened fauna.

The most significant habitat of the Island being the Leeke's Estuary and adjacent terrestrial environs has been avoided through project design. Several mitigation measures have been identified that are aimed to minimise direct impacts on habitat or indirect impacts on significant fauna species and their habitat. Adequate monitoring and adaptive management responses will ensure impacts on fauna are minimised.

Refer **Section 3.3** for further information on terrestrial fauna and associated impacts and mitigation measures.

ES.14.8 Aquatic Ecology

frc environmental was engaged by the Proponent to investigate the aquatic ecology and water quality values for the EIS– refer **Section 3.3.**

The aquatic ecology survey area included marine and freshwater communities on and surrounding the Island, and marine communities near Kinka Beach and Tanby Beach on the mainland (for the submarine cable studies).

Physicochemical water quality was typical of inshore waters. The concentration of total suspended solids was high in Leeke and Putney Creeks and at both mainland sites (Kinka and Tanby Beach). High concentrations are likely to be related to sediment-laden run-off associated with heavy rain. The concentrations of total nitrogen and total phosphorus were also high at most sites. The concentrations of total copper and zinc exceeded the relevant guideline values at several sites.

Surface sediments were largely composed of sands and were uncontaminated within the marina footprint. Concentrations of metals in the sediment were generally higher at Leeke's Creek mouth, near the underwater observatory on Middle Island and at the mainland sites. The concentration of total lead exceeded the relevant guideline value at Leeke's Creek mouth during the post-wet survey. Relatively high levels could be related to the boating activity in Leeke's Creek and terrestrial run-off at the mainland sites

Ten species of mangrove were recorded on the Island and seven species at Kinka Beach (cable connection site). Six species of saltmarsh were recorded on Great Keppel Island and at Kinka Beach. Mangrove forests ranged from poor to good ecological health. Most trees showed few signs of stress; the major exceptions to this were at Putney Creek, where the community was assessed as being in poor health. Most of the mangrove communities provide good to very good fisheries habitat.

Four species of seagrass were recorded around the Island. Communities were dominated by *Halophilaovalis* and *Haloduleuninervis*. Seagrass communities typically had an overall cover of less than five per cent with sparse, patchy distribution. There has been a substantial decrease in the cover and the extent of seagrass since the 1970s. This is likely to be related to cyclone activity, sedimentation and / or elevated nutrient levels.

ES.14.8.1 Marine Ecosystems

Construction and operation of the proposed development may impact marine ecosystems. Impacts may be both direct (for example, loss of habitat to dredging) and indirect (for example altered community structure in response to altered water quality), and either irreversible or temporary. Potential impacts to marine ecosystems include loss and / or gain of habitat, increased turbidity and sediment deposition, spills of hydrocarbons and other contaminants, copper contamination, nutrient enrichment, artificial lighting, human activities, introduction of marine pests, waste / litter, and acid sulphate or potential acid sulfate sediments.

'Best practice' assessment and engineering practices are proposed to minimise the impacts associated with both construction and operation of the proposed development.

Whilst dredging will result in the loss of approximately 9.6 hectares of substrate that has the potential to support seagrass, only 10 percent of this area was actually found supporting any seagrass and in these locations the distribution was patchy; estimated at less than 15 percent cover. The resultant impact would be a loss of less than 0.1 percent of seagrass mapped within the Central Queensland Region. In addition the dredging will impact on approximately 20 hectares of sub-tidal unvegetated soft sediment. Installation of the submarine cables and pipes from the Island to the mainland are planned to avoid significant areas of seagrass, coral and mangrove, and is likely to result in the further disturbance of approximately 0.004 hectares of sparse seagrass (regrowth can be expected). Disturbance of up to 0.04 hectares of mangroves at Kinka Beach may be required.

Modelling has shown that it is likely that the dredge plume will be contained within the marina footprint; however it may extend beyond the footprint for short periods. Consequently, floral and faunal communities beyond the marina footprint are highly unlikely to be significantly impacted: only a very small area of seagrass to the south of the marina (less than one hectare) may potentially be significantly, but temporarily, impacted by deposited silt. The coral communities in the vicinity of the proposed marina are likely to be largely unaffected by increased suspended solid concentration and sediment deposition. Fishes, turtles and marine mammals are highly unlikely to be significantly impacted. During dredging / sediment disturbance, the extent and density of the turbidity plume will be monitored, and the results of monitoring will inform the implementation of a Dredging Environmental Monitoring Program.

Construction of the marina will result in the loss of approximately 0.98 hectares of rocky intertidal habitat, whilst providing a greater extent of hard surfaces (breakwalls, piles, pontoons, etc.), able to support algae, hard and soft coral, sponges and associated fauna.

Reopening the mouth of Putney Creek will result in improved water quality within the creek and consequently enhanced ecosystem heath and productivity.

Fuel and oil spills together with waste and litter could potentially cause impacts that may be effectively managed if the appropriate controls are put in place.

Monitoring of seagrass, mangroves, coral communities and soft-sediment macrobenthic communities will also take place during the construction phase. Annual monitoring of seagrass, mangrove, coral and soft-sediment macrobenthos health is proposed following completion of the development. Monitoring will focus on the community structure and health of communities in the vicinity of the development footprint (including around the Island and adjacent to the mainland), and in areas where altered hydrodynamics may impact on habitat characteristics.

Operation of the marina and of the golf course will have the potential to contribute nutrients and other contaminants to coastal waters, whilst lighting and increased vessel activity will have the potential to impact on fish, turtles, dugong and other marine mammals. Appropriate control measures are proposed to effectively manage contaminant export and light-spillage. Increased vessel activity is to be managed through responsive engineering design, opportunities for regulation of speed and importantly, education.

The proposed development is sufficiently distant from other proposed major developments (at Balaclava Island, Curtis Island and Port of Gladstone) to be unlikely to contribute to significant cumulative impacts.

Refer **Section 3.3** for further information on marine ecosystems and associated impacts and mitigation measures.

ES.14.8.2 Freshwater Ecosystems

Construction and operation activities have the potential to impact on surface water quality, sediment quality and freshwater ecosystems through vegetation clearing and earthworks, increased turbidity and subsequent sedimentation, impacts to aquatic fauna passage, hydrocarbon contamination, litter / waste and nutrient enrichment.

'Best practice' engineering design and implementation will be employed to effectively manage the impacts associated with both construction and operation of the proposed development. The minimal habitat loss proposed is unlikely to impact ecosystem function or health. Erosion and sediment control measures will be employed to manage the necessary clearing and stormwater runoff predicted impacts to water quality are insignificant.

Monitoring of turbidity levels in the creeks will be undertaken when constructing permanent or temporary creek crossings during the wet season. Water quality in the water storage ponds will be monitored regularly to confirm the suitability of the water for irrigation (including monitoring of blue green algae), and to confirm water quality in the event of release to the receiving environment.

Refer **Section 3.3** for further information on freshwater ecosystems and associated impacts and mitigation measures.

ES.14.9 Matters of National Environmental Significance

Matters of National Environmental Significance (MNES) of relevance to the Project include World Heritage Areas, National Heritage Places, wetlands of national importance, listed threatened flora and fauna communities, and listed migratory and marine species.

ES.14.9.1 World Heritage and National Heritage

The Great Barrier Reef (GBR) was inscribed as a World Heritage Area (the GBRWHA) in 1981 by the United Nations Educational, Scientific and Cultural Organisation (UNESCO) due to its outstanding universal value. The GBRWHA was nominated for all four natural criteria set out in Article 2 of the World Heritage Convention under the 'Operational Guidelines for the Implementation of the World Heritage Convention'. The natural criteria that triggered the listing of the GBR on the World Heritage List are as follows:

- **Criterion vii**: Contains superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance;
- **Criterion viii**: Outstanding examples representing the major stages of Earth's history or significant geomorphic or physiographic features;
- **Criterion ix**: Outstanding examples of on-going evolution; and
- **Criterion x**: Contains important and significant habitats for in-situ conservation of biodiversity, including threatened species.

The World Heritage values that have been bestowed on the Island include the scenery of the Island and surrounding waters, fringing coral reefs and associated reef-building processes, habitat for migratory species (birds and marine fauna), and flora and fauna typical of continental islands which add to the biodiversity of the GBRWHA. The Australian Government developed legislation to establish a heritage system to complement and enhance the World Heritage Management regime. The system includes the establishment of a National Heritage List of Places that have outstanding national heritage values, including cultural, natural and Indigenous heritage values. The Great Barrier Reef's corresponding National Heritage Criteria to the World Heritage property values xii, xiii, ix and x is (a), (b), (c), (d) and (e) as outlined below:

- **Criterion A**: the place has outstanding heritage value to the nation because of the place's importance in the course, or pattern, of Australia's natural or cultural history; GBR is taken to meet this National Heritage criterion because it meets World Heritage criteria (vii), (viii), (ix) and (x).
- **Criterion B**: the place has outstanding heritage value to the nation because of the place's possession of uncommon, rare or endangered aspects of Australia's natural or cultural history. GBR is taken to meet this National Heritage criterion because it meets World Heritage criteria (x).

- **Criterion C**: the place has outstanding heritage value to the nation because of the place's potential to yield information that will contribute to an understanding of Australia's natural or cultural history. GBR is taken to meet this National Heritage criterion because it meets World Heritage criteria (vii), (viii), (ix) and (x).
- **Criterion D**: the place has outstanding heritage value to the nation because of the place's importance in demonstrating the principal characteristics of:
    - a class of Australia's natural or cultural places; or
    - a class of Australia's natural or cultural environments.
- GBR is taken to meet this National Heritage criterion because it meets World Heritage criteria (viii), (ix) and (x).
- **Criterion E:** the place has outstanding heritage value to the nation because of the place's importance in exhibiting particular aesthetic characteristics valued by a community or cultural group. GBR is taken to meet this National Heritage criterion because it meets World Heritage criteria (vii).

The proposed GKI Revitalisation Plan, with its minimal development footprint, located on areas of former disturbance or otherwise areas of lower environmental significance, and with mitigation measures as proposed, has been determined to pose a low risk of causing detrimental impacts on World Heritage or National Heritage criteria.

In terms of World Heritage aesthetic values (including the 'existence value' of the Island as a relatively undeveloped place close to and within view of the Capricorn Coast), the modified project layout will ensure that most of the proposed development will be screened from view and separated into several discrete precincts. One of these locations has already been developed as the existing resort and airstrip, and the proposed Fisherman's Beach Precinct development will be no more visible from the mainland and Rosslyn Bay than at present (and in respect to the existing visually-intrusive hillside units, the situation will be improved). The main visual impact of the Project will be associated with the proposed marina which, although partly-screened by Putney Point, Sand Spit and Middle Island, will be visible from within an arc of offshore view. All built form will be low-rise (three-storey maximum), set back from the shoreline and landscaped, such that other visual impacts are minor or capable of mitigation.

ES.14.9.2 Great Barrier Reef Marine Park

The Great Barrier Reef Marine Park was established in 1975 with the passing of the *Great Barrier Marine Park Act 1975*. This act allowed the establishment of the Great Barrier Reef Marine Park Authority (GBRMPA) and outlined management of the marine park.

In 2003 the Federal Government passed the Great Barrier Reef Marine Park Zoning Plan 2003 which refined and extended previous zoning within the GBRMP.

Zoning reserves currently surrounding the Project include Marine National Park Zones, Conservation Park Zones, General Use Zones and Habitat Protection Zones.

Potential direct and indirect marine impacts from the Project on the GBRMP include:

- public appreciation, understanding and enjoyment of the GBRMP;
- marine pests;
- other marine users;
- climate change;
- orderly and proper management on the GBRMP; and
- placement of material/infrastructure during construction.

The Project was determined to be able to appropriately manage each of these potential impacts and also be able to deliver a range of positive benefits to the GBRMP.

ES.14.9.3 Listed Threatened Species and Communities

The EPBC listed "Littoral Rainforest and Coastal Vine Thickets of Eastern Australia" ecological community was mapped where it met the key diagnostic characteristics and the condition thresholds as defined by the Threatened Species Scientific Committee (2008). Three areas located outside the proposed development footprint were found to meet SEWPaC's (2008) definition for the threatened ecological community.

Threatened flora species with potential to occur on the Island based on review of existing databases, including the EPBC protected matters search, were targeted during field work. No flora species scheduled under the EPBC Act were identified as known or likely to occur on the Island.

Searches for threatened fauna species followed EPBC Guidelines (SEWPaC, 2010) where the likelihood of occurrence was regarded as 'Possible' to 'Known'. Database searches identified only two species regarded as threatened fauna under the EPBC Act including the endangered Southern Giant-Petrel *(Macronectesgiganteus*) and vulnerable Kermadec Petrel (western) (*Pterodroma neglecta*). The likelihood of occurrence of these species was regarded as 'Unlikely'.

No other fauna species scheduled under the EPBC Act were identified as known or likely to occur on the Island.

ES.14.9.4 Listed Migratory and Marine Species

Studies by ecologists from Chenoweth and frc environmental concluded that a number of migratory and listed marine species have been recorded or are likely to use the Island and surrounding waters, but there were found to be no 'important habitats' for migratory birds (as defined by DEWHA 2009) nor is the Island a significant turtle rookery.

The environmental impact studies summarised in **Section 3.4** indicate that the proposed GKI Revitalisation Plan is unlikely to cause degradation of World Heritage or National Heritage values, or significantly affect other matters of national environmental significance. The few environmental impacts which could potentially occur have been identified as low risk and capable of being mitigated, managed or offset.

ES.14.9.5 Commonwealth Marine Area

The Commonwealth Marine Area (CMA) is designated as any part of the sea, including the waters, seabed and airspace within Australia's exclusive economic zone and or over the continental shelf of Australia, that is not State or Northern Territory waters. The CMA stretches from 3 to 200 nautical miles from the coast including islands.

The CMA is situated more than 3 nautical miles off the coast of GKI, due to the proximity of Barren Island, which results in the entire Project area not being located within the CMA. It is anticipated that the Project will have no direct impact on the CMA. There is, however, potential that the development of the marina and resort may have an indirect positive impact on the CMA by reducing recreational boating traffic through the CMA.

ES.14.10 Water Resources

The Proponent engaged Opus International Consultants Pty Ltd to prepare the water resources impact assessment report for the EIS – refer **Appendix AN**.

Substantial groundwater resources are available on the Island and have the potential to supply a significant proportion of the total mains water demand for the GKI Revitalisation Plan. However, use of groundwater as a primary water supply source during operation was not considered appropriate due to the potential for saline intrusion, as occurred historically as a result of poor management use of the resource. Rather, apart from small-scale, sustainable use for Stage 1 construction water supply, groundwater aquifers will be allowed to recover from past overuse. This will allow a better quality and more sustainable groundwater resource for other Island users and groundwater dependant ecosystems.

A comprehensive water and nutrient balance model demonstrates that the proposed recycled water irrigation scheme will not increase nutrient leaching or runoff rates compared to modelling of a no irrigation scenario. Modelling of nutrient concentrations in groundwater at the point of discharge to Leeke's Creek has demonstrated compliance with relevant water quality objectives. Modelling of possible emergency discharge of recycled water via ocean outfall has also demonstrated that nutrient levels will achieve compliance with relevant water quality objectives within a very small mixing zone and are therefore unlikely to impact on ecological communities.

The high standard of treatment proposed for recycled water will not only mitigate potential impacts on the environment, but will also significantly reduce potential human health impacts should persons come into contact with recycled water. To further reduce this risk, additional controls have been proposed; including the use of large droplet fixtures on spray irrigators, use of sub-surface or surface dripper systems in the vicinity of sensitive receivers, scheduling irrigation to occur at night and installing signage across irrigation areas and at recycled water storages advising of the use of waste waters.

Refer **Chapter 2.0** and **Section 3.5** for further information on water resources, the proposed water cycle management strategy and associated impacts and mitigation measures.

ES.14.11 Coastal Environment

The Proponent engaged Water Technology to prepare the coastal environment assessment for the EIS – refer **Section 3.6.**

Numerical modelling, data collection and analysis and interpretation of coastal processes was undertaken to identify potential impacts on the coastal environment from the GKI Revitalisation Plan.

Key findings from the impact assessment and proposed mitigation measures are summarised as follows:

ES.14.11.1 Tidal Flows and Hydrodynamics Assessment

Hydrodynamic modelling simulations incorporating the marine facility were undertaken and compared to existing conditions. The comparisons of the simulated current fields showed the following impacts:

- tidal currents will be diverted around the western side of the marina under both ebb and flood tide conditions resulting in local accelerations of peak current speeds west of the marina compared to existing conditions;
- tidal current speeds along Putney Beach and between the marina and Putney Point are predicted to reduce due to the sheltering effect of the marina breakwaters; and
- negligible impact on water levels or tidal phases is predicted due to construction of the marina.

The relatively minor change to current speeds and directions predicted to arise from the construction of the marina are not considered to result in direct impacts requiring mitigation.

ES.14.11.2 Sediment Transport and Coastal Processes Assessment

Potential impacts of the marina development on sediment transport and siltation have been assessed. The following impacts on sediment transport and coastal processes have been identified:

- maintenance dredging is likely to be required periodically over the course of the marina's operation to maintain minimum required depths for navigation in the entrance channel. Low rates of sediment transport into the entrance channel are predicted, apart from an initial flux of sediment resulting from local morphological adjustment following construction of the breakwaters. Maintenance dredging of the entrance channel is therefore only expected to be required at a frequency of approximately five years or greater, or following a severe tropical cyclone;
- to prevent siltation of the entrance channel by this accreting sand and to maintain the long term sand transport continuity on Putney Beach, periodic bypassing of approximately 5,000 – 7,000 cubic metres of sand every five years would be required from the area between the marina entrance and Putney Point; and
- construction of the marina will result in changes to the size and incident angles of waves on Putney Beach relative to existing conditions. In turn this is predicted to reduce the net sediment transport potential along Putney Beach. The impact of this change is expected to result in a reduction in the rate of shoreline recession currently being observed along Putney Beach (refer **Photograph ES.16** and **ES.17**) and over-time, gradual accretion and progradation of the beach widths along Putney Beach.

Photograph ES.16 AERIAL VIEW OF PUTNEY BEACH EROSION PROCESSES, GREAT KEPPEL ISLAND

Photograph ES.17 PUTNEY BEACH COASTAL EROSION PROCESSES, GREAT KEPPEL ISLAND

ES.14.11.3 Marina Wave Climate Assessment

Protection for vessels moored within the marina from waves generated in Keppel Bay will be provided by the marina breakwaters such that waves may only propagate into the marina through the marina entrance. Detailed wave modelling of the entrance and marina basin was undertaken to predict the wave climate in the marina under design wave conditions. Under worst case design wave conditions from the north to north-west, a small number of berths immediately adjacent to the marina entrance could experience wave heights that would be considered to provide a 'good – moderate' climate. The remainder of the berths under these conditions would all experience wave heights consistent with 'excellent' conditions.

ES.14.11.4 Coastal Climate Change Risk Assessment

The main components of the coastal environment and GKI Revitalisation Plan that are potentially exposed to climate change threats include:

- Putney and Fisherman's Beaches - the consequences of shoreline recession related to sea level rise would include loss of beach amenity and beach access constraints associated with eroding shoreline. Shoreline recession hazards could be mitigated by nourishment of these beaches;
- marina breakwaters - increases in mean sea level, storm tide heights and increase in the size of extreme waves could potentially cause increased rates or overtopping and structural damage to the breakwater. The risk posed by climate change to the breakwater structures can be accommodated during the detailed design of the breakwater by increasing crest heights and the size of primary armour unit weights;
- marina infrastructure and reclamation - marina infrastructure and the reclamation area will be protected from wave action by the breakwater and as a result, the threats of climate change relate to inundation during large storm tide events. The marina infrastructure and reclamation area can be designed to accommodate the risks posed by climate change by constructing finished surface levels and floor levels above the relevant projected storm tide inundation levels; and
- foreshore development - the majority of the proposed development will be located at distances greater than 100 metres from the existing shoreline and at elevations above the projected storm tide inundation levels to 2100. The impact on minor areas of the development that could potentially be subjected to relatively shallow storm tide inundation under extreme 2100 storm tide conditions or impinged upon by shoreline recession can be accommodated by raising floor levels in these areas and/or landscaping to prevent the ingress of storm tides into these areas.

ES.14.11.5 Marina Water Quality

Residence times within the marina are expected to be very low due to the relatively small marina basin volume and large tide range. Approximately 50 percent of the average marina volume will be exchanged over a single spring tidal cycle. Practical measures of residence times such as the e-folding time are therefore likely to be no greater than one - two days for all locations with the marina basin.

Copper concentrations in the waters of the marina basin are likely to be elevated due to the presence of copper in antifouling paints on the marine vessels. Hydrodynamic model simulations have been undertaken to determine the resulting concentration and fate of copper leached from antifouling paint under a fully berthed marina scenario. The advection and dispersion of the numerical tracer showed that elevated copper concentrations will generally be confined to the marina basin.

ES.14.11.6 Sediment Quality and Dredging

Approximately 300,000 cubic metres of sand is required to be dredged to create the marina basin and approach channel. The average depth of dredging is generally in the order of 2.5 – 3.0 metres. The geophysical survey of the marina footprint identified a continuous reflector at depths greater than approximately 10.0 metres below the seabed that was interpreted as a bedrock surface. A series of horizontal reflectors overlay the bedrock surface and penetration levels through this material are indicative of unconsolidated material.

Sediment cores were undertaken to depths of one metre below proposed dredge depth from 12 locations within the dredge area footprint. Particle size distribution analysis of the sediment cores showed that on average, 95 percent of the sediment is comprised of sand sized or greater fractions with minor (5 percent) silt and/or clay content. The characteristics of the sediment are such that their disturbance would not be expected to generate relatively large suspended sediment loads.

Construction constraints associated with the limited access to quarry material on the Island and the desire to prevent the need for sea disposal of dredge material are such that it is proposed that all the material from the marina basin dredging will be contained within geotextile tubes to form the core of the breakwaters and to provide the majority of the material required for the reclamation.

The hydrodynamic model was coupled with a suspended sediment transport model to assess the likely magnitude and extent of suspended sediment plumes generated during construction and dredging of the marine facility.

Measures to mitigate the generation and impact of suspended sediment during construction include:

- installation of silt screens at the entrance to the marina for Stage 2 and 3;
- design of the reclamation area to maximise the length of time fine sediments may settle out of suspension before the decant flows back to the marina basin; and
- development of a Dredge Management Plan (DMP) to manage and impacts of dredging and construction.

ES.14.11.7 Emergency Wet Weather Wastewater Outfall

An assessment of the wet weather wastewater outfall on the water quality of the receiving environment has been undertaken incorporating both near field initial dilution and far field mixing assessments.

In the near field it was predicted that an initial dilution of the buoyant plume of 70:1 to 100:1 could be achieved from the outfall under quiescent conditions at the water surface. From the far field modelling assessment it was predicted that under the worst case three consecutive wet weather day discharge scenario, rapid dilution of key wastewater constituents would be achieved. Concentrations of Total Nitrogen and Total Phosphorus are predicted to reduce to below relevant trigger values within a small mixing zone in the immediate vicinity of the outfall.

The emergency discharge of treated recycled water is expected to occur once every 10 years during periods of extreme wet weather and will result in less than one percent of total recycled water produced being discharged over a 50 year period. It should also be noted that in these periods of extreme wet weather significant outlflows from the Fitzroy River are likely to impact the water quality surrounding the Island.

ES.14.12 Air Quality

The Proponent engaged ASK Consulting Engineers to prepare the air quality assessment report for the EIS – refer **Section 3.7.**

During construction of the GKI Revitalisation Plan, the most significant impact on air quality (in the form of dust generation) would occur during the airstrip relocation earthworks and demolition of the old resort. The predicted dust impacts of all of the modelled health and wellbeing dust descriptors meet the nominated human and terrestrial flora and fauna criteria, assuming the haul routes are watered when required.

During the operation of the Project the most significant impact on air quality (in the form of odour) will be potentially generated from the proposed solid waste facility and the waste water treatment plant. The fuel storage may create emissions of Volatile Organic Compounds (associated with odour), and other air emissions, but these will be of negligible impact given the quantities proposed to be stored, and the commitment to handle and store these products in compliance with the relevant Australian Standards. To reduce air pollutant impacts of fuel storage associated with the Project, the recommended buffer distance between the fuel storage and residential receivers is 300 metres. The recommended buffer distance may be reduced with appropriate selection of fuel storage volume and equipment selection.

Buffer distances of up to 200 metres will be implemented between any composting activities and residential receivers. Enclosing and controlling emissions of a solid waste facility may provide reductions to the recommended buffer distance.

The specific details of the wastewater treatment plant type and size are not yet known. An assessment of potential odour impacts and recommended buffer distances of different treatment plants and sizes was undertaken. The recommended buffer distances vary between 50 metres and 700 metres for the approximate number of 3,000 equivalent persons. The recommended buffer distances to mitigate against odour impacts of waste water treatment plants can be reduced if an enclosed package plant similar to a sequencing batch reactor is selected. Recommended buffer distances could be reduced to as little as 20 metres depending on plant size and configuration.

To assess the risk posed to the air quality environment by activities undertaken as part of the proposed project, a risk assessment has been undertaken. The risk assessment indicated that each of the potential risks are in the 'low' category and can be appropriately managed.

Refer **Section 3.7** for further information on air quality and associated impacts and mitigation measures.

ES.14.13 Greenhouse Gases

The Proponent engaged ASK Consulting Engineers to prepare the greenhouse gas emissions assessment report for the EIS – refer **Appendix V**.

The Project is expected to generate annual maximum scope 1 emissions of 1.17 kt CO_2e and 10.2 kt CO_2e scope 2 emissions. The annual maximum emissions of the GKI Revitalisation Plan represent a contribution of less than 0.0066 percent to the reported Queensland greenhouse gas emissions in 2007 and less than 0.0022 percent of Australia's reported greenhouse emissions in 2008.

Part of the greenhouse gas abatement strategy for the development is to install approximately 24,000 photovoltaic solar panels which are estimated to provide approximately 12.7 kt CO_2e of annual carbon offset to the development and therefore create a carbon positive development.

To assess the risk posed to the environment by greenhouse gas emissions arising from the proposed project, a risk assessment has been undertaken. The risk assessment indicated that each of the potential risks are in the 'low' category and can be appropriately managed.

Refer **Section 3.8** for further information on greenhouse gases and associated impacts and mitigation measures.

ES.14.14 Noise and Vibration

The Proponent engaged ASK Consulting Engineers to prepare the noise and vibration assessment report for the EIS – refer **Appendix AE.**

The existing noise environment at the Island is typical of most beachside locations with limited residential / commercial development, in that noise environment is dominated by natural features of waves on the beach and wind rustling leaves in the trees. There is also the influence of insects, usually a seasonal effect which is strongest in warmer months, and birds. The noise environment is also affected by the operation of a number of diesel powered generators at the various dwellings and backpacker accommodation. Noise monitoring conducted inland, away from the beach, resulted in lower noise levels than those taken at Fisherman's Beach.

A number of underwater noise measurements were conducted off Fisherman's Beach and around the Island. The measurements indicated that the underwater acoustic environment was dominated by snapping shrimps. Measurements were also conducted when various sea vessels passed, including recreational craft and the ferry.

To establish suitable noise limits for the Project a review of DERM (now know as DEHP) noise criteria was conducted. The review considers noise criteria contained within the Act, *Environmental Protection (Noise) Policy* and EcoAccess Guidelines.

Some implementation of noise and vibration mitigation and management measures will be required to achieve compliance with the nominated noise and vibration criteria.

A risk assessment was undertaken to assess the potential noise risks associated with the proposed development. All of the potential risks associated with the development activities are expected to be mitigated resulting in each of the mitigated risk levels indicated within the 'low' category.

Refer **Section 3.9** for further information on noise, vibration and associated impacts and mitigation measures.

ES.14.15 Waste

Photograph ES.18 BINS ON FISHERMAN'S BEACH

The Proponent engaged OPUS International Consultants Pty Ltd to prepare the waste assessment report for the EIS – refer **Appendix AM.**

Wastes currently produced on the Island are either disposed of at an old quarry site or transported via wheelie bins on the regular ferry service for disposal at council landfill. A range of wastes will be generated during the demolition, construction and operational phases of the GKI Revitalisation Plan. Key components of the waste stream generated during operation of the Resort will comprise paper, food waste and packaging (plastics, glass, cans, all recyclable) consistent with domestic and commercial waste sources. During demolition and construction, concrete, bricks and pavers, and timber are expected to comprise the dominant sources of waste.

The proposed waste management strategy for the Project focuses on avoiding waste generation during construction and operation wherever possible, through implementation of procurement policies, planning and scheduling, training and awareness, and specific work practices. Given the high costs associated with transporting and disposing of Island-generated waste on the mainland, reducing the total volume of waste generated by the GKI Revitalisation Plan, and in particular the volume of waste requiring disposal, is an economic imperative for this Project while also achieving a range of environmental and social benefits.

A range of environmental controls and mitigation measures have been recommended to minimise potential risks to the environment associated with waste management practises for the GKI Revitalisation Plan. These measures include nomination of waste reduction criteria in all procurement contracts, regular monitoring inspections and tracking of wastes, regular audits of

waste streams to identify opportunities for increased reuse and recycling, and improved waste management practices. Engineering and procedural controls, such as construction of bunded containment areas, covering bins and stockpiles likely to generate odour or litter and aeration of composting materials, are recommended to minimise the potential environmental impacts of waste management.

Although this waste management strategy deals specifically with wastes generated by the activities proposed under the GKI Revitalisation Plan, an opportunity may exist for existing residential and commercial properties on the Island to utilise the waste collection and storage facilities established as part of the GKI Revitalisation Plan subject to further negotiation and agreement between the relevant parties.

A consolidated approach to waste management on the Island will provide a range of benefits including:

- reducing costs to Rockhampton Regional Council due to the inefficiency of providing current waste management services to the Island;
- increasing opportunities for implementation of reuse and recycling initiatives, which are currently not available to Island residents; and
- improving facilities for storage and handling of wastes on the Island to reduce potential environmental impacts and public health risks, including:
    - safer transfer of waste onto vessels for transport to mainland by construction of the new marina;
    - providing greater separation of waste material being transferred to the mainland from other passengers travelling to and from the Island; and
    - upgrade of existing collection and storage facilities on the Island to improve containment of potential contaminants.

For these reasons, it is considered that the GKI Revitalisation Plan provides an opportunity to improve current waste management practices on the Island for the benefit of the environment, as well as Island residents and visitors.

Refer **Chapter 2.0** and **Section 3.10** for further information on waste management and associated impacts and mitigation measures.

ES.14.16 Transport

ES.14.16.1 Road Transport

The Proponent engaged OPUS International Consultants Pty Ltd to prepare the traffic assessment report for the EIS – refer **Appendix AK.**

Transport on and around the Island at present consists of a series of unsealed bush tracks and trails linking a limited number of residential and tourist facilities. Two notable exceptions are the boardwalk linking several residents and businesses near Fisherman's Beach to Putney Point and several short stretches of sealed but poorly maintained road in the vicinity of the former resort.

The GKI Revitalisation Plan will require the construction of serviceable, sealed roads both within sections of the Revitalisation Area and to the proposed marina. Currently, paths leading to the remainder of the Island are traversable only by foot, bicycle, 4WD or similar all-terrain vehicle.

The intent is to minimise traffic on the Island during both construction and operation phases through planning and scheduling of work.

The traffic assessment concluded that neither the construction nor operation of the Project will have any significant adverse impact on the mainland road network. However, the Project will significantly increase the number of vehicular movements on the Island, mainly during construction, but also through maintenance / service vehicles during operations. At present, Island traffic volumes are negligible. The Proponent will manage these impacts by constructing the required road network at the commencement of construction (Stage 1) to the requirements of the Rockhampton Regional Council and relevant Australian Standards..

The assessment also demonstrated that marine traffic impacts will be negligible, as only two barges per day will be required in the maximum construction-traffic year (2013) and another two ferries per day when the Resort is fully operational by 2023. The construction program is to occur over 12 years and further services to reduce the average number of construction vehicles required to service these barges.

The increase in parking demand as a result of additional staff and construction commuting trips to Rosslyn Bay which services the Island will require mitigation in the form of a staff car park, acquired or leased outside Rosslyn Bay Marina, with a minimum of 150 spaces and a direct shuttle service to and from the ferry. This location can double as a construction pre-staging area for the movement of materials to Rosslyn Bay and the Island.

While there are no undue effects as a result of the GKI Revitalisation Plan, the impacts from the construction of the Project on the traffic operation and pavement quality will be mitigated with the preparation of a Transport Management Plan (TMP). The TMP will be developed as required when the contractor is appointed and prior to construction. The TMP will cover the construction period and outline how the contractor will maintain safety, efficiency and the condition of infrastructure.

Refer **Section 3.11** for further information on road transport and associated impacts and mitigation measures.

ES.14.16.2 Marina and Marine Vessel Transport

Great Keppel Island is located within 12 kilometres of Rosslyn Bay Boat Harbour. The next closest mainland harbour, Gladstone, is approximately 90 kilometres south of the Island.

The Great Keppel Island marina, located on the southern side of Putney Point will provide a barge landing area, ferry terminal, 250 marina berths and refuelling and vessel sewage pump-out facilities.

The marina will provide safe and efficient access to the Island by sea and will be an integral part of the transport infrastructure required for the Revitalisation Plan.

The marina entrance and breakwater has been configured to provide a safe all-weather haven for vessels and minimise entrance channel length to deep water. The preliminary marina berths layout for Great Keppel Island is in accordance with best practice (AS3962-2001 Guidelines for Design of Marinas) as will be the final detailed design.

The marina will support the following vessel movements:

- ferry service to and from Rosslyn Bay (up to three return services daily once operational);
- barge traffic:
    - up to two barge movements per week day (during peak construction), primarily including movements to and from Rosslyn Bay and daily rock armour transportation from the Fitzroy River during construction of the marina; and
    - one barge movement daily to and from Rosslyn Bay once operational.
- commercial vessels, including charter and fishing; and
- trailerable (day) boats and other private vessels.

A Vessel Traffic Management Plan is to be prepared in consultation with Maritime Safety Queensland (MSQ) to manage all construction and operational vessel movements.

The creation of the marina at the Island is considered to provide the benefit of additional boating infrastructure within the Queensland Coast rather than causing increased or unmanageable pressures on existing harbours, particularly Rosslyn Bay Marina.

ES.14.16.3 Air Transport

The current runway is inadequate to accommodate Dash-8 aircrafts. A new airstrip forms part of the Revitalisation Plan. The proposed airstrip will be aligned approximately north-west/south-east at 125° magnetic north. The airstrip will be designated as Runway 12/30.

There will be negligible impact on the Island caused by operations at other proximate airports. Only Rockhampton, 27 nautical miles west-south-west and Gladstone, 44 nautical miles to the south, were found to require consideration when determining possible impacts.

The proposed realignment of the airstrip on the Island will improve the residential amenity of the existing dwellings along Fisherman's Beach by setting the airstrip significantly further away from these dwellings. At present, the Fisherman's Beach dwellings to the north of the existing airstrip are very close to the approach route required by aircraft utilising the current airstrip.

Air traffic in the vicinity of the Island is not impacted by this airspace design and there are no designated air routes except for those to the north and south of Rockhampton, the nearest traversing around 35 nautical miles to the west-north-west of the Island. On this basis there would be little, if any conflict between Rockhampton and the Island except for aircraft flying between the two destinations where designated air routes may be established if traffic levels warrant this.

The GKI Revitalisation Plan will not adversely impact on operations at the other operational airports in its vicinity. Further, as the envisaged air services are primarily to service Brisbane, Cairns, Sydney or Townsville it is likely that air routes would be established to provide tracking via Gladstone or Bundaberg, rather than the generally northern Rockhampton flight paths, overflying these southern airports at altitudes that have no impact on local traffic.

The additional volume of air traffic on routes south of Gladstone or Bundaberg will have no substantive impact on air safety.

Refer also **Section 6.1.3** for an assessment of hazard and risk associated with aircraft operations on the Island.

ES.14.17 Indigenous Cultural Heritage

The Proponent engaged Converge Heritage and Community to prepare the Indigenous cultural heritage assessment for the EIS – refer **Section 3.12.**

The lands associated with the Project are within the registered Native Title claim area of the Darunbal People. Direct consultations with the Darumbal People, in relation to Indigenous cultural heritage matters have been held through the progress of the EIS.

Indigenous occupation of the Keppel Islands has been demonstrated over thousands of years (Rowland 2004).

After the settlement of Yeppoon (1865) and Emu Park (1867) on the mainland, non-Indigenous visitors to the Island increased. Visitors to the Island often reacted violently towards the Island's Indigenous population (refer Rowland 2004:3; 5). Due to reports of mistreatment, Archibald Meston, Southern Protector of Aborigines, saw to the permanent removal of all remaining Aborigines from the Island in 1902.

The descendants of those people removed from the Island have been shown anthropologically to be part of the wider Darumbal group, although their particular clan name was the Woppaburra People. The Woppaburra People are acknowledged as being part of the registered Darumbal Native Title claim.

Aboriginal cultural heritage is present on the Island, with much known information collected during fieldwork activities conducted between 1978 and 1992.

A Cultural Heritage Management Plan (CHMP) must be developed and signed off by the Aboriginal parties and the Proponent before the construction activities commence on the Island to ensure protection of cultural heritage. Potential impacts are assessed in regards to the value or significance of the cultural heritage place. Cultural heritage significance relates to people's perspective of place and sense of value, within the context of history, environment, aesthetics and social organisation. The scientific and Aboriginal assessments of significance and impacts will be carried out as part of the cultural heritage survey process prior to and during initial earthworks. Protection, management and mitigation measures will be incorporated into the CHMP which will form part of contract documentation for all construction and operational contractors and employees.

Refer also **Section 3.12** for an assessment of Indigenous cultural heritage and associated impacts and mitigation measures.

ES.14.18 Non-Indigenous Cultural Heritage

The Proponent engaged Converge Heritage + Community to prepare the non-Indigenous cultural heritage assessment report for the EIS – refer **Appendix AF.**

The field survey identified 12 non-Indigenous cultural heritage sites in the vicinity of the Project area including the historic Leeke's Homestead. Assuming that the recommendations in **Appendix AF** are suitably implemented, the non-Indigenous cultural heritage assessment finds that the nature and level of impacts by the GKI Revitalisation Plan to the non-Indigenous cultural heritage values, is acceptable from a heritage perspective.

With regard to the existing Leeke's Homestead, the Proponent proposes to prepare a CHMP for the heritage listed site. The intention of preparing the CHMP will be to appropriately restore the building in order for it to be preserved as a tourist attraction to the Island and in the interest of protecting the Island's history.

ES.15 Stakeholder Consultation and Social Impacts

The Proponent engaged CQG Consulting to run the community consultation program and ImpaxSIA to assess potential social impacts. Hundreds of individuals, numerous groups and organisations have participated in consultation activities during the preparation of the EIS and the finalisation of the Project design, with approximately 600 people being informed on a regular basis about the GKI Revitalisation Plan. A range of tools and activities were implemented to facilitate timely two-way information flow with all stakeholders and gain an understanding of their concerns. These included one-on-one meetings, a Project Information Sheet, advertising, project shop front and a project hotline, website, email and a random telephone survey. Throughout all activities key messages were utilised to communicate the assessment methodology and approval process.

Community consultation identified a range of social, economic and environmental issues for consideration in the EIS investigations and development of the Project design. These issues related to local and regional benefits and impacts.

Stakeholder and community feedback indicated that 100 percent of stakeholders interviewed were in support of a proposed tourism resort on the footprint of the existing resort. However, a difference of opinion across the stakeholder categories in relation to the proposal was noted in relation to the scale and intensity of any development on the Island.

Specifically, the key concerns identified during the community consultation include:

- environmental impacts (traffic, pollution, impacts on wildlife, amenity and public health);
- provision of infrastructure (water, sewerage, power);
- over-development of the Island;
- loss of natural landscape, character and beauty (through over development, pollution and scenic amenity);

- exclusivity and restricted access (in terms of the proposed target market for visitors to the Island and in terms of restricted access to visitors to the public land); and
- poor social behaviour associated with construction and operational workforces.

The key likely benefits expressed during the community consultation included (in the words of the community):

- reinvigoration of the Capricorn tourism industry;
- improved accommodation facilities on the Island;
- it will make the local area more popular;
- the proposal will make use of a beautiful island;
- good for local businesses;
- increased employment opportunities;
- good for the local and state economy;
- good for the community and community spirit;
- the proposal will be good for the Region;
- the proposal is necessary as the Island needs redevelopment;
- the proposal will be a good holiday spot and great for a family holiday; and
- the Island will become more accessible for visitors.

A random telephone survey was conducted by Newspoll in May 2011 within the State Government electorates of Keppel and Rockhampton. The overall outcome of this random telephone survey was a positive response to the GKI Revitalisation Plan. Relevant key findings of the survey included: 84 percent of people indicated that they are in favour of the Project, 82 percent of people indicated that the Project would have a positive impact on their local community and 89 percent of people were in favour of the Project's "carbon positive" objective.

Social impact mitigation measures that have been proposed post EIS approval include:

- establishment of a Community Reference Group;
- development of a Workforce Plan focusing on a local training and recruitment strategy; and
- preparation of a Local Procurement Plan.

These management and mitigation tools will also ensure maximisation of potential opportunities associated with the Project.

Monitoring of social impacts of the Project by the proposed Community Reference Group should ensure identification of any unidentified impacts, as well as the timely management of potential negative impacts and maximisation of potential benefits.

A risk assessment of the potential social impacts arising from the Project was also undertaken and it was found that all potential risks are in the 'low' category and are able to be appropriately mitigated and/or managed.

ES.16 Cumulative Project Impacts of Associated Projects in the Region

The Central Queensland Major Projects Status Report (April 2011) prepared by Capricorn Enterprise estimates the total value of major projects in the Central Queensland region at approximately $142 billion[3] comprising:-

- $41.41 billion in coal projects;
- $7.766 billion in mineral projects;
- $74.976 billion in energy related projects;
- $7.732 billion in port projects;
- $6.869 billion in rail projects;
- $1.248 billion in water supply works;
- $528.637 million in transport infrastructure works;
- $311 million in social infrastructure projects; and
- $959 million in a range of residential, industrial, commercial development projects.

Further, only $185 million of identified major projects can be attributed to tourism related development in the Central Queensland region and comprise the following projects:-

- The Haven Wellness Resort, Emu Park ($100 million);
- Gracemere Hotel, Gracemere ($21 million);
- Beachside Resort, Gladstone ($24 million); and
- Gladstone City Central Hotel, Gladstone ($40 million).

The GKI Revitalisation Plan is not directly relevant to the range of major projects occurring within the Central Queensland region, largely due to it's relatively isolated island location. This factor voids opportunities for co-location with like or complementary projects, and voids cumulative impacts associated with other non-related Projects that are known to occur in the Central Queensland Region.

The GKI Revitalisation Plan will result in increased business opportunities in the Capricorn Region which will have economic, social and environmental impacts. Offering a domestic destination to Australian tourists the Resort is expected to have an impact on air and car travel out of this region and may reduce international air travel by those seeking an island escape. Cumulative impacts in relation to other proposed projects in the region are expected to be minimal due to the isolation of the island (>40 kilometres from Port Alma and >90 kilometres from Gladstone).

3. *Includes an approximate $4.25 billion correction to an identified error in Community Projects cost estimate.*

ES.17 Proponent Commitments

Key proponent commitments include the rehabilitation and protection in perpetuity of 575 hectares of land within the Environmental Protection Precinct, establishment of the Great Keppel Island Research and Historic Centre, undertake all actions identified in the Environmental Management Plan (refer **Appendix O**), undertake third part ESD certification of the Resort through EarthCheck, and implement a strategy to provide approximately 586 hectares in GBRWHA (combined State and Commonwealth) biodiversity offsets (refer **Appendix P**).

A comprehensive list of Proponent commitments is provided in **Appendix J**.

ES.18 Conclusion and Recommendations

The EIS presents a rigorous investigation of the GKI Revitalisation Plan in the context of the Island and greater Project area and in particular:

- **Chapters 1** and **2** provide an introduction to the Project and Proponent and describes the Project in detail, including providing discussion on the needs, costs, benefits, options and alternatives to the Project;
- **Chapter 3** describes the various environmental values associated with the Project area and impacts reasonably associated with the Project, and whether identified impacts capable of being mitigated, managed or offset;
- **Chapter 4** describes the various social values associated with the GKI Revitalisation Plan and potential impacts and mitigation measures;
- **Chapter 5** describes the economic impacts and benefits of the Project, and includes a narrative on the Project's sustainability compliance;
- **Chapter 6** identifies the accidental hazards and risks reasonably associated with the Project, in particular airstrip hazards and risks. Chapter 6 also describes:
    - the health and safety issues potentially associated with construction and operation phases of the GKI Revitalisation Plan; and
    - emergency response planning.
- **Chapter 7** describes the cumulative impacts of the Project, both in isolation of and in the context of other projects in the Region;
- **Chapter 8** provides an Environmental Management Plan (EMP) that seeks to manage or mitigate all project risks for both construction and operation phases of the Project; and
- **Chapter 9 – 11** includes conclusions, recommendations, references and appendices applicable to the Project.

An evaluation of the cumulative effect of Project impacts is summarised as follows:

- if all mitigation measures are implemented appropriately this would remove the identified residual "high" risk impacts.
- the exception to this is "high" risk impacts due to the direct and indirect loss of marine habitat associated with the construction of the marina and utilities services pipeline.
- mitigation measures to reduce and eliminate potential impacts are proposed, including but not limited to the avoidance of sensitive ecological communities through detailed design and the employment of construction methods sensitive to the particular environment.

Further, loss of marine habitat is proposed to be offset as part of a 586 hectare GBRWHA (combined State and Commonwealth) biodiversity to ensure a no net loss outcome (refer **Appendix P**);

- the majority of environmental impacts will be short-term impacts associated with the construction phase and have an identified maximum residual impact of "low" or "medium". Further, the proposed Environmental Protection Precinct will provide long-term environmental management and protection benefits;
- all Indigenous and non-Indigenous cultural heritage impacts are likely to be short-term impacts associated with the construction phase and have an identified maximum residual impact of "low" if appropriate controls are implemented, including the CHMP. Further, restoration of Leeke's Homestead is an identified project benefit;
- the Resort, once operational will produce more electricity than it consumes and therefore the Project will make a positive contribution toward carbon emission reductions;
- the Project represents a mix of social impacts and benefits, and overall may be considered to improve the resilience and persistence of the Island community through providing an improved local employment outlook and improved air and sea access to the mainland and its associated essential services; and
- in general, the GKI Revitalisation Plan will generate "medium" and "high" economic benefits during construction, and will result in long-term "medium" to "high" economic benefits to the Capricorn Region once operational.

An evaluation of the cumulative effect of project impacts on MNES is summarised as follows:

- there are no wetlands of international importance, and no terrestrial species of flora or fauna which are listed as threatened on the Island. The EPBC-listed "Littoral Rainforest and Coastal Vine Thickets of Eastern Australia" occur on the Island, but are outside the proposed development footprint area and will not be impacted. The locally-important habitat area associated with Leeke's Estuary will be protected and buffered, as will all the coastline apart from the proposed marina;
- a number of migratory and listed marine species have been recorded or are likely to use the Island and surrounding waters, but there are no 'important habitats' for migratory birds (as defined by DEWHA 2009) nor is the Island a significant turtle rookery;
- the World Heritage Values associated with geomorphology and associated processes (terrestrial and marine) are not at risk from the proposed development;
- the Project is not expected to increase marine vessel traffic within the GBRWHA as it will only provide another stop-over for tourists and the large majority are expected to travel by air;
- the design of the GKI Revitalisation Plan has considered the need to protect the OUV of the GBRWHA;
- in terms of World Heritage aesthetic values (including the 'existence value' of the Island as a relatively undeveloped place close to and within view of the Capricorn Coast), the constraint-based approach to project planning has ensured that most of the proposed development will be screened from view and separated into several discrete precincts. The main visual impact will be associated with the proposed marina which, although its location and building heights will ensure it is partly-screened by Putney Point, Sand Spit and Middle Island, the built form and night-time lighting will be visible from within an arc of offshore view. All built form will be low-rise (2-3 storey), set back from the shoreline and landscaped, such that other visual impacts are minor or capable of mitigation; and
- the proposed GKI Revitalisation Plan is likely to cause little degradation of World Heritage or National Heritage values, or significantly affect other matters of national environmental significance. The few environmental impacts which could potentially occur are "low" risk and capable of being mitigated, managed or offset.

Having regard to the benefits and impacts of the Project, in particular that the EIS ensures that no intolerable risks from cumulative events for the GKI Revitalisation Plan remain, it is a recommendation of the EIS that the Project proceeds subject to:

- conditions pursuant to Section 39(1) of the *State Development and Public Works Organisation Act 1971*; and
- conditions of approval pursuant to Section 134 of the *Environment Protection and Biodiversity Conservation Act 1999*.

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(To allow for A3 pages to be included within hardcopy submissions.)