AQUIS
GREAT BARRIER REEF RESORT

FLANAGAN CONSULTING GROUP

AQUIS RESORT AT THE GREAT BARRIER REEF PTY LTD

ENVIRONMENTAL IMPACT STATEMENT

June 2014

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EXECUTIVE SUMMARY

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1. INTRODUCTION

On 1 August 2013 the Coordinator-General declared Aquis Resort at The Great Barrier Reef (Aquis Resort) to be a 'coordinated project' for which an environmental impact statement (EIS) is required.

On 5 May 2014 the Federal Department of the Environment declared the project to be a 'controlled action' and further that assessment would be via the processes under the *State Development and Public Works Organisation Act* (SDPWO) as an accredited process. Consequently the Co-ordinator General will assess the impacts to matters of national environmental significance (MNES) under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), as part of the overall state assessment. Revised terms of reference (ToR) incorporating the 'controlling provisions' under the EPBC Act were issued by the Coordinator-General under section 30 of the SDPWO Act on 21 May 2014.

This EIS is therefore applicable to both national and state assessment processes.

The Queensland Government has called for expressions of interest from proponents to put forward development concepts for up to three major Integrated Resort development proposals throughout Queensland. The proponent has submitted an expression of interest for one of the two possible regional casino licences.

On 27 May 2014 the Queensland Government announced that Aquis would be able to receive a gaming licence if the project proceeds and meets all the necessary environmental, planning, and gaming licencing approvals.

The proponent is also in the process of acquiring the Reef Casino in Cairns and is investigating the opportunity to amend the Reef Casino licence to permit satellite operations at the Aquis Resort site with the Queensland Government. Issues relating to the casino licence will be determined by the State Government on advice from the Department of Justice and Attorney-General. The expressions of interest for the Integrated Resorts and casino licence arrangements are **not** part of the Coordinator-General's assessment process under the SDPWO Act for the project.

An EIS' main objective is to evaluate the project and its impacts, allowing the Coordinator-General to decide whether or not it should proceed to the development approval phase. Its other purpose is to inform government agencies and the community about the project, and how the developer (the proponent) intends to avoid or mitigate its impacts. This EIS has been prepared in accordance with the Coordinator-General's requirements, and is available for comment through a 'public notification' period of 30 business days. During the public notification period of this EIS, anyone may make a submission to the Coordinator-General about the EIS. Section 34 of the SDPWO Act identifies the requirements for making a submission.

Properly made submissions can be submitted:

By mail addressed to:

The Coordinator-General
c/- EIS Project Manager
Aquis Resort at the Great Barrier Reef project
Coordinated Project Delivery
PO Box 15517
City East Qld 4002 Australia

By Facsimile to (07) 3452 7480

Electronically at the following email address:

Email. http://www.dsdip.qld.gov.au/aquis

Electronic submissions are required to meet the properly made requirements of the SDPWO Act.

Closing date for Submissions: **5 August 2014**

The Coordinator-General is required to accept all properly made submissions. A properly made submission for an EIS means a submission that:

(a) is made to the Coordinator-General in writing

(b) is received on or before the last day of the submission period

(c) is signed by each person who made the submission

(d) states the name and address of each person who made the submission

(e) states the grounds of the submission and the facts and circumstances relied on to support those grounds.

Section 35 of the SDPWO Act identifies the Coordinator-General's responsibilities in response to the submissions received and the evaluation of the EIS. At the end of the public notification period, the Coordinator-General considers all 'properly made' submissions to determine whether the proponent is required to prepare additional information to address issues raised during the notification period. Public notification of any additional information provided is at the Coordinator-General's discretion.

Properly made submissions on the EIS (and additional information) are part of the material that must be given consideration in the Coordinator-General's assessment of the proposal, including recommendations and conclusions about environmental impacts and mitigation strategies.

Any submitter of a properly made submission in response to the EIS will have submitter appeal rights in relation to any subsequent 'impact assessable' development application under the *Sustainable Planning Act 2009.*

The process of preparing this EIS has given the proponent the opportunity to refine the original proposal in response to a number of concerns raised by the community, as well as the findings of detailed technical and environmental investigations. These refinements have resulted in significant modifications to the design and construction of the resort in order to avoid—or at the very least minimise—the environmental, social and economic impacts of the project.

2. PROJECT PROPONENT

Experience and Objectives

The proponent is *Aquis Resort at The Great Barrier Reef Pty Ltd*. Its chairman and sole shareholder is Mr Tony Fung. Tony Fung is a Hong Kong resident and private investment banker, financier and investor, with more than 40 years' experience in global financial services and investment, including more than 15 years as an active investor in Queensland, particularly in the Far North, where he owns sugar cane and cattle farming operations. Mr Fung can demonstrate a long history of successfully funding and constructing major tourism and entertainment projects in both Hong Kong and internationally.

Aquis is an 'Integrated Resort', which is an industry term for a high quality, mixed-use destination that combines five or six star hotel accommodation with leisure and entertainment facilities—usually including a casino. The success of Integrated Resorts in Asia are based on the travel and tourism aspirations of the burgeoning Chinese middle-class and, in particular, their interest in gaming.

It is Tony Fung's objective for Queensland and Cairns to benefit from this rapidly emerging and significant sector of the Asian market. This will be achieved through three key features of the resort, which—as a combination—are unique to Cairns, and allow Aquis Resort to compete on a global level:

1. The resort's proximity to the iconic **World Heritage-listed Great Barrier Reef and Wet Tropics rainforests**, attracting international tourists from around the world, particularly Asia.
2. A fully **Integrated Resort and gaming experience, including world class accommodation and entertainment facilities** in close proximity to these two natural World Heritage-listed icons, which will enhance the Cairns and Tropical North Queensland brands in the international arena, and allow it to confidently compete in the Asian tourism market.
3. Proximity to an **international airport**, which is a prerequisite and fundamental to the selection of the site.

In addition, Tony Fung will engage with Cairns Regional Council (CRC) and the Queensland Government to contribute to the development of sports and entertainment facilities appropriate for a city that will become an internationally recognised destination as a consequence of Aquis Resort. The objective is to attract visitors to Cairns through the staging of major entertainment and sporting events to complement the natural attractions of the region.

Site Selection

The scale of the Aquis Resort project called for a critical evaluation of available land in the Cairns region. The first step was to assess the five broad regional areas: Edmonton/Gordonvale, the CBD, Northern Beaches, Atherton Tablelands, and the Barron River delta. Through a process of elimination in which a number of factors were assessed, the Barron River delta—despite the constraints of flooding—represented the most appropriate area of Cairns where sites of sufficient size to accommodate an Integrated Resort could be found. Within the Barron River delta, three possible sites were identified:

- Freshwater
- Caravonica
- Yorkeys Knob.

The features and constraints of each site were considered, and the relative features of Yorkeys Knob were superior to the other options, while its constraints were fewer.

Features of the Yorkeys Knob site include:

- proximity to the Cairns International Airport
- direct access to CBD attractions and for reef access
- proximity to local tourist attractions (Skyrail, Tjapukai Aboriginal Cultural Park, Kuranda Scenic Railway)
- convenient access to/from areas to the south (Captain Cook Highway), south west (Cairns Western Arterial Road), west (Kennedy Highway) and north (Captain Cook Highway)
- separation from residential areas
- located at eastern/widest extent of the Barron River delta

The significant constraints of the site include:

- flooding
- site's designation as Strategic Cropping Land.

In addition to the features and constraints of the site, several recommendations in the Queensland Floods Commission of Enquiry's final report (released in March 2012), were also taken into account during the site selection process. In particular these recommendations affected the positioning of the development within the site, the development's proximity to existing infrastructure, and how the development would isolate and preserve existing flooding characteristics in the locale.

The proponent has developed a series of project specific policies that demonstrate Aquis Resort's commitments to positive environmental and community outcomes. The proponent also makes detailed commitments in relation to the project in four key areas, which can be summarised as:

- **Environment:** the proponent will adopt best-practice solutions, sustainable development practices, and an environmental management plan for both the construction and operational phases of the project.
- **Community:** the proponent commits to working closely with government and the community in developing a range of community plans, including:
  - Community Engagement Plan
  - Workforce Development and Management Plan
  - Local Content Plan
  - Construction Management Plan
  - Strategic Change Management
  - Housing and Accommodation Plan
  - Community Services and Facilities Plan
  - Community Health and Safety Plan
  - Cultural Development Plan
  - Responsible Gaming Plan
  - Cultural Heritage Management Plan.
- **Infrastructure.** the proponent will design and construct services connections and upgrades to meet the demands created by Aquis Resort to the standards required by the service provider; contribute infrastructure charges and undertake the required upgrades to local and state controlled roads; and provide High Occupancy Vehicle (HOV) transport in the (buses and coaches) for guest transfers and day trips.

3. SITE DESCRIPTION

Aquis Resort is located south of the residential community of Yorkeys Knob, and is approximately 13 km north of the Cairns CBD and 6 km north of the Cairns International Airport. The site is made up of 11 freehold titles, over a total area of 340.63ha. All lots are accessed via either Yorkeys Knob Road or Dunne Road.

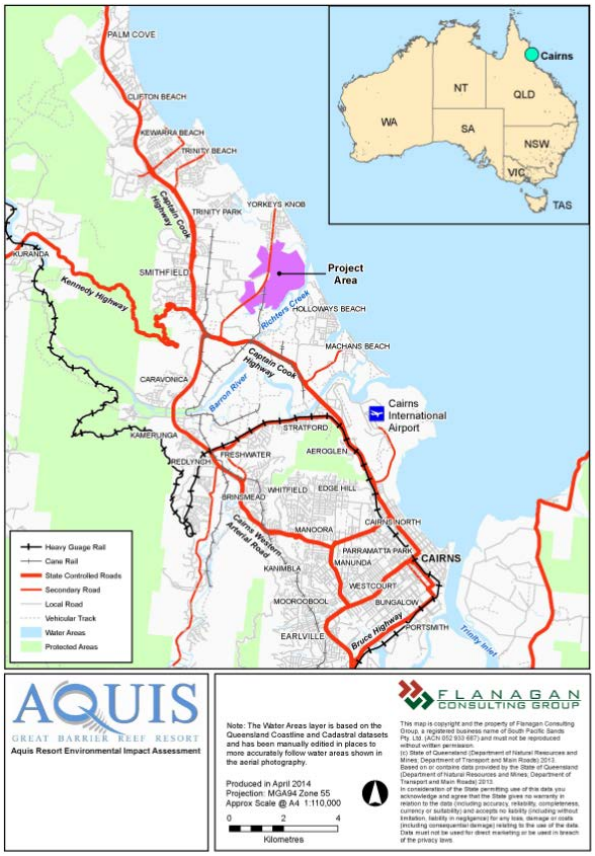


Figure 1 Locality Plan.

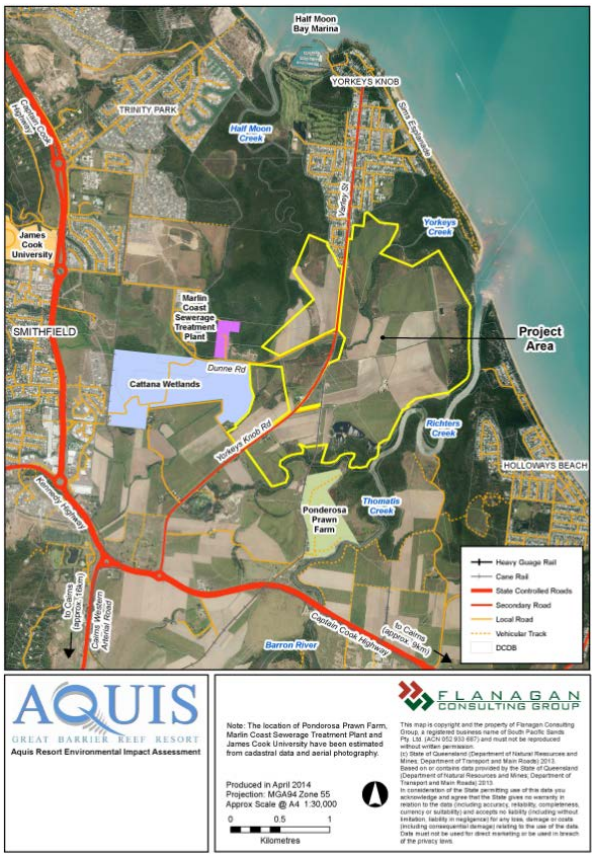


Figure 2 Site Plan.

Although the site is largely cleared of native vegetation, it is predominantly surrounded by remnant coastal vegetation and marine areas, much of which is protected by Queensland legislation. The key environmental features surrounding the site—which are either Matters of National Environmental Significance (MNES) or Matters of State Environmental Significance (MSES)—are:

- protected areas such as the Great Barrier Reef World Heritage Area
- regional ecosystems
- wetlands of various types and values
- As native title has been extinguished on all freehold land within the site, no native title compliance actions under the *Native Title Act 1993* (Cwlth) (NTA) are required for work conducted inside the boundaries of the site. However, native title still exists on various external areas including:
  - areas of unallocated state land (USL)
  - reserves, and in particular Lot 139 NR3838 – an area of state marine park and Fish Habitat Area (FHA)
  - the bed and banks of Richters Creek.

The elevation of the site is generally between 1 m and 3 m Australian Height Datum (AHD – this is the recognised basis of elevation and is approximately mean sea level). Cairns' Highest Astronomical Tide (HAT) is 1.86 m, meaning some of the site will be below the highest high tides. There is a well-established dune system where the land rises to approximately 3 m AHD. This higher land, and the ridge between the lots east and west of Yorkeys Knob road, form the watershed between Yorkeys Creek to the east and Half Moon Creek to the west. The only other notable topographic feature is Richters Creek that flows along the south-eastern and eastern boundary of the site.

The site is located in the wet-tropics climate zone, where the average annual rainfall is approximately 2000mm over 154 days, February is the wettest month, with an average rainfall of 450.6 mm over 16 days; and July and August are the driest months. Heavy rainfall associated with cyclones can produce extensive flooding causing further damage to infrastructure, particularly if the cyclone makes landfall just north of Cairns. The majority of flood events occur between the months of January to March.

The average minimum and maximum daily temperatures are 20.8^{0}C and 29.0^{0}C respectively. July is the coldest month with an average minimum temperature of 17.1^{0}C; and January and December are the hottest months with an average maximum temperature of 31.4^{0}C. The annual average humidity at 9 am is 73%, and 62% at 3 pm. February and March are the months with the highest humidity (78% average at 9 am), and September has the lowest (55% average at 3 pm).

The highest wind speeds in the site area are normally associated with winds from the south-east, and the direction is predominantly from the south-eastern quadrant. The wind direction in the afternoon—while predominantly from the south-east—can also come from the north to north-east.

The location of the site means that the effect on coastal process and flooding of expected sea level rise (SLR) due to the greenhouse effect are considerations in any development proposal. Sea level rise predictions by the Intergovernmental Panel on Climate Change in 2007 for the mid-case scenario, which have been adopted by the Department of Environment and Heritage Protection, are:

- 0.4 m for the year 2060 (50 years)
- 0.8 m for the year 2100 (100 years).

The recent *Queensland rainfall – past, present and future* study prepared by the Office of Climate Change in 2012 identified that extreme rainfall events have increased in their contribution to the annual rainfall total over the 20th century for Queensland. Specifically for the Far North Queensland region, over the recent decade there has been a 21% increase in average winter rainfall and a 10% increase in average summer rainfall (compared to the 1961-1990 average). At present, there is no state or local government requirement for consideration of increased or decreased rainfall and rainfall intensity due to climate change, and there is considerable uncertainty in the science underpinning such predictions.

Although no definitive state or local government requirements are in place, the Queensland Government has published climate change predictions for Queensland and in particular for the Far North Queensland Region. For Queensland in general, it is predicted that there will be a stronger but shorter rainfall season during January and February, thus resulting in drier autumns. It is generally anticipated that the number of rainy days will decrease but the amount of rain falling on wet days may increase by up to 20%. Extreme rainfall events are predicted to also become more frequent during the summer months.

4. PROJECT DESCRIPTION

Aquis Resort includes:

- Accommodation for up to 12,000 guests (at peak occupancy) in hotel rooms and suites, together with ancillary retail and food and beverage outlets; convention and exhibition spaces; entertainment facilities, including casinos and theatres; an interpretative centre; lagoons and an aquarium; as well as 'back of house' facilities and guest/staff car parking in a **resort complex** precinct.
- An 18-hole championship golf course, tennis centre and other outdoor sports and recreation activities in a **sports and recreation** precinct.
- Protection enhancement and presentation of the remnant environmental values on the site and improved bio-diversity and connectivity in an **environment management and conservation** precinct.

The precincts are shown on the Aquis Local Plan Precinct Plan ALP1 (see **Figure 3** below).

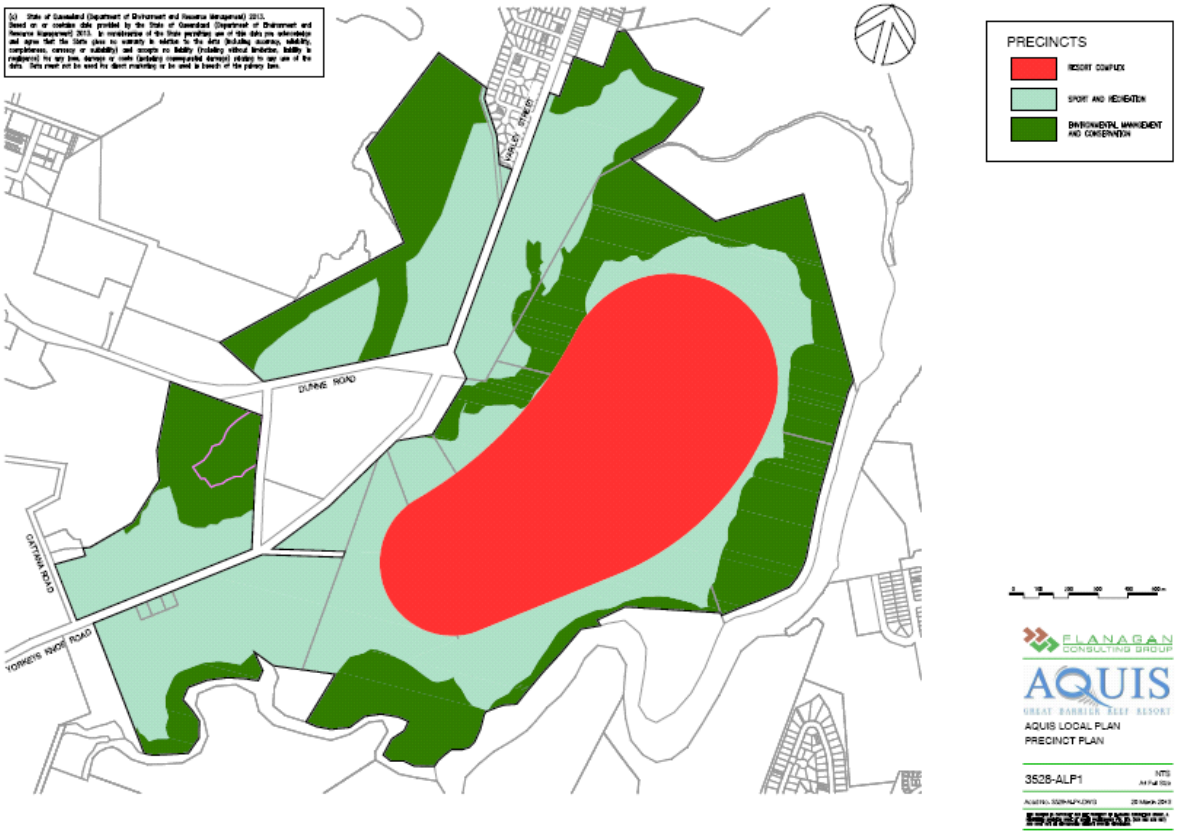


Figure 3 Aquis Local Plan Precinct Plan ALP1.

The distribution of land uses within the precincts is shown on the Aquis Local Plan Concept Master Plan ALP2 (see **Figure 4** below).

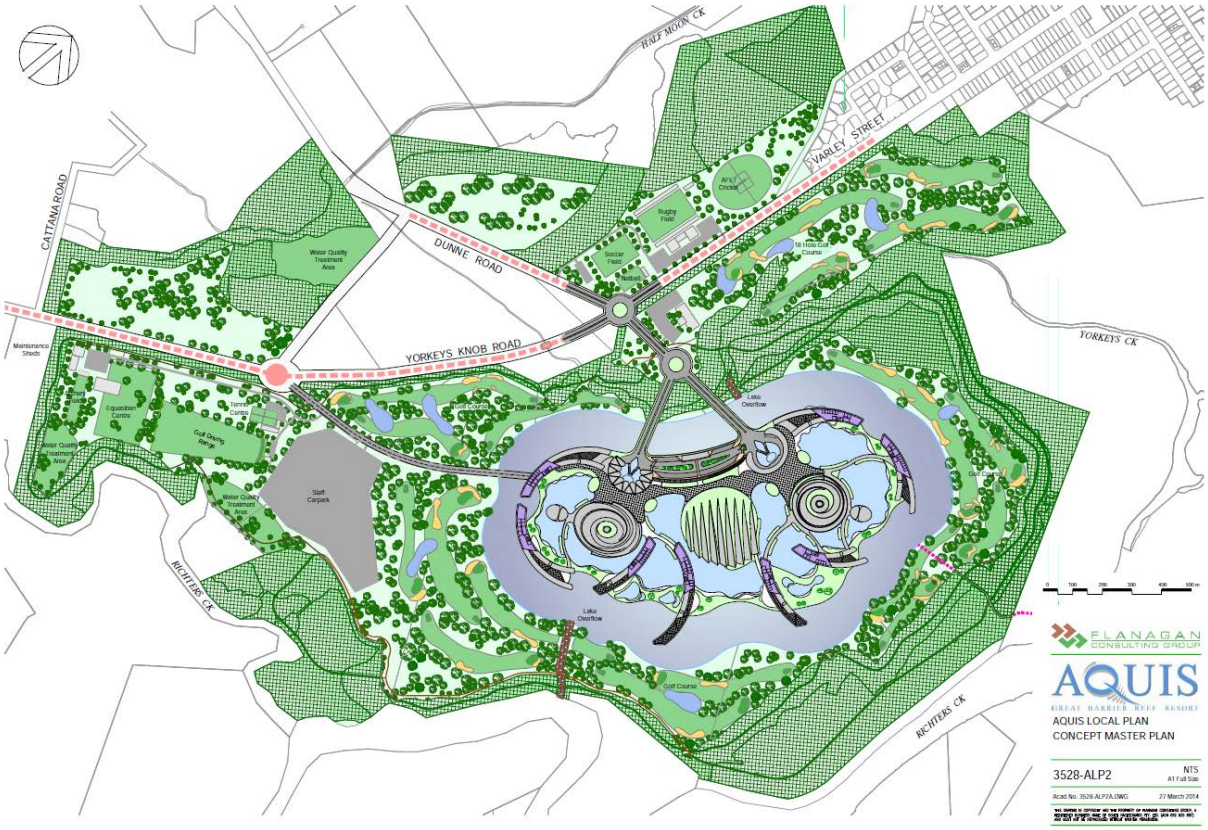


Figure 4 Aquis Local Plan Concept Master Plan ALP2.

Aquis Resort involves an anticipated capital investment of **A$8.15 billion** from 2014 to 2024. The resort comprises three precincts:

- **A resort complex precinct** (73 ha): Aquis Resort sits on an 'island' of 40 ha, surrounded by a 33 ha artificial lake. The resort complex—constructed over a 'flood secure' basement—includes accommodation for up to 12 000 guests in hotel rooms and suites across eight towers; retail and food and beverage outlets; convention and exhibition spaces; entertainment facilities including casinos and theatres; an interpretive centre; lagoons and an aquarium; back-of-house support facilities; and staff and guest car parking.
- **A sports and recreation precinc**t (155 ha). This includes an 18-hole championship golf course, tennis centre, equestrian facilities and riding trails, and a range of other outdoor activities.
- **An environment management and conservation precinct** (113 ha): Aquis Resort will protect and enhance the remaining environmental features of the site and improve bio-diversity through the preservation of 53 ha of native vegetation and ecological restoration works and other plantings including approximately 56 ha of native vegetation around the perimeter of the site, along Yorkeys Creek, and adjacent to Yorkeys Knob Road.

Figure 5 Aerial View of Aquis Resort.

Figure 6 Aerial View from East.

The ground floor, or podium level, of the resort complex will be constructed over flood secure basements, at a level to ensure immunity from the Probable Maximum Flood (PMF). Safe refuge above this level (defined as a very extreme theoretical flood used for emergency management planning) is provided for guests and staff, supported by emergency power, stores, medical facilities, water supplies and waste storage, as well as access by helicopter.

The artificial lake has been designed to ensure that the developed site can convey floodwaters in the same manner as it does now, so there is no worsening of flood flows on properties upstream, downstream, or neighbouring the site.

The saline lake will be separated from adjacent groundwater to limit its interference with groundwater levels and quality. Water quality within the lake will be maintained via a tidal exchange system connected to the Coral Sea. Landscaping buffers are provided within the resort complex and sports and recreation precincts to screen the development from Yorkeys Knob Road and to reduce air quality impacts on adjacent land.

While it is anticipated the overwhelming majority of overnight guests will be transported to Aquis Resort by bus or coach, car parking facilities for guests and staff will be located in basements (1400 spaces), in addition to a further 3000 staff parking spaces in the sports and recreation precinct. End-of-trip facilities will also be provided to encourage staff to use active modes of transport (cycling and walking).

Aquis Resort also involves:

- Ancillary infrastructure including internal access roads; water supply mains; sewage pump stations; and electrical, communications services infrastructure, administration and maintenance facilities and car parks.
- The upgrading of Yorkeys Knob Road to accommodate the anticipated traffic generated by the development and improve flood immunity.
- The upgrading of Dunne Road to cater for likely traffic generated by staff residing on the Northern Beaches.
- Connection to the existing water supply network through the provision of dedicated service connections.
- Connection to the Marlin Coast Waste Water Treatment Plant (WWTP).
- A tidal exchange system connected to the Coral Sea to maintain water quality in the lake.
- The use of treated effluent from the Marlin Coast WWTP that will be used for irrigation, landscaping, and other non-potable uses, to reduce demand on the potable water network.

Aquis Resort is *not* a real estate development, and none of its elements will be available for sale. It is a 24/7 tourism facility and all assets will be owned by the proponent.

The resort is expected to attract up to 1 000 000 guests a year—74% from overseas—with an average stay of four nights, while the entertainment facilities will attract an additional 500 000 visitors. As such, it will provide employment for 20 000 operational staff, creating a significant demand for a skilled workforce. While the construction workforce and initial operational workforce—will be sourced from Cairns and the region, the demand for skilled staff is likely to outstrip local supply, and additional workers and their families are expected to relocate to Cairns.

This, in turn, will place stress on the existing accommodation supply and it is anticipated the housing and development sector will respond by building new stock. The timing of this is likely to be triggered during the construction phase which will create 3750 new jobs in Stage 1 (2014-2018) and 3500 in Stage 2 (2020-2024). The viability of building new housing stock to accommodate the construction workforce will be underpinned by the long term, sustainable demand for accommodation by staff when Aquis Resort becomes operational. As such, the proponent intends to partner with CRC and the property development industry to develop a housing and accommodation plan to manage the sustainable increase in demand from the early stages of the project.

Design Refinement

The process of preparing this EIS has given the proponent the opportunity to refine and modify the original concept design, which has resulted in:

- an additional 3750 hotel rooms to cater for the accommodation needs of the target market
- removal of the serviced apartments due to community concerns about the scale of the building
- deletion of the centrally managed villas as their inclusion meant the island layout impeded the lake water quality performance
- deletion of the staff accommodation as the proponent proposes to source staff from—and accommodate them in—the local community
- a reduction of 3500 m² from the retail and food and beverage (F&B) area.
- reconfiguration and reduction of 32 ha from the lake, based on flood modelling, water quality and ecological criteria
- a reduction of 20 000m² from the convention/exhibition centre
- deletion of the water park and inclusions of themed recreation features in the lagoons
- an additional 40 ha of open space and recreation facilities, including a community sports and recreation precinct
- deletion of the sports stadium due to community concerns about the location outside the CBD

Changes to major project elements are shown on **Figure 7**. This uses the layout included in the July 2013 IAS (Initial Advice Statement) to show features that have been modified in the EIS.

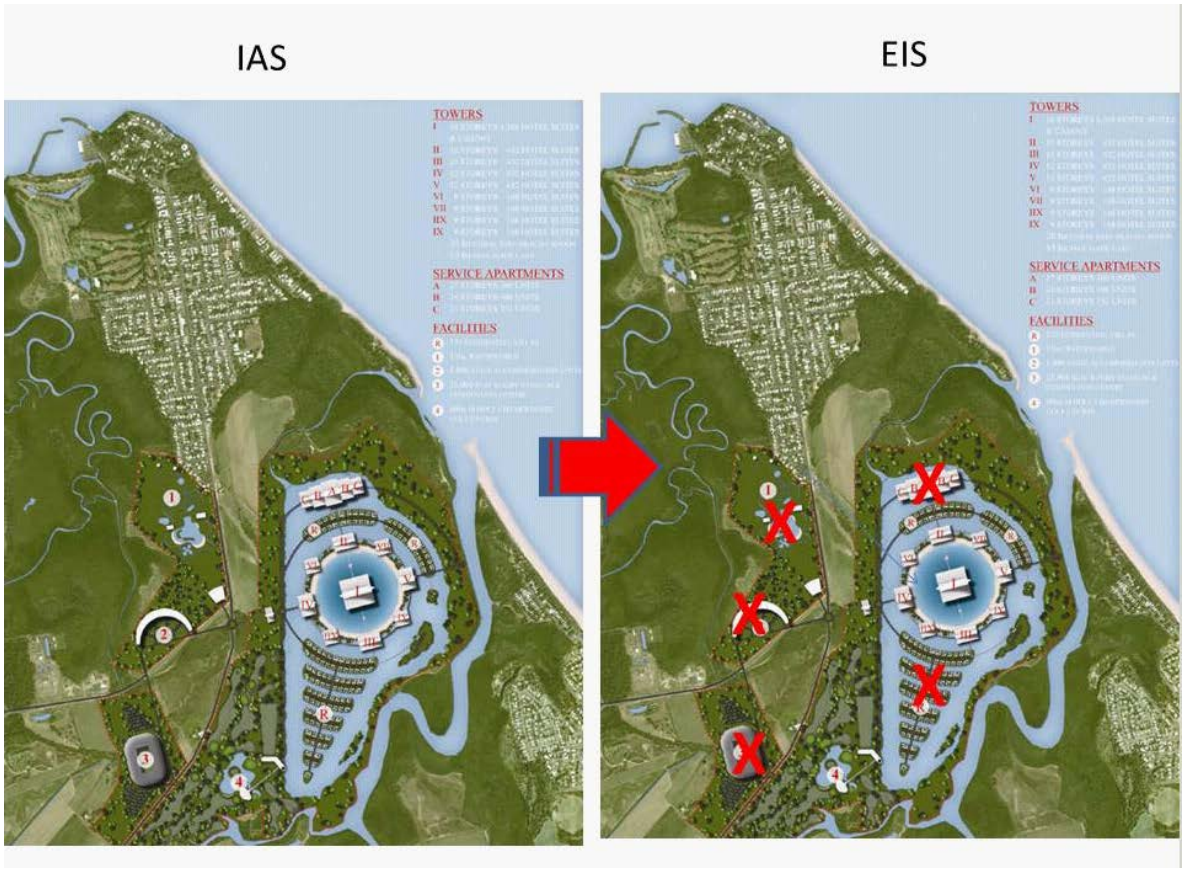


Figure 7 Changes to Project Elements Included in the Initial Concept.

Figure 8 shows a comparison between the Initial Concept Plan (IAS) and the current Aquis Concept Master Plan.

IAS	EIS
	

Figure 8 Comparison of Initial and Current Concept Master Plans.

Ecologically Sustainable Development (ESD)

ESD is defined by Australia's 1992 *National Strategy for Ecologically Sustainable Development* as 'using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and into the future, can be increased.'

In practical terms, the application of ESD to Aquis Resort is addressed through the:

- protection of habitats, species and ecological processes to the greatest extent possible
- protection of the values of surface and ground water
- wise use of natural resources
- sustainability initiatives to reduce energy consumption, conserve water, reduce waste and re-use materials where possible
- limitation of visual impacts through vegetation screening and other strategies
- protection of Indigenous and non-Indigenous cultural heritage values
- interpretation and education programs to present natural and cultural values.

There are three unavoidable impacts,:

- the alienation of mapped strategic cropping land (SCL)
- the fundamental change in land use and its effect on landscape
- the net production of greenhouse gases.

While these are unavoidable impacts of the project, they are also inherent in the fourth guiding principle of the National Strategy for Ecologically Sustainable Development, which is 'the need to develop a strong, growing and diversified economy which can enhance the capacity for environmental protection should be recognised.'

Construction Process and Program

The construction of Aquis Resort will take place over two stages:

- Stage 1. 2014-2018, with a workforce of 3750, and capital expenditure of A$5.05 b
- Stage 2. 2020-2024, with a workforce of 3500, and capital expenditure of A$3.10 b

The program includes three distinct construction elements:

- External Works: upgrades to the external roads and connections to water and the sewerage treatment plant, all of which will be required prior the bulk of the building works starting.
- Site works: bulk earthworks, site shaping, roads, landscaping, and the golf course. The lake functions as a flood channel and is required to be at least as deep as the ground water level prior to the building of the resort complex rising above the natural ground level.
- Building works. the building of the island from basements up to podium level, prior to construction of the buildings above the podium.

Before any external works can start, detailed designs have to be prepared for the roads, resort complex, and golf course; construction offices and other facilities will have to be established, and the site made ready, including haul roads and site access roads. Existing infrastructure—rural buildings and cane rail lines—will be demolished and/or removed.

Construction will involve conventional techniques for civil works and building construction, and the site will include an onsite batching plant for concrete production, as well as a facility for screening excavated sands which can be reused for beach replenishment and concrete manufacture. Hard rock aggregates will be sourced from existing suppliers in Cairns; and material supply will be subject to commercial arrangements with existing quarry operators.

All activities will be undertaken during normal construction working hours, although the haulage of excess excavated material from the site may have to occur outside peak commuter traffic hours to minimise the impact on the Captain Cook Highway.

The project will create a significant demand for skilled labour during the construction phase with a peak of approximately 3750 anticipated in 2017. Initially, the construction workforce will be sourced from local and regionally based labour pools, with workers being accommodated in the residential areas of Cairns and the region. When skills and labour demands reach peak levels, it is likely the workforce will be made up of workers that relocate to Cairns for the duration of the construction period.

It is premature to detail the actual plant and equipment that will be utilised during construction, but the operation of high impact equipment will be confined to normal operating hours and will be controlled by the proponent's duty to cause no environmental nuisance with respect to noise, air and vibration.

Existing infrastructure likely to be impacted by the construction of Aquis Resort will include Yorkeys Knob and Dunne Roads, which will both be upgraded. The construction of services connections will be undertaken entirely within the Yorkeys Knob and Dunne Road reserves.

Demands imposed on Infrastructure Networks

- **Transport.** The construction phase of Aquis Resort will create a peak of an additional 550 trips/hour on Yorkeys Knob Road. Peak movements of workers and materials on and off the site will be scheduled outside the traditional commuter peak by staging three staggered work shifts starting from 6am and finishing shifts from 4 pm. The transport of workers represents 92% of the total construction traffic movements and this can be mitigated by the implementation of a dedicated high occupancy vehicle (HOV) fleet.

  The operational phase of Stages 1 and 2 will generate traffic movements associated with the transfer of guests to and from Cairns Airport and on day tours; tourists from other hotels; locals; staff and back-of-house deliveries. Staff in private vehicles equates to 83% of total operational movements, whereas guest and associated back-of-house trips represent 17%. The impact of traffic peaks can be mitigated by introducing an HOV service to transfer the workforce on a hail-and-ride system, operating between Gordonvale and Palm Cove, and a staff reward program to encourage car-pooling and other higher occupancy modes of transport; and providing staff showers/changing facilities for those who choose to cycle to work.

- **Water Supply.** The proponent will minimise the demands on the local water networks by on-site storage and off-peak draw-down on supply during the excavation and earthworks in years one and two, and the building works in years three and four, which represent the peak demand for water during construction.

  Once operational, Aquis Resort will require 8.5 megalitres per day (ML/day) (taking into account tourist peaks, maximum and average days), just under half of which will be non-potable water to irrigate the open spaces and golf course. The Marlin Coast WWTP currently processes over 6 ML/day of non-potable water, the majority of which is not used. Aquis Resort represents a significant opportunity to use this resource.

- **Waste Water.** The peak construction workforce waste water usage is estimated to be 0.15 ML/day for Stage 1 construction and 0.14 ML/day for Stage 2. The Marlin Coast WWTP currently has surplus capacity to accommodate 2 ML/day; however it will require a new dedicated rising main prior to Aquis Resort becoming operational.

- **Power.** The power demand is expected to peak during years three and four of the construction program, and the existing Ergon network will need to be supplemented by local generators during Stage 1. Once the resort becomes operational, its demand will exceed the capacity currently available in the Yorkeys Knob and Smithfield area and will therefore trigger major infrastructure upgrades to the Ergon network, which are already planned.

- **Telecommunications.** The existing telecommunication network for data, land lines and mobile phones should be adequate during the construction phase; however upgrades to both fixed and mobile networks will be required once Aquis Resort is operational.

- **Solid Waste.** Industry best practice for waste management will be implemented during the construction phase and on-going operations.

Public Open Space and Use of Foreshore

The Aquis Resort proposal includes the development of a community sports and recreation facility on the land north of Dunne Road and west of Yorkeys Knob Road, with its inclusions and uses to be determined through community consultation and engagement. The resort will cater for the recreational demands of its guests and visitors through the golf course, walking and cycling tracks, tennis courts, and other facilities in its sports and recreation precinct. Although access to some of these will be provided to the general public, they will not become public facilities.

It is unlikely that guests of the resort will place a demand on existing community facilities, however it is conceded there may be some demand placed on beaches and foreshores.

There is no physical public access to the foreshore abutting the site, although there is an unformed esplanade along the eastern boundary of the site, and a small beach exists on the western bank of Richters Creek which is accessible from the site via a narrow track.

While the development of the project will not impede public access, there is no plan to install infrastructure to provide guests with access to the beach or foreshore.

Relationship to Other Projects

Aquis Resort is the first Integrated Resort in Australia catering to the Asian tourism market. It has no relationship with other projects in the region, nor does it compete with other tourism projects mooted for Cairns, such as Satori Resorts in Ella Bay (a A$1.4 b tourism and residential project near Innisfail), or the A$200 m Sheraton Mirage refurbishment in Port Douglas.

There are other significant but unrelated (resource) projects in the region which may occur at the same time, and may compete for labour and materials during construction; however, the timing of these projects is uncertain. These include South of Embly (A$1.4 b bauxite mine near Weipa); Cape Alumina (A$400 m bauxite mine and port facilities near Weipa); and Wongai Project (A$500 m coking coal project north west of Cooktown).

There are a number of other tourism and residential projects slated for Cairns which may proceed as a consequence of the economic stimulus Aquis Resort will generate. Likewise, the direct demands on infrastructure networks imposed by the development, together with the likely population growth, may result in the 'bring forward' of planned infrastructure projects.

Land Use Approval

Aquis Resort is proposed to be built on a site that is currently zoned rural. Subject to the Coordinator-General's evaluation report on this EIS allowing it to proceed to the next phase, the proponent will lodge *'a development application for preliminary approval varying the effect of a local planning instrument, in accordance with section 242 of the Sustainable Planning Act 2009'.* As part of this process, the matters relevant to state legislation regarding a land use decision relate to Strategic Cropping Land (legislation created to protect the long term viability of the food and fibre industries); works within the Coastal Management District (coastal areas requiring special development controls); and impacts on the state controlled road network.

Further Approvals

A Preliminary Approval will approve the use of the land for the development, but will not authorise assessable development to take place. Accordingly, further applications for development permits will be required as part of the implementation of the project. These will include

- material changes of use (code assessable)
- operational works
- environmentally relevant activity (ERA) permits.

Approval by the Commonwealth Government under the EPBC Act is also required and assessment is being undertaken under the SDPWO Act as an accredited process.

Future approvals that may be concurrent with the code assessable material change of use (MCU) or with subsequent operational works applications are:

- Native vegetation clearing for road/service crossings. This could include *Nature Conservation Act* approval if protected plants are found (however these may be avoided by design solutions).
- Tidal works for tidal exchange pipes, lake overflow, and emergency supply inlet (if required in the design of the flood conveyance system).
- Marine plant permits for clearing for road/service crossings. This could include *Fisheries Act* approval (however these may be avoided by design solutions).
- Permits under the *Fisheries Act* for any works in fisheries reserves/marine parks and waterway barrier works for crossing of Yorkeys creek.
- ERAs under the *Environmental Protection Act* for land reshaping, chemical storage.
- Operational works for site works and external works for road upgrades/services connections.
- Approvals for construction of works within the state controlled road corridors.

These are all likely to be Referral Agency/State Assessment Manager approvals associated with the implementation of the Preliminary Approval through the code assessable MCU(s) or operational works stages and/or conditions of those approvals.

5. LAND USE

Existing Land Use

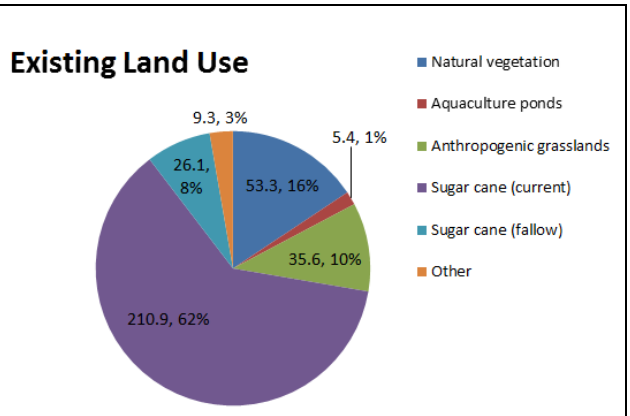
The 340.6 ha Aquis Resort site is currently used predominantly for sugar cane production. Of the total area, 211 ha (62%) is currently under cane while the balance consists of natural areas, cleared but unfarmed areas, farm infrastructure (roads, farm dams, and various structures), and abandoned aquaculture ponds. These features are shown on the following figure. By way of explanation:

- Land formerly cleared for sugar cane but which has been abandoned due to salinity issues is referred to as man-made or anthropogenic grassland. It contains some areas of marine plants that have recolonised the cleared areas and has some habitat values.
- The abandoned aquaculture ponds are man-made freshwater dams formerly created for fish-farming. This activity was abandoned many years ago and the ponds have been colonised by a range of native and exotic plants and animals. Water levels vary considerably over the year and they are seasonally used by many species of birds.

A geographic information system (GIS) analysis of the land use data is provided in **Table 1** below.

TABLE 1 EXISTING LAND USE

LAND COVER	AREA (ha)	% of SITE
Natural vegetation	53.3	16%
Aquaculture ponds	5.4	2%
Grasslands (former cane land)	35.6	10%
Sugar cane (current)	210.9	62%
Sugar cane (fallow)	26.1	8%
Other	9.3	3%
TOTAL	**340.6**	**100%**



Aquis Resort is the largest single tourism development ever proposed for Cairns /Queensland /Australia.

It is, by its scale and connection to the Chinese in-bound tourist market, a proposal of the type that could not have been reasonably anticipated by any planning instrument. It is on constrained land, particularly with respect to flooding and sea level rise, and will involve the loss of cane production.

However, that status, as history has shown, is not uncommon in what is, at times, a rapidly growing community and international tourism hub such as Cairns.

Planning Assessments

Planning assessments of the proposal against State Planning Policy, Far North Queensland Regional Plan and CairnsPlan identify a number of areas of conflict and inconsistencies across all three levels of planning instruments. These are summarised in **Table 2**.

TABLE 2 INCONSISTENCIES / CONFLICTS WITH PLANNING INSTRUMENTS

Area of Inconsistency	State Planning	Far North Queensland Regional Plan	Cairns Plan 2009
Loss of Primary Production Land (Strategic Cropping Land)	Module 6: Strategic Cropping Land	Strategic Directions: Rural Production Values Regional Policies: 2.4 Primary Production 5.4 Primary Industries	DEO: Preservation of good quality agricultural land
Economic Diversification		Regional Policies: 5. Economic Diversification	DEO: major economic activity outside of nominated activity centres DEO: Tourism based development located outside of nominated tourism areas
Pattern of Urban Development		Strategic Directions: Urban consolidation (outside of nominated urban footprint) Regional Policies: 4. Urban Development (outside of regional activity centre	DEO: preferred pattern of development (outside of nominated urban footprint)
Rural Planning Area			Planning Area Code (Rural 1): Change of Rural to Urban landuse
Location of Short Term Accommodation			Short Term Accommodation Code: location of development outside of CBD or nominated activity centres and change of nature of rural area

Benefits

The proposed development has the following features/ benefits:

- protection of 53 ha of natural vegetation that is not currently protected against threats from agricultural activities and degradation due to un-managed weeds and pests
- restoration of 56 ha of new habitat using native species
- strengthening of degraded waterways, and removal of obstacles to fish passage (undersized culverts and tide gates)
- reduction in net export of pollutants (133 tonnes per year) from agricultural activities and opportunity to use treated WWTP effluent with improved water quality outcomes for Great Barrier Reef World Heritage Area (GBRWHA)

- removal of acid drainage from existing watercourses
- preservation and interpretation of biodiversity values
- preservation and interpretation of Indigenous and non-Indigenous cultural values
- reduced risk to aviation (bird strike) and potential river migration due to removal of 6 ha of abandoned aquaculture ponds
- provision of safe refuge for local residents during natural disasters
- regional economic stimulus arising from capital expenditure of A$8.15 b and annual revenue of A$11b per annum
- significant employment in the construction sector over the period 2015-2023
- increase in Queensland Government Revenue of A$1 b per annum
- 20 000 direct employment and 35 000 indirect employment form Aquis operations
- Establishment of Queensland and Cairns in particular as an international resort destination
- improvements to flood immunity of access to Yorkeys Knob Road
- utilisation of current surplus capacity at Cairns Airport and tourism infrastructure in the region
- increased sports and recreation facilities for the Yorkeys Knob community
- significant contribution to the development of community sporting and entertainments facilities suitable for an international tourism destination.

In assessing the application for a preliminary approval to override the planning scheme, the CRC will assess whether the benefits of the land use change provide sufficient merit and grounds to justify the development, despite the conflict with the planning instruments.

In development assessment, and particularly through the Planning and Environment Court and its antecedents, the approach of assessing each site and each application on its merits is well-held and of long standing.

Importantly, in a scenario where this development might be approved, good practice would support a separate resolution identifying any conflict, how and why it was varied and upon what grounds in the public interest. This step, routinely applied in local government, provides a sound and robust response to any suggestion of a ‘precedent’.

6. LANDSCAPE AND VISUAL

The site has recognised local landscape values as part of the Barron River delta mosaic. This area has a rural character containing a patchwork of cane fields within a framework of remnant waterways. However, there are increasing areas of lower scenic integrity where the older patterns and interfaces are changing relatively quickly in favour of many forms of residential, commercial, and industrial development including

- linear infrastructure across the landscapes, including Captain Cook Highway upgrades, roundabouts and connecting roads, and the runways and infrastructure associated with Cairns Airport
- urban expansion of the coastal settlements, with newer subdivision patterns and more detached dwellings
- tourist facilities such as Skyrail and the Tjapukai (Djabugay) Cultural Park, cable ski park, go-kart track, artillery museum etc.
- quarries, sand and gravel extraction and non-traditional rural uses (such as the Ponderosa Prawn Farm)
- Smithfield and its spreading 'centre', including bulky goods outlets and warehouses along the Captain Cook Highway.

The mitigation response to flooding has set minimum ground and floor levels for various parts of the site. The maximum level to which buildings can be constructed is determined by airport / aircraft criteria, principally the Obstacle Limitation Surface. These two factors constrain the development to a specified lower and upper level respectively. The density and form of the buildings was determined by architectural and commercial criteria.

The Concept Land Use Plan includes vegetated buffers along the eastern side of Yorkeys Knob Road to screen the development from this route. These will be established early in the construction program. However, these plantings will take several years to achieve a tall dense screen and will be supplemented by screen fencing. As seen from the air during construction, the project site will appear as a large area of earthworks and part-completed buildings, but surrounded by bands of retained vegetation, recently planted trees, natural creeks and wetlands, and a golf course.

The Aquis Resort, with an intensively developed complex of buildings to 13 and 20 storeys and other major elements on a 341 ha site, is likely to have the following visual impacts, with mitigation measures in place:

- The existing rural character and landscape integrity of the Yorkeys Knob area will change to a large-scale international tourism precinct, particularly as seen from Yorkeys Knob Road, one section of the Captain Cook Highway at Smithfield, and in the distance from two lookouts (Skyrail and Henry Ross Lookout). The scale of change will be exacerbated by the likely rate of change, in that most of the development will take place in a continuous phase.
- Tall buildings on the site will also be seen from offshore, from some elevated houses at Yorkeys Knob and Smithfield, and will be glimpsed above the mangroves as seen from the Cairns Esplanade; but will not be seen from Green Island, Fitzroy Island, Palm Cove, Redlynch or Redlynch Valley.
- The existing quiet beach at the mouth of Richters Creek may lose its perceived naturalness and seclusion, although development is quite distant from the beach and it may be possible to enhance the screening effectiveness of coastal vegetation.
- There are unlikely to be any visual impacts on the GBRWHA, its Outstanding Universal Values (OUV) and associated aesthetic attributes, or on intangible perceptions or responses, as the built form will be no more visible from offshore than Cairns CBD buildings.

- The lighting associated with this major complex will be noticeable over a wide distance, either directly or as night-time glow, and from a distance may appear to be similar to or compatible with airport lighting.
- Yorkeys Knob Road will be upgraded, and its character will change from a two lane rural road to a four lane arterial road elevated to some degree above the surrounding land. The surrounds as experienced by current residents and future guests, will change from cane fields to a wider and more extensively landscaped resort access road, with a wide band of screening forest. Tall buildings will be evident in the mid-distance.
- The resort facilities proposed for the southern part of the site (golf course, tennis centre etc.) will create a gateway to both the resort and to Yorkeys Knob residential area, and these facilities will be visible from Yorkeys Knob Road and the highway, especially at night.
- The development will be seen from the air by passengers on planes approaching or taking off from Cairns Airport,. The construction phase will also be most visible when seen from the air.

The location, name, and target market for Aquis Resort at The Great Barrier Reef present opportunities for interpretation of the natural features, conservation values and management principles of the Great Barrier Reef (GBR) Marine Park and World Heritage Area (WHA), the Wet Tropics WHA (WTWHA) and presentation of World Heritage attributes. A number of overseas guests will undoubtedly be attracted to Aquis Resort and to Cairns because of its proximity to, and association with, the Great Barrier Reef and the Far North Queensland rainforests, and will create additional demand for existing and new tourist services. Within the resort, the proposed large aquarium and rainforest features will present a wide range of opportunities for nature-oriented education, awareness and interpretation. Planning for the resort themes, aquarium design, and visitor activity will incorporate as many elements as possible relating to both the Great Barrier Reef and the Wet Tropics, in collaboration with the agencies responsible for managing these WHAs.

A suite of environmental management strategies has been prepared to manage impacts during the construction and operation phases. The key strategies regarding landscape and visual issues are:

- the EMP (Construction) – will apply to management of all construction phase activities that involve potential impacts on visual amenity
- Interpretation Strategy
- Landscape and Habitat Strategy
- Restoration and Rehabilitation Strategy.

The above strategies will be developed fully once the design phase commences and will inform design as well as management during construction and operation as appropriate. This is described in **Chapter 23** (Environmental Management Plan).

7. FLORA AND FAUNA

Despite extensive prior clearing for agriculture, the site contains biodiversity resources that provide valuable habitats for a range of flora and fauna species. Ecological processes are largely intact, and although connectivity has been compromised by total or partial clearing of creek corridors, the site currently helps sustain natural areas outside its borders.

The project concept has been developed to protect virtually all of the existing natural vegetation and to reinforce this with additional plantings using similar species. Key outcomes are:

- Of the 53 ha of mapped natural vegetation and habitat on site, only minor clearing (0.7 ha) is required for minor infrastructure not able to be located in existing clearings.
- Despite providing some habitat values, the abandoned aquaculture ponds (5.4 ha) are proposed to be drained and filled to reduce birdstrike risk, address water quality concerns, and reduce the likelihood of river migration.
- Approximately 56 ha of new native plantings are proposed to restore and reinforce natural areas and provide visual screening and spray barriers around the site boundary as required. The benefit of these plantings is not just in creating new habitat and buffering existing areas of natural vegetation – it will also improve habitat connectivity, especially on Yorkeys Creek, which traverses the site.
- Of the 34.3 ha of marine plants on the site, less than 0.5 ha will be cleared and nearly 30 ha will be restored. This means that this resource will benefit from an 85% increase.
- A total of 33 ha of lake habitat will be created. The lake could incorporate stocking of native fish species and native flora species along parts of the banks on the outer lake edge to increase available habitat in the area. However, there are conflicting objectives in terms of crocodile and wading bird management and control of midges and mosquitos that need to be considered.

Existing connectivity on and through the site will also be protected and enhanced as follows:

- No existing connections (principally vegetated areas along Yorkeys Creek and Richters Creek) will be impacted on.
- Connectivity will be enhanced by the removal of on-site existing waterway barriers (two tide gates and two undersized culverts on Yorkeys Creek)
- Recommendations have been made for enhancement works external to the site but this work will require investigations and commitment by others. However, if undertaken, it will complement the work on the site to the benefit of ecological processes and values upstream to the Cattana Wetlands and downstream to the GBR lagoon.

A suite of environmental management strategies has been prepared to manage impacts during the construction and operation phases. The key strategies regarding flora and fauna are:

- the EMP (Construction) – will apply to management of all construction phase activities that involve potential impacts on flora and fauna
- Acid Sulfate Soil Management Strategy
- Fauna Management Strategy
- Indigenous Cultural Heritage Strategy
- Integrated Water Management Strategy
- Interpretation Strategy
- Lake Management Strategy
- Landscape and Habitat Strategy

- Restoration and Rehabilitation Strategy
- Sustainability Strategy
- Water Quality Management and Stormwater Management Strategy
- Weed and Pest Management Strategy.

These strategies will be developed fully once the design phase commences and will inform design as well as management during construction and operation as appropriate. These strategies will also give effect to any conditions of approval that arise from the EIS process and that of subsequent approvals.

Together, these design and management solutions will result in a net beneficial impact on flora and fauna values both within the site and in external areas upstream to the Cattana Wetlands and downstream to the GBR lagoon via the two Fish Habitat Areas and the Estuarine Conservation Zone of the Great Barrier Reef Coast Marine Park (State).

8. COASTAL PROCESS

The Aquis Resort site lies in the coastal zone and is subject to coastal processes including:

- elevated water levels arising from cyclones (storm tide and wave effects) and tsunami
- long term coastal erosion ('coastal bite')
- river migration and other instabilities of the Barron River delta.

Tropical cyclones pose a considerable threat to the Cairns region, with a cyclone affecting the region on average once every two years. One of the main effects of a cyclone is elevated water level arising from storm surge and other effects. The phenomenon called 'storm surge' is the combination of several components that result in an increase in mean sea level as a cyclone approaches the coast. The components include lower atmospheric pressure and wind setup causing an elevated water surface that is pushed in front of the moving cyclone. 'Storm tide' is the combination of this surge and normal (astronomical) tide and its assessment takes into account the random nature of surge and tide combinations. This combined level can be considered as the 'still' water level during a cyclonic event.

As a cyclone approaches land, the waves caused by the associated winds supplement this 'still' water level and produce an increase in water level at the shoreline. These increases are due to 'wave effects' and include wave setup and wave runup – for these to occur requires that a shoreline exists at the elevated 'still' water level. When these waves break at the shoreline, momentum carries the water up the beach. This is called wave runup. Therefore, the ultimate water level experienced during a cyclone will include the tide at the time, surge (wind setup and pressure effects) and the wave effects (wave setup and runup).

The CRC has commissioned studies into storm tide effects on the Northern Beaches and has produced maps showing likely depths of inundation. These maps show that the Aquis Resort site is prone to inundation from major low frequency storm tide events.

Similarly, like most of the Northern Beaches, the Aquis Resort site is at risk from inundation from tsunami, although the current level of knowledge is insufficient to be specific about levels. CRC deals with this uncertainty by noting that land under 6.0 m above sea level is at risk. This applies to all of the Aquis Resort site and most of the Yorkeys Knob area.

Site development principles to accommodate these two aspects of elevated water level (together with flooding effects) involved selecting safe floor levels above likely water levels and specifying that the structures be designed to accommodate the resultant forces. The design flood level of the resort complex precinct is about 5 m above the existing ground level (7.5 m above mean sea level) which is well above even the most extreme storm tide and tsunami levels.

Most of the Aquis Resort site is within a Coastal Management District. Hazards associated with locating buildings and structures within the coastal zone are well known and rules are in place regarding set-back distances for important infrastructure to allow for 'coastal bite'. Shoreline 'erosion prone area' widths have been determined by the Queensland Government to identify the potential extent of erosion of the dune system over a specified planning period. Both short-term (cyclone-related) and longer term (gradual) trends are included in the assessment, together with an allowance for potential sea level rise associated with climate change. Provision must also be included for a factor of safety on the estimates and an allowance made for slumping of the dune scarp following erosion. At the Aquis Resort site, the width of potential coastal bit is 400 m, meaning that all major infrastructure needs to be landward of that line.

It is known from a number of studies that the Barron River has a history of switching channels and exhibiting other characteristics of a mobile delta. Over last 6000 years, the eastern shore of Trinity Inlet has accreted (i.e. moved seaward) due to sediment supply from the Barron River. Dating of sediment suggests that the average accretion rate for Yorkeys Beach over the last 6000 years was 29 m every 100 years. There is also evidence that during this time there have been major changes to the river's mouth. The most recent change occurred in 1939 when the river formed a new entrance in its current location at Ellie Point near the airport.

During the 1970s, there was concern over increasing flows in Thomatis and Richters Creeks (then estimated at 35% of Barron River discharge) and the effect that this could have on the stability of the bifurcation (i.e. the point at which the Barron River and Thomatis Creek split). Erosion mitigation works were recommended at that location. Some of these options have since been implemented and the creek is currently stable for most of its full length, with significant mangrove populations in the lower sections.

Site development principles to accommodate these coastal processes are based on the following:

- No major permanent structures east of the predicted shoreline erosion line.
- Consider need for armouring site against possible coastal bite and Richters Creek erosion.

Consideration was given to the need for armouring against river migration by the construction of a buried rock wall within the site to act as a 'last line of defence'. This concluded that this is unnecessary and that the preferred approach involves:

- ensuring that the lake and resort complex precinct are structurally secure against erosion
- stockpiling suitable rock on site to be used for emergency stabilisation works in the event of serious erosion.

The design solutions for accommodating coastal processes are such that:

- safe refuge above an extreme storm tide and tsunami can be provided for the resort complex precinct
- the project infrastructure is located approximately 600 m landward of the current shoreline and is outside of the calculated shoreline erosion prone area (maximum 400 m)
- armouring of the eroding bend of Richters Creek will mitigate local river migration
- the project will not result in worsening of costal process effects for adjacent landholders.

An Integrated Emergency Management Plan will be prepared to manage response to cyclones and tsunamis, amongst other hazards.

9. FLOODING

The Barron River with its headwater located on the Atherton Tableland has a contributing area of 217 500 ha and drains into Trinity Bay (i.e. Coral Sea) north of Cairns and north of Trinity Inlet.

The catchment contains five major dams and / or weir(s) with an extensive irrigation network located in the upper reaches, before the river drops through the Barron Gorge and forms the Barron River delta. The delta is also extensively developed with agricultural activities and cane farming with fringing residential development, although this agricultural use is quickly being transformed by urban, commercial and industrial uses. The tidal limit of the Barron River is located some 7 km upstream of the site, at Kamerunga near where the Cairns Western Arterial Road crosses the river.

The Barron River has a history of minor and major floods and most of the site itself is inundated during some flood events (i.e. on average every couple of years). When the Barron River breaks its banks most of the delta floods and Richters Creek, Yorkeys Creek, and Half Moon Creek help convey floodwaters around the Yorkeys Knob township (i.e. to the east and west of the natural divide formed by Yorkeys Knob Road (Varley Street)).

The probability of occurrence (likelihood) of a hazard such as flooding includes two alternative concepts:

- **Average Recurrence Interval (ARI)** – the annual period between events of the specified magnitude, expressed in years (i.e. 100 year or 1,000 year ARI)
- **Annual Exceedance Probability (AEP)** – the probability that events of the specified magnitude occur in 1 year, expressed as a percent (i.e. 1% AEP or 0.1% AEP). This is the preferred terminology.

These are related concepts in that ARIs of greater than 10 years are very closely approximated by the reciprocal of the AEP (i.e. 100 year ARI = 0.1% AEP). Note that the old approach of referring to probability as, for example, the '1 in 100 year flood', while being statistically identical to 100 year ARI, is no longer in official usage as it implies that rare events are in some way separated by fixed periods of time. As noted above, the preferred terminology is AEP.

The Aquis Resort site is generally flat and is flood-prone, with the entire site being affected by Barron River flooding for events less frequent than about 50% Average Exceedance Probability (AEP). Key points regarding flooding on the site are summarised below:

- The largest recorded flood occurred in 1977 and resulted in flood depths of 1-2 m across the site with floodwaters receding after about four days. This was estimated to have an AEP of about 2%.
- A similar sized event also occurred in 1979 (demonstrating that large events can occur more frequently than the calculated ARI).
- The PMF (defined above as a very extreme theoretical flood used for emergency management planning) results in an approximate peak water level of 7.5 m AHD at the southern part of the site.

Planning controls permit certain development in the Barron River delta but require compliance with a number of criteria related to minimum building levels, access provisions, prohibition on affecting other properties (increasing upstream water level, velocities), and other matters covered in CairnsPlan's *Flood Management Code* and *Excavation and Filling Code.* Under CairnsPlan 2009, flooding is not necessarily a constraint to development and three broad mitigation options are available:

- adopting flood-tolerant land uses (e.g. golf courses) involving minimal earthworks that could affect external properties, and accepting frequent inundation
- building habitable floors and important infrastructure above (at least) the 1% AEP level (plus freeboard) on piers such that floodwaters can pass beneath the development with no effect on external properties
- building habitable floors and important infrastructure above (at least) the 1% AEP level (plus freeboard) and provide compensatory waterways with appropriate flood plain storage (e.g. lake) to prevent floodwaters affecting external properties.

The Aquis Resort solution is a mixture of the first and third options above. The third option was selected for the resort complex precinct and involves building designed at flood immune levels and a large lake that allows floodwaters to flow around the central island.

Site development principles adopted to deal with flooding effects were to select safe floor levels well above likely flood level and to require that structures be designed to accommodate the resultant forces.

The design flood level of the Resort Complex Precinct is about 5 m above the existing ground level (7.5 m above sea level) which is above the PMF.

CRC's Barron River Delta Flood Model was used to test the effectiveness of the lake solution and thereby assess compliance with the *Flood Management Code.* Modelling demonstrates that the resort can feasibly be designed to achieve a no significant worsening impact on private land beyond the site, in terms of actionable damage and nuisance and thereby comply with CairnsPlan. In particular, modelling shows that:

- upstream of the development, there are extensive areas of predicted flood level reduction and no unacceptable flood level increases
- downstream of the development, flood level impacts are contained to non-urbanised areas
- predicted velocities across the site are generally less than 1 m/s and therefore are non-scouring for grassed areas and are not highly hazardous to people
- flood modelling and impact assessment has also been carried out for a range of events and this reveals that acceptable flooding impacts can be achieved across the full range of flood frequencies.

The design solutions for flooding are such that:

- safe refuge above the PMF flood can be provided for the resort complex precinct
- there will be no worsening of flood effects for adjacent landholders (overall, the impact is beneficial due to the lowering of flood levels on many Holloways Beach properties).

The Integrated Emergency Management Plan to be produced by Aquis Resort will include responses to flooding.

10. WATER RESOURCES

The Aquis Resort site is situated at the seaward limit of the delta of the Barron River (catchment 217 500 ha) and is within several hundred metres of the Coral Sea. At a local level, the site lies partly within the sub-catchments of:

- Richters Creek (catchment 449 ha)
- Yorkeys Creek (catchment 267 ha)
- Half Moon Creek (catchment 3797 ha).

Of these, Richters Creek is the largest of the waterways, being a distributary of the Barron River due to its connection via Thomatis Creek. The Barron River and the Thomatis Creek / Richters Creek systems are hydraulically interconnected, sharing both drainage and tidal flows. For example:

- approximately 70% of the annual net seaward flow from the Barron River is discharged at the mouth of the Barron River
- approximately 30% of the annual net seaward flow from the Barron River is diverted first down Thomatis and then Richters Creek.

Water in the creeks surrounding the Aquis Resort site is predominantly saline and there is no use made locally of surface water. The few small freshwater ponds (natural and man-made) on the site itself are sustained by groundwater, although they also collect incident rainfall and runoff from small local catchments. The natural ponds lie within the melaleuca wetland and their water is not extracted for any purpose, while the various farm dams are used for a number of purposes, principally dust control. The abandoned aquaculture ponds contain freshwater sustained by groundwater and their level varies by up to 4 m throughout the year. Water from these ponds is not extracted for any purpose.

The project is not designed to intercept, store, or otherwise use surface water resources. The ‘use’ of surface water occurs only during large Barron River floods (i.e. those with of a frequency less than 50% AEP). Any captured surface water is inimical to lake operations and is proposed to be discharged as quickly as possible as the overall catchment drains.

The loss of the small on-site water resources (i.e. farm drains, farm dams, and the abandoned aquaculture ponds) are not considered to be significant impacts on surface water resources.

No significant residual impacts on surface water are expected.

Groundwater exists in the site in two separate aquifers:

- an upper unconfined (water table) aquifer between about 0.5 m and 3.5 m depth containing fresh water, although this is tidally-influenced and becomes brackish at times
- a lower semi-confined aquifer which is saline towards the top and become less so with depth.

There are six licensed bores in the vicinity. Four of the bores have been used in the past for agricultural supply but are not currently used due to the costs associated with irrigation and the remaining two bores are located adjacent to the residential properties and are used for garden watering.

The main design-related constraint to groundwater is the lake that is required to be constructed on the eastern lots as a flood mitigation solution. The water quality needs of this lake require it to be some 4 m deep and this will intersect the upper aquifer and therefore interact with groundwater. The lake water quality solution requires that seawater be pumped into the lake constantly.

Over a very short period of time, the water in the lake will become saline, approaching the salinity of Richters Creek at most times. Without mitigation, this water has the potential to interact with adjacent groundwater and make it saline.

The adopted design solution is to quarantine the lake from groundwater, either by lining its base and sides, or by constructing waterproof cut-off walls beside the lake down to the impermeable clay layer that exists at a depth of about 7-10 m. Both of the solutions are practical and the preferred approach will be determined during detailed design.

The principal risk to groundwater is interaction with saline lake water and this has been effectively mitigated by quarantining. As part of the construction of the lake, approximately 900 ML of groundwater (i.e. the resource within the quarantined area) will be unavoidably consumed by the dewatering process. This could be used beneficially, subject to appropriate approvals.

11. WATER QUALITY

The site is adjacent to protected areas where the maintenance of high water quality is essential to ongoing ecological function and protection of recognised conservation values. These are:

- the GBRWHA (and GBRMP (Commonwealth) further off-shore)
- the GBR Coast Marine Park (Queensland)
- the Yorkeys Creek and Half Moon Creek FHAs.

Current water quality in the Aquis Resort catchment does not meet the Queensland Water Quality Guidelines for various nutrients and turbidity. It appears that water quality is adversely affected by agricultural runoff from the surrounding land (predominantly cane farming in the overall catchment and the prawn farm on Richters Creek) and the Marlin Coast WWTP on Half Moon Creek.

Land development typically poses threats to water quality through the construction process (e.g. soil and water runoff associated with earthmoving activities, mobilisation of soil contaminants, acid sulphate soils/possible acid sulphate soils (ASS / PASS) conditions and during operation (e.g. stormwater drainage, chemical and fuel spills, overflows and other losses from sewerage systems).

The Aquis Resort response to protecting water quality has five components:

- development of a comprehensive stormwater drainage strategy to capture and treat as much as possible of the sediment and nutrient load that would otherwise leave the site when it rains
- reuse of as much of the sewage produced on the site after treatment at the Marlin Coast WWTP as a potable water substitute (this saves on the use of potable water and also allows for all of the pollutants remaining in the effluent to be used on site rather than being exported to the GBR from the WWTP)
- environmental design of the lake (required for flood mitigation purposes) to ensure that it is sustainable in its own right and does not involve unacceptable discharges
- ongoing management of the lake for all circumstances and conditions
- comprehensive construction management control to manage soil and water.

The stormwater drainage strategy involves the use of stormwater quality improvement devices such as bio-retention ponds and gross pollutant traps. Industry-standard assessment techniques were coupled with ten years of actual meteorological data for Cairns to calculate annual loads of pollutants. Taking into account the stormwater quality improvement devices and the reuse of treated effluent, when compared with the existing (cane farm) use, Aquis Resort will produce:

- 132.1 t/a (46%) less total suspended solids
- 0.24 t/a (28%) less total phosphorus
- 0.7 t/a (12%) less total nitrogen .

Overall, the export of all pollutants will reduce by 133 t/a (45%) when compared with the existing cane farm.

The flood mitigation lake has been designed as a saltwater system that is supplied with water from the sea floor 2.2 km offshore via a buried pipeline and continuous pumping into the lake. Water will be pumped from the lake on an ebb (out-going) tide only, at an outlet near the mouth of Richters Creek. This will be fitted with a diffuser to reduce local velocities. This inflow and outflow arrangement will create a flushing action in the lake that will replace the lake's volume on average every 14 days.

By the use of relatively clean water from the offshore inlet, the flushing action described above, and additional internal mixing using fountains and aerators, it is expected that the water quality in the lake will be as good as if not superior to that of Richters Creek. Even if this is not the case, modelling shows that the available dilution is such that any impacts will be insignificant.

Notwithstanding available dilution, the proposed management arrangements require that lake discharge will only be permitted when continuous testing shows that the water is of an acceptable quality. Draft discharge criteria (based on Australian and New Zealand Environment and Conservation Council guidelines) have been established and these will be refined based on on-going testing that has already commenced. The basis of this approach is that the quality of the discharge must fall within the range of normal variation in water quality in the receiving waters. Separate criteria will apply for dry season, wet season, post-flood, and during construction.

Ongoing lake management incudes provision for removal of sediment, post-flood clean-up, and management of algae, pest fish, crocodiles, sharks, marine stingers, mosquitos and biting midges. The lake will not be used for swimming etc.

A detailed soil and water management plan will be developed to cover the construction phase. Techniques for this management are well-known and can be expected to be successful.

A suite of environmental management strategies has been prepared to manage impacts during the construction and operation phases. The key strategies of relevance to water quality and general lake management issues are:

- the EMP (Construction) – will apply to management of all construction phase activities that involve potential threats to water quality
- Acid Sulfate Soil Management Strategy
- Contingency Strategy
- Crocodile Management Strategy
- Fauna Management Strategy
- Integrated Water Management
- Lake Management Strategy (including a specific Tilapia Management Plan)
- Water Quality Management and Stormwater Management Strategy (including a specific Discharge Compliance Plan)
- Weed and Pest Management Strategy.

The above strategies will be developed fully once the design phase commences and will inform design as well as management during construction and operation as appropriate. These strategies will also give effect to any conditions of approval that arise from the EIS process and that of subsequent approvals.

Together, these design and management solutions will result in a net beneficial impact on water quality, principally by the reduction in export of sediments and nutrients via stormwater drainage.

12. HAZARDS

The Aquis Resort site is exposed to a number of hazards, of which elevated water level from cyclones or tsunami and flooding are considered to be the most severe. These have been discussed above. Cairns is also exposed to a range of other hazards and some of these involve risk to the development. The concept of 'risk' involves the combination of:

- the likelihood of an event occurring (referring for example to the concept of AEP as previously described)
- the consequence of this occurrence.

For example, a *Likely* event with a *Major* consequence would result in a *High* risk whereas a *Rare* event with a *Moderate* consequence would result in a *Negligible* risk. Risk assessments involve the use of a matrix include in an Australian Standard (AS / NZS 4360:2004) that produce risk levels based on likelihood and consequence. **Table 3** provides details of all hazards assessed, associated risk, recommended mitigation, and residual risk.

TABLE 3 RISK, MITIGATION, AND RESIDUAL RISK

HAZARD	RISK	MITIGATION	RESIDUAL RISK	NOTES
Earthquake	*Medium+*	Design structures to appropriate standards.	*Low*	Structural response only.
Tsunami	*Medium-*	Design structures to withstand calculated loads. Provide safe refuge above current evacuation level and associated management.	*Low*	Combination of structural and management response.
Landslide	*Low*	Nil.	*Negligible*	Nil.
Bushfire	*Low*	Incorporate appropriate fire design and management.	*Negligible*	Incorporate in EMP (Construction) and EMP (Operation and Maintenance).
Flooding	*Medium*	Design structures to withstand calculated loads. Provide safe refuge above PMF and associated management.	*Low*	Combination of structural and management response.
Cyclone	*Extreme*	Design structures to withstand calculated wind loads.	*Low*	Combination of structural and management response.
Storm tide	*High*	Design structures to withstand calculated surge loads. Provide safe refuge above 0.01% AEP and associated management.	*Low*	Combination of structural and management response.
Coastal erosion and river migration	*Low*	Contribute to stabilisation of Thomatis Creek bifurcation (Note 2).	*Low*	Thomatis Creek works require joint Aquis Resort / Queensland Government response.
Disease outbreak / pandemic	*Medium+*	Combination of infrastructure and collaborative systems and associated management.	*Low*	Requires collaboration with Queensland Health to develop procedures.

HAZARD	RISK	MITIGATION	RESIDUAL RISK	NOTES
Wildlife hazards (crocodiles)	*Medium-*	As per actions required by **Health and Safety**.	*Negligible*	Implement Crocodile Management Plan. Incorporate in EMP (Operation and Maintenance).
Wildlife hazards (sharks and marine stingers)	*Negligible*	As per water quality actions (e.g. screening of inlets, lake management).	*Negligible*	Implement Lake Management Plan. Incorporate in EMP (Operation and Maintenance).
Climate change	*Low+* to *High*	Design of floor levels.	Impossible to predict	Possible future adaptation required.
Accidents, spillages, fire and abnormal events	Low	Incorporate appropriate fire design and management.	*Low*	Incorporate in EMP (Construction) and EMP (Operation and Maintenance).

The mitigation of all risks requires a combination of the following tools:

- structural design to withstand loads imposed by identified natural hazards (especially tsunami, cyclone, and flood)
- provision of safe refuge above designated design levels
- 'vertical evacuation' procedures to lead people without harm to the safe refuge areas, and allied plans, actions and associated infrastructure (e.g. communications) under the umbrella of an Integrated Emergency Management Plan
- management actions to be incorporated in the EMP (Construction) and EMP (Operation & Maintenance)
- collaboration with appropriate Queensland Government and local agencies for integrated planning for safety.

The resort complex is to be built on a raised podium set at 7.5 m AHD. This level:

- is approximately 5 m above natural ground level
- is above the PMF for all parts of the site
- provides 2 m freeboard to the 0.01% AEP storm tide (allowing for 0.8 m sea level rise (SLR))
- is also well above the 6 m AHD refuge level set by CRC for tsunami
- provides adequate allowance to any conceivable extreme event, even with SLR.

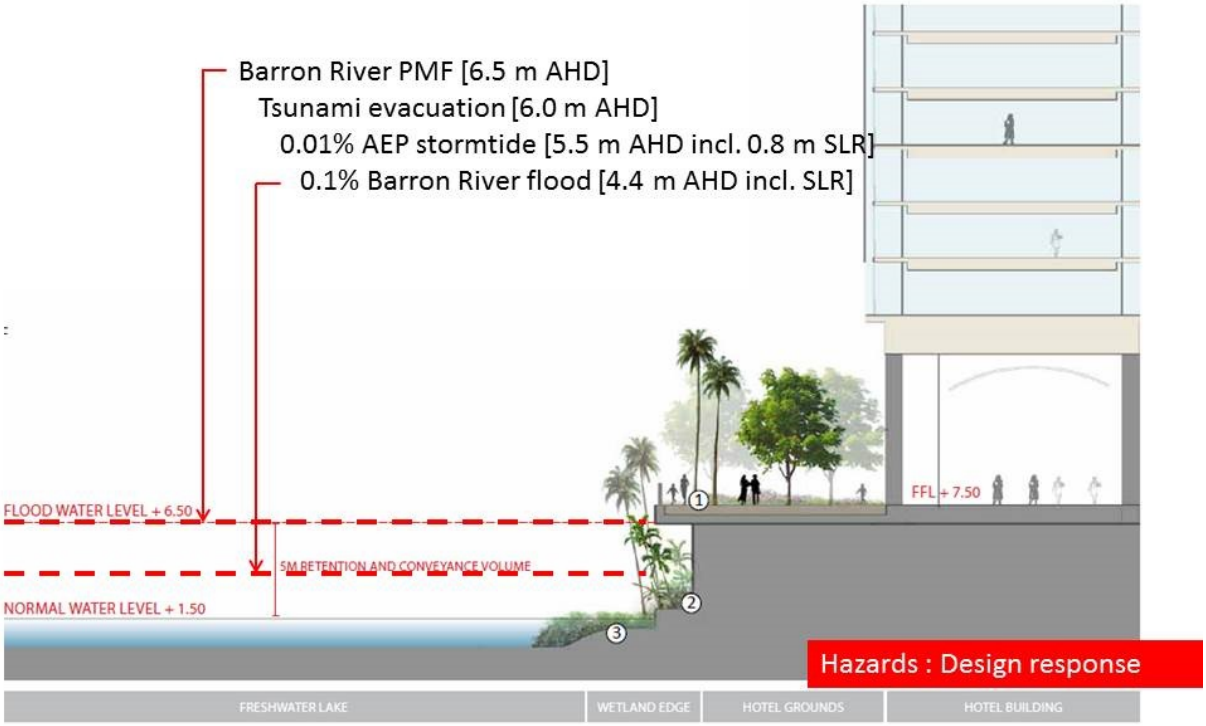


Figure 9 Schematic Showing Design and Hazard Levels at Resort Complex Precinct.

The residual risk to all hazards is considered to be low. All site activities and project design will be informed by the Integrated Emergency Management Plan to be developed in consultation with emergency management agencies.

13. ECONOMIC

The economic impacts from the Aquis Resort are driven by two phases of development: the construction and operation periods. These phases underpin the pattern of economic activity and the types of demands (i.e. for materials inputs, capital, labour etc.) placed on the Far North Queensland region and wider state over time.

Construction phase.

This involves the period where major construction works are undertaken in the local Cairns project area. Costs are associated with the construction of the eight hotel towers, a casino, aquarium and other food, retail and entertainment facilities. Additional costs for site establishment, road and infrastructure upgrades have also been factored in.

Operation phase:

This involves the operational costs and revenues incurred over the life of the resort. In this phase, Aquis facilities open to the public, with the business operating at full scale following the second expansion.

Unlike most major projects, the capital expenditure expected for the Aquis Resort is not 'front-loaded'. This is due to the two stages of project development which sees 60% of the total A$8.15 b construction expenditure incurred in the first four years of the project at approx. A$1.4 b p/a, with the remaining 40% expended in Stage 2 at a rate of approximately A$800 m/a between 2020 and 2024.

Project revenues would start to be realised from 2018 onwards, once Stage 1 facilities become operational. Initially, Aquis revenue grows to around A$5.9 b by 2020. After the additional capacity enhancements from State 2 come on line, revenue increases to above $13 b.

The Aquis Resort, should it be approved, will increase the level of tourism activity in both Far North Queensland and for Queensland as a whole. Beyond these economic direct impacts, considerable indirect impacts are also generated from the distribution of project expenditures and tourist revenue over the life of the resort. This is because the tourism sector is supported by a deeply linked chain of related recreation industries that also benefit from increase visitation.

Over the period 2014 and 2024, increases in output are tied to the capital investments for project construction. After this time, deviations in output reflect the revenues earned by Aquis, its suppliers and other local tourism operators that benefit from higher visitation numbers.

The economic impacts ramp up over time. In 2017, construction activity sees Gross Regional product (GRP) increase by 9.0% above the baseline — the equivalent of an almost A$1 b addition to value added in the Far North Queensland region. Over the longer term (as capacity expansions become functional), increases in GRP approach A$11 b by 2030 (an increase of around 72% above the reference case).

This is an extraordinary change when remembering that in 2011, the Far North Queensland economy was A$13.5 b in size. Another way to frame the economic impacts, especially the cumulative results over a long period of time, is to convert the stream of value-added gains into present terms. In this way, the net present value (NPV) of future GRP gains is estimated to be around A$52.5 b over the period 2014 and 2030.

At the peak of construction and operations Aquis has estimated that the project is likely to directly employ around 3750 and 20 000 full time equivalent (FTE) staff respectively.

The economic modelling projections suggest that in 2017, an extra 2825 full-time jobs would be created indirectly across supplier industries in Far North Queensland that support project construction. Similarly, in 2027, the Aquis Resort is projected to create about 30 675 full-time jobs in the region throughout supplier industries that are connected to resort operations.

The employment impacts to the region are appreciable. In the long run, the Aquis Resort is estimated to cause employment deviations of close to 42% above the current non-Aquis baseline in 2030.

The Aquis Resort will contribute A$1.4b to Gross State Product (GSP) during the peak of construction in 2017. This is an incremental increase of over A$400 m in value added outside of the Far North Queensland region and across the rest of the state.. The economic gains to the rest of Queensland continue to rise throughout the operational life of the Aquis Resort. By 2030, there is an increase of A$1.3 b in value added outside the Far North Queensland; while in NPV terms to 2030 the increase in economy wide value added is $55.4 b.

At the peak of the construction phase in 2017, a further 2250 FTE jobs will be created across the rest of Queensland. This totals to an additional 9229 full-time jobs to the Queensland economy (0.4% above the baseline). Once again, these forecasts include both the additional workers employed by Aquis directly and also the jobs created indirectly across supplying industries in the State. As the Aquis Resort transitions into its stable operational phase, the employment impacts pass 50 000 FTEs by 2025.

The estimated fiscal impacts of the Aquis Resort indicate that the total tax contribution of the Aquis Resort in the central scenario is $18.5 b over 2014 and 2030 in NPV terms. Commonwealth taxes account for around half of these impacts.

Given the scale of the proposed development and related tourism activity that would ensue, the Aquis Resort is likely to increase the Queensland Government's capacity to raise revenue and fund public initiatives.

Given the scale of the Aquis Resort and its significant contribution to the regional economy, it is no surprise that the expected employment impacts are also large. Aquis has estimated that it plans to directly employ up to 3750 during the peak of construction activity and offer 20 000 full-time positions for the ongoing operation of the resort. As the economic analysis highlights, another 2825 FTE jobs is estimated to be created in 2017 indirectly across the supplier industries supporting project construction in Far North Queensland in the central scenario. Similarly, a further 30 675 full-time jobs are projected to be generated indirectly throughout parts of the region connected to resort operations in 2027.

In the context of the Cairns and wider Far North Queensland region which employs 59 000 and 92 000 full-time workers respectively at present, the positive contribution of Aquis to employment growth and related economic and community opportunities cannot be understated.

While there are substantial economic gains, there is some potential local planning and management challenges associated with the Aquis Resort. The implementation of considered mitigation strategies can act to both minimise the adverse impacts of major project development and magnify the flow-on economic benefits for local residents and businesses.

The four main potentially adverse economic impacts that will be targeted for mitigation by Aquis are:

- cost of living pressures
- labour and skills shortages
- infrastructure and other goods and services
- pressures on local businesses.

Mitigation measures will be identified and implemented through the development of Management Plans including:

- Workforce Development and Management Plan
- Local Content Plan
- Strategic Change Management
- Housing and Accommodation Plan
- Community Services and Facilities Plan.

Over the next decade and beyond, the Cairns economy will look rather different from how it looks today. It will be considerably larger, with more residents, workers and have greater connectivity both within Cairns and wider parts of Queensland and the rest of the world. It is likely to have a more imposing skyline, as new commercial and residential buildings are constructed to accommodate this growth (many of which are under consideration now). In general terms, it will be designed to have a more vibrant and global feel, just as today's Cairns looks far more urban and modernised than it did in the 1990s.

Most of these outcomes are likely to occur even in the absence of the Aquis Resort as an innate function of the region's strong economic fundamentals, coastal lifestyle and as Australia's relationship with Asia deepens into trading high-value service offerings. The latest forecasts by the Queensland Treasury suggest Cairns is expected to grow by 55 000 people over the next 10 years — with the city projected to surpass the populations of Geelong and Hobart by then. A natural increase in the gap between birth rates and death rates has been the main contributor to the recent population growth in Cairns, followed by overseas migration. The need to accommodate a larger population has been recognised as a key priority in the Cairns Community Plan 2011. The Community Plan is seen as a blueprint for how the city's growth should be best managed and guide to the emerging development needs for the region over the next two decades.

Once the Aquis Resort is factored into the equation, the growth in population, workers and dwellings will be more dramatic and accelerated than initially anticipated by CRC. Should the Aquis Resort be approved, population growth rates are likely to double to around 4%. These population changes, that are beyond the direct and indirect economic impacts from the Aquis project, are what are considered as consequential impacts — that is, people moving due to the renewed intrinsic appeal of Cairns as a booming coastal city or to capitalise on the stronger Asian tourism prospects. Certainly, the Aquis Resort will continue to underpin and reinforce the longstanding specialisation of Cairn's services and tourism leanings, bringing with it a range of second order economic incentives for existing and new residents.

Taking into account of the baseline population growth (55 000), and combining the Aquis operational workforce (55 000 direct and indirect); the city is projected to be home to 250 000 residents; over a 10-15 year period. Not only would this influx greatly alter the spatial distribution of settlement in Queensland, Cairns would also transform into a different class of city to become Australia's largest tropical destination.

14. SOCIAL

Cairns—while being predominantly a typical regional city with strong British/Australian traditions and structures—has elements of Indigenous, European, Asian and the Pacific Islands melded into its population and culture.

A further aspect of the city's social background is important. The attraction of the area's environment has led to a situation where people want to live in the area and when economic circumstances deteriorate, they will often stay rather than leave.

While this leads to comparatively higher levels of unemployment (ranging from 8% – 11% over the last three years), against a background of strong long-term, but volatile, levels of job creation, it also influences the city to:

- be dominantly private enterprise-oriented (Cairns has the highest business count of all Queensland regional cities – 13 326 as at June 2011)
- have comparatively high levels of self-employment
- have lower per capita incomes than would otherwise be the case.

Yorkeys Knob, as a state suburb (postcode 4878), has the following age and gender profile.

- population: 2766 (comprising 48% females and 52% males)
- median/average age: 39 years of age (two years above the Australian average)
- born in Australia: 71.3% of people living in suburb. (Other top responses for country of birth were England 6%, New Zealand 4%, Germany 1.2%, Papua New Guinea 1.2%, Canada 0.7%)
- speak English as their first language: 85.5% of people (other spoken languages include 1% German, 0.8% Japanese, 0.7% Italian, 0.4% Dutch, 0.4% Spanish)
- religions: 32.8% no religion, 20% Catholic, 17.4% Anglican, 3.9% Uniting Church, 3.7% Presbyterian and Reformed
- marital status: 32.8% of people married, 43.3% never married, 16.2% divorced and 4.2% separated
- employment: 58.1% employed full time, 28.1% employed part time
- unemployment: 7.9%
- occupations: professionals 19.8%, technicians and trades workers 15.3%, clerical and administrative workers 12.7%, community and personal service workers 12.3%, sales workers 12%, labourers 10.2%, managers 9.6%, machinery operators and drivers 5.7%
- vehicles per household: 1.5
- median individual income: $620 per week
- median household income is $938 per week
- home ownership: 19.3% fully owned, 24.5% being purchased
- rental properties: 52.9% of accommodation
- median rent: $230 per week
- median mortgage repayment: $1473 per month.

A comprehensive community and stakeholder engagement program has been conducted to receive feedback on the community's response to the project.

The six objectives of the program were to:

- inform, consult and involve stakeholders and interested community members about the project and its likely impacts and benefits
- solicit aspirations concerns/local knowledge, for use as inputs to the project and for project refinement throughout the preparation of the EIS
- establish two-way communication about the project
- minimise the amount of misinformation that may circulate about the project
- identify potential impacts and where possible, provide recommendations for measures to mitigate those impacts

Throughout the consultation process, more than 2000 people contributed inputs through face-to-face meetings, reference and focus groups, technical advice, online feedback, social media, and community feedback forms.

The community feedback forms generated 1,979 responses, 91% of which supported the project going ahead, with 82% unconditionally supportive. Conditional support was most frequently given on the basis the environment is cared for or locals are employed in the project. A word frequency analysis shows the key elements of the positive responses, indicating a sense of hope and enthusiasm for the project by uplifting a depressed Cairns economy.

In accordance with the Coordinator-General's Social Impact Assessment (SIA) Guideline, the SIA is to focus on social impacts or benefits of the project that are 'high risk, for the project lifecycle including commitments for the project's construction and operational phases. The identification, review, analysis, assessment and mitigation of social impacts have been undertaken for the project on this basis.

Due to the location of Aquis Resort (within the Cairns urban area) the impact, intensity, duration, severity and probability of the potential social impacts will vary according to the location of the individual, group or stakeholder. The adopted hierarchy of sub-regional areas and the breakdown of the social profile into these areas assists with the assessment of potential social impacts.

The seven top ranking potential social impacts resulting from the project were identified as (in no particular order):

- rate of change
- human services
- lifestyle changes
- cost of living
- gambling
- cultural change
- law and order.

Some potential social impacts are likely to be mitigated or managed through environmental, economic or infrastructure actions by the proponent, CRC, state agencies and/or the community. A range of mitigation plans for social impacts are proposed. When implemented these will work towards mitigating the identified 'high risk' social impacts associated with the project.

The following mitigation plans are proposed:

- Community Engagement Plan
- Workforce Development and Management Plan
- Local Content Plan
- Construction Management Plan
- Strategic Change Management
- Housing and Accommodation Plan
- Community Services and Facilities Plan
- Community Health and Safety Plan
- Cultural Development Plan
- Responsible Gaming Plan

The mitigation plans require the proponent to collaborate with the CRC, relevant state agencies, and representatives of the community (community reference group) in the development of the monitoring program. The following framework outlines the elements of the program anticipated, based on the monitoring actions developed in each of the impact management plans.

The monitoring programs will:

- respond to project approval conditions requiring monitoring social impacts
- outline internal processes (the proponent) for monitoring performance indicators of the mitigation strategies
- outline external reporting processes for receiving feedback from stakeholders
- outline procedures for periodically reporting progress and results to company management, the assessment manager, state government, and affected stakeholders
- outline any requirements or conditions set down for partnerships, joint actions and activities by various parties
- outline the timing of progress reports – when/if compliance audits will be required during the construction and operation phases
- establish performance indicators to provide a measure of the extent to which commitments and conditions are being met
- clearly identify the data required, the data sources, frequency, and responsibility for that data collection.

15. GEOLOGY AND SOILS

The site is located within the Barron River floodplain and formed of unconsolidated Holocene age (i.e. the last 6000 years or so) alluvial deposits of sands, gravels, silts and clays. The majority of the development area (i.e. the existing farmed areas) is underlain by geologically younger creek alluvium, while the outer parts of the property are characterised by coastal flats and mangrove flats.

In general, the surface layer of soil on the site is firm-to-stiff clay to around 2 m below ground level and this is underlain by looser sands and gravels, typically between 7 m and 10 m (but as much as 13 m) below ground level. At greater depths, the soils vary depending on proximity to watercourses. Within the main disturbance footprint (i.e. the lake), there is a layer of stiff-to-hard clays, interspersed with medium-dense to dense sands, as well as gravels below the younger soils. This layer is sufficiently deep to be not affected by lake construction.

With the exception of small areas of contaminated soils and possibly widespread ASS / PASS, the site's soils do not present any particular design constraint, nor require a specific construction management response. Standard soil and water management and other site controls (e.g. dust control) will be required under the site's EMP (Construction) to reduce normal construction impacts. The net impacts are likely to be very minor.

No parcels of land in the site are listed on the Contaminated Lands Register and only Lot 2 on RP800898 is listed on the Environmental Management Register (for the prescribed activity 'Petroleum product or oil storage'). Fuel and oil storage is being undertaken on this lot and minor staining is evident. It is expected that other areas of minor contamination may occur around farm buildings where fuel and chemical mixing may have occurred in the past.

Possible impacts arising from the disturbance of areas of contaminated land or other land that may have been contaminated by agrichemicals cannot be practically mitigated by design, due to the constraints imposed by the project footprint. More detailed investigations and possible remediation of contaminated areas will need to occur to enable a suitability statement to be issued under the *Environmental Protection Act* for the proposed development. This can be a development approval condition. However, the remediation / management of contamination associated with historical cane farming activities is not a complex task. A large number of former cane farming properties in the Cairns region have been successfully remediated and redeveloped for residential and other sensitive land uses. Management of contaminated soils is an element of the proposed EMP (Construction). The net impacts are likely to be very minor.

The soil survey found that the top 1-2 m of the soil profile within the cultivated area on the site does not include acid sulfate soil (ASS). However, potential acid sulfate soil (PASS) underlies the entire site below this layer, with ASS material occurring in lenses with thicknesses of between 1 m and 4 m. PASS material is strongly associated with soft grey-dark grey silty clays and loose sands.

When ASS is exposed to oxygen as a result of direct disturbance (via excavation or displacement) or drainage (via dewatering or other means), pyrite can oxidise and form sulfuric acid. Sulfuric acid can dissolve metals from the soil profile (including iron, aluminium and heavy metals) as it leaches out of the affected soils. The resulting contaminated acidic water can then migrate into surface waters and groundwater.

The main design-related mitigation option to deal with ASS / PASS is to not disturb it, either directly, or by lowering the groundwater level. This option is not available given the decision to construct the lake as a flood mitigation solution. The construction of the lake requires excavation of approximately 2.8 million cubic metres of material that will definitely contain ASS / PASS.

Until more detailed ASS investigations are completed to enable a detailed Acid Sulfate Soil Management Plan (ASSMP) to be completed, it is considered prudent to assume that all materials to be excavated will be ASS and will therefore require management.

The management and treatment of ASS to mitigate potential environmental impacts is a mature process that has commonly been adopted for ground disturbance projects in the Cairns region and for lake / water developments of a similar size elsewhere along the Queensland coastline. Experience has shown that with appropriate management there is not expected to be an environmental impact.

A suite of environmental management strategies has been prepared to manage impacts during the construction phase. The key strategies regarding soils are:

- the EMP (Construction) – will apply to management of all construction phase activities that involve potential impacts on soils (and will include a detailed Erosion and Sedimentation Control Plan as is normal construction practice)
- Acid Sulfate Soil Management Strategy (and a detailed ASSMP)
- Water Quality Management and Stormwater Management Strategy.

The above strategies will be developed fully once the design phase commences and they will inform design as well as management during construction and operation as appropriate. These strategies will also give effect to any conditions of approval that arise from the EIS process and that of subsequent approvals.

16. AIR QUALITY

In general, air quality is not currently an issue of concern in the Cairns area. The majority of pollutants emitted from within the Cairns airshed originate from motor vehicles and industrial sources in the vicinity of the sea port, as well as from the airport. Particulate matter concentrations arising from non-motor vehicle sources, such as bushfires, may continue to result in elevated levels on occasions.

The State Planning Policy (SPP) 2013 requires that development is designed to avoid or otherwise minimise adverse impacts from emissions that will affect the health and safety, wellbeing and amenity of communities and individuals. It is normal practice to assess impacts at external receptors such as schools, residences, and businesses. The main external receptors relevant to the Aquis Resort are in the adjacent urban areas of Yorkeys Knob and Holloways Beach (across Richters Creek). Some rural receptors are located to the south and west.

A review of existing sources of air emissions likely to affect the site concludes that, although air quality standards are occasionally exceeded by controlled forest and sugar cane fires and dust fallout from sugar cane farming, these are infrequent events. Combustion gases and other vehicle emissions are not expected to exceed acceptable criteria as traffic volumes are low, there are no large industrial facilities in the region, and meteorological dispersion at the site is high due to the sea breeze, when compared to other parts of the airshed. Overall, the existing air environment is characterised by common emission sources that can be managed by adequate buffer zones.

No high level design solutions have been identified to limit air quality impacts arising from the construction and operation of the Aquis Resort, although there are many detailed design initiatives that can be expected to improve performance. Existing external emissions are unlikely to impact on the project and minor effects of these emissions can be managed by vegetated buffer zones. The Concept Land Use Plan includes vegetated buffers (either existing vegetation to remain or new plantings) around all boundaries to limit airborne particles moving onto or off the site. New plantings will be established early in the construction program so that they can mitigate construction impacts as well as those during the operation phase.

In general, all earth-moving activities other than dredging will generate dust. At the main excavation site for the lake, the presence of vegetation along the creeks between the site and sensitive receptors will enhance deposition of dust and reduce suspended particulates. Provided that dust emissions are kept to a minimum by spraying working areas during dry weather, the particulate concentrations reaching external receptors should be well within health criteria. Similarly, dust deposition from all sources (including concrete batching) beyond the vegetated areas should be well within the nuisance guidelines. Generation of dust clouds sufficient to limit visibility of airline pilots or vehicles on Yorkeys Knob Road is considered unlikely. Application of water sprays should prevent visible dust crossing the site boundaries.

Where the golf course is close to residences, the early establishment of the vegetated buffer zone and appropriate water spraying during earth-moving will prevent impacts at these locations. During the operation phase, any chemical spray from the golf course is not likely to differ substantially from the existing agricultural use and impacts will be mitigated by the vegetated buffer and appropriate management practices.

Odour from other activities during operation, including sewage pumping stations and restaurants, will be of minor consequence as they will be far from external receptors. These air emissions do not require any specific mitigation measures.

In terms of greenhouse gas emissions, the project is estimated to contribute 17 kilotonnes of carbon dioxide (CO_2) equivalent per annum during construction, and 190 kilotonnes per annum during operation (including an allowance for the impacts of international air travel for guests).

A number of design, construction, and operation initiatives are included in the Sustainability Strategy. These include sequestering CO_2 by planting native vegetation on site to act as a greenhouse gas sink. Preliminary modelling shows that the 56 ha of natural vegetation to be planted will sequester 126.3 kilotonnes (about 67% of the annual CO_2 production during operation). Other design-related initiatives include:

- Maximise use of natural lighting and ventilation in design of buildings.
- Ensure appropriate design of water management systems to minimise consumption and pumping, use variable speed drives on large pumps.
- Design buildings to 5/6 star standards for energy conservation. Include light and motion sensors and timers to switch on lighting, energy efficient light bulbs, solar hot water, solar and electric panels, reticulated gas network and centralised chilled water generators for air-conditioning, purchase energy efficient and water efficient appliances, and install programmable thermostats.

The use of reticulated chilled water for cooling has been adopted and will save a large amount of energy and allow for the use of off-peak power. In developing the Sustainability Strategy, additional investigations will take place into other measures to reduce greenhouse gas emissions during construction and operation, making use of standards applicable to a sustainable tourism facility such as Green Globe and adopting auditing / tracking measures using a system such as Green Hotels Global.

With the recommended mitigation, the net annual figure for greenhouse gas emissions is about 63.5 kilotonnes. This exceeds the 25 kilotonne threshold that, under the *National Greenhouse and Energy Reporting Act* 2007 (NGER), requires Aquis Resort to report emissions. It may be possible to sequester additional carbon in external sites if required. Mitigated emissions from the operation of the resort will be approximately 0.012% of Australian NGER emissions. This represents a small contribution to Australia's emission inventory.

A suite of environmental management strategies has been prepared to manage impacts during the construction and operation phases. The key strategies regarding air quality are:

- the EMP (Construction) – will apply to management of all construction phase activities that involve potential air emissions
- Landscape and Habitat Strategy
- Restoration and Rehabilitation Strategy
- Sustainability Strategy
- Waste Management Strategy.

These strategies will be developed fully once the design phase commences and they will inform design as well as management during construction and operation as appropriate. These strategies will also give effect to any conditions of approval that arise from the EIS process and that of subsequent approvals.

17. NOISE AND VIBRATION

The dominant short-term noise events across the site are traffic on Yorkeys Knob Road and aircraft overhead. Increased traffic noise occurs closer to Yorkeys Knob Road and increased aircraft noise towards the eastern portion of the site.

Sensitive receptors for air emissions are defined in the SPP 2013 under *Planning for hazards and safety (Emissions and hazardous activities)* and include schools, residences, and businesses. The main sensitive receptors relevant to the Aquis Resort are in the adjacent urban areas of Yorkeys Knob and Holloways Beach (across Richters Creek). Some rural receptors are located to the south and west. These receptors are similar to but not identical with external receptors previously discussed for air.

High level design solutions to limit noise impact have included removing the Water Park and Stadium from the proposal. Further, the Concept Land Use Plan includes vegetated buffers around all boundaries. Although vegetation has little effect on reducing noise, the separation provided between noise sources and sensitive receivers is of benefit.

In terms of impacts of external emissions on the development (operation phase only):

- Road traffic: The predicted road traffic noise levels are not expected to be excessive and standard building construction should be sufficient to achieve acceptable internal noise level for road traffic noise.
- Air traffic: The calculated aircraft noise reduction is considered readily achievable with relatively standard construction and upgrading glazing (Rw 31 glazing: 6 mm laminated glass with acoustic seals) based on the current aircraft noise information.

The project covers a large site and, while there will be noise and vibration emissions from its construction and operation, it is expected that these will be controllable due to the opportunity for reasonable buffer distances through appropriate design layout and construction management.

The major issues for the development relating to noise and vibration include:

- construction impacts such as noise and vibration emissions from construction activities, particularly involving heavy equipment, pile-driving and vehicle movements, have the potential to impact on nearby residents
- operational impacts of the development on the existing acoustic environment, i.e.:
- noise emissions from the golf course, particularly lawn maintenance equipment, impacting on nearby residents
- noise emissions from increased traffic flow on Yorkeys Knob Road and proposed new project roads, impacting on nearby residents
- noise emissions from the helipad impacting on nearby residents and on Aquis Resort guests
- noise emissions from external sources affecting the project, with resulting requirements on building construction and impacts on people in outdoor areas:
- traffic noise, especially from Yorkeys Knob Road
- aircraft noise (additional aircraft movements will add to the frequency of noise episodes but not their magnitude. All airport operations (and this includes noise emissions) are under the control of North Queensland Airports (NQA). The Aquis Resort will absorb some of the latent capacity of already approved infrastructure.)

Management of the construction process is required and will be undertaken under the site's EMP (Construction). Given the scale of the development, the approach should be to limit noise impacts by selection of appropriate buffer distances. Nonetheless, where there are multiple plant items in close proximity it is likely that target construction noise criteria will be exceeded. In these instances noise and vibration emissions should be minimised in accordance with Australian Standard AS2436-2010 'Guide to noise and vibration control on construction, demolition and maintenance sites'.

Further evaluation of key activities that could lead to excessive noise and vibration (e.g. concrete batching and pile-driving) will take place during the development of a detailed noise management plan to be developed for the site as part of the EMP (Planning).

Overall, it is considered that noise and vibration associated with the operation of the development will be maintained at a compliant level. Activities will need to be appropriately managed during the construction phase to minimise impacts on nearby sensitive receptors.

18. WASTE MANAGEMENT

CRC is responsible for the management of most solid waste generated in the region through the operation of a kerb-side household and commercial collection program and network of public waste transfer stations. In addition, Cairns and surrounding areas are well serviced by a broad range of commercial waste companies that operate both under contract to CRC and directly to commercial and industrial clients.

Solid waste produced by the Aquis Resort will need to be disposed of at external facilities available at the time. Aquis Resort has an obligation to reduce waste to the greatest extent possible and will enter into future negotiations with CRC and other operators regarding disposal arrangements.

The Aquis Resort Waste Management Strategy follows the Queensland Government framework (shown on **Figure 10**) and sets out preliminary information on how it will be applied to various waste streams. It also describes how indicators for monitoring waste management can be developed and environmental controls can be implemented.

Policy drivers and principles

- Recognising waste as a material resource not a disposal problem.
- Waste management hierarchy (refer to figure opposite).
- Proximity principal of identifying and using local markets and solutions for recovered resources as close as possible to the source of generation.
- User pays to ensure that those who generate the waste pay an appropriate price for managing and disposing of it.
- Support and participation in product stewardship programs.
- Sustainable balance of economic, environmental and social considerations.
- Explore possibilities for strategic partnerships and collaboration with other stakeholders.

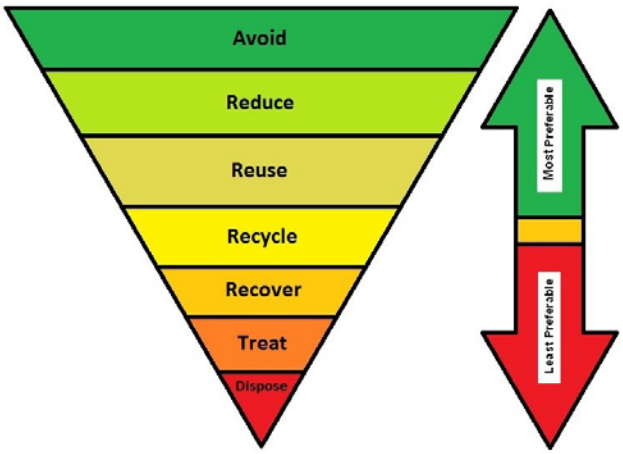


Figure 10 Waste Management Hierarchy and Policy Drivers and Principles.

The objectives of the Aquis Resort Waste Management Strategy are:

- Adoption of the principles of the Queensland Waste Management Hierarchy shown on **Figure 10** and align with the CRC waste management strategy where possible
- the measures adopted for waste management will meet current best practice, be in proportion to the potential environmental and health impacts the waste being managed, and be cost-effective
- minimise waste and negotiate supply of goods with minimal packaging
- securely contain waste in bins and skips for the shortest period of time possible (this also has implications for the reduction of bird strike risk)
- ensure responsible management and disposal through considering waste streams as a whole and the final destination before sending waste off-site
- comply with statutory requirements

- ensure that waste management options do not place unreasonable burden on existing CRC infrastructure
- consult with CRC and commercial waste contractors to identify opportunities for introduction of new best practice waste management services that will benefit the Cairns region.

While no current co-generation opportunities for power have been identified with the development, Aquis Resort is committed to exploring any opportunities that may be identified during the detailed project planning and design stages.

Adopting the current construction industry waste reduction targets, the volume of waste requiring disposal to landfill is expected to be as follows:

- Construction – less than 16 000 tonnes. Adoption of best practice waste management systems during the planning, design and procurement of Aquis Resort presents the opportunity to further reduce construction waste requiring disposal to landfill in the Cairns region to less than 3200 tonnes.
- Operation – in the order of 14 455 tonnes per year (combined Stage 1 and Stage 2). Adoption of best practice waste management systems during the planning, design and operation of Aquis Resort presents the opportunity to reduce ongoing waste disposal to landfill in the Cairns region to approximately 1885 tonnes per year.

In terms of current waste capacity:

- CRC has limited capacity to accept the estimated waste material quantities that will be generated by the Aquis Resort during both construction and operational phases. Discussions with CRC suggest that it would be interested in working with the proponent to identify opportunities to support the development of new cost-effective infrastructure and technologies that achieve the waste management hierarchy objectives of increased waste recovery and recycling and minimising waste disposal to landfill.
- Existing commercial facilities have relatively large existing waste management capacity and should be able to accept the estimated waste material quantities that will be generated by the Aquis Resort during both construction and operational phases.

The estimated amounts of both construction and ongoing operations waste generated within the Aquis Resort at The Great Barrier Reef is considered to be well within the capacity of existing commercial waste service providers and their waste management infrastructure that services the Cairns region.

Adoption of best practice solid waste management systems for both the construction and operation of the Aquis Resort will significantly reduce the amount of waste disposed of to landfill, with estimated quantities well within the existing capacity of commercial waste providers that service Cairns and the surrounding region. The Aquis Resort should not impact upon the current and future waste management responsibilities of CRC, however, there are potential opportunities to work together to support the development of new cost effective waste management infrastructure and technologies.

19. BIOSECURITY

There is a relatively low diversity and abundance of weeds across the site. Those weeds that are present are typically those associated with agriculture and/or abandoned areas, and weed penetration into native ecosystems is rare to absent. Exotic species (plants and animals) are present mainly along woodland margins, with limited incursions into the forest.

A total of 64 exotic plant species were recorded on the site. Of the exotic species recorded, ten species are listed as either Weeds of National Significance, Class 2 or Class 3 pest plants under the *Land Protection (Pest and Stock Route Management Act) 2002* (Qld), and/or locally declared under categories in the FNQROC Pest Management Plan. Both listed and unlisted exotic flora on site are capable of altering and degrading natural areas. None of the exotic species which have penetrated woodland are considered likely to persist or affect ecosystem function. The habitat type with by far the greatest number of weed species is the man-made (anthropogenic) grassland while the shoreline and mangrove forest habitats contain the least number of weed species.

Seven species of pest animals were recorded, all of which are common in the Cairns area. Nine exotic non-indigenous animal species have been recorded in the broader Barron River catchment, with one species, mosquitofish, observed on the site. Several other aquatic pest species (e.g. tilapia) are likely to occur on the site and within the proposed development footprint.

In addition to the pest animals located on site, it is known that electric ants have been found in the Yorkeys Knob and other parts of the Cairns region. Restrictions apply to the movement of materials that pose a high risk of spreading electric ants within and from these control areas. Biosecurity Queensland manages the National Electric Ant Eradication Program that includes surveillance, treatment, and containment components. All responsibilities required under the program will be incorporated into the Aquis Resort Pest Management Plan.

Developing the Aquis Resort will involve removal of the anthropogenic grassland and aquaculture pond habitats and replacement of these with restoration (native species), lake, resort complex precinct, or golf course. All of these uses will be less prone to weed invasion.

No design solutions for pest animals are available, with the exception of pest fish. The construction and operation of the lake will introduce the risk of introduction of pest fish (especially tilapia). The design of the lake and subsequent management will take the likely presence of these species into account via the Lake Management Strategy.

Weeds are an impact of the existing land use and it is expected that this threat will largely disappear with the construction of the Aquis Resort due to the conversion of weed-infested habitat to more managed areas. The new land use involves active weed management. With these controls in place, the development is considered to provide a net beneficial impact with respect to pest plants.

Similarly, the presence of pest animals is an impact of the existing land use and it is expected that this threat will largely disappear with the construction of the Aquis Resort due to the conversion of pest-infested habitat to more managed areas with active pest management. With these controls in place, the development is considered to provide a net beneficial impact with respect to pest animals. Care will be taken in, for example, refuse management to ensure that pest animals associated with human use do not infest the resort.

The required response for all pest plants and animals is management. A Weed and Pest Management Strategy is incorporated into the EMP (Planning) and implemented in the project's EMP (Construction). The management plan will be consistent with CRC's Pest Management Plan and include the results of negotiations with CRC regarding the alignment of coordinated weed and pest management with Council's priorities.

This includes ensuring any local pest management work addresses all locally-important weeds (e.g. pond apple), that were not located on site but could still be of concern. This strategy will include an element to manage electric ants and will be developed in consultation with Biosecurity Queensland.

The management of tilapia and other pest fish is expected to be largely successful although there is little that can be done to prevent the spread of these fish during flooding. Both species of tilapia are already present throughout the Barron River delta so the Aquis Resort is unlikely to create any new impacts.

20. HEALTH AND SAFETY

Health and safety issues are focused on crocodiles and on mosquitos and biting midges.

The estuarine (saltwater) crocodile (*Crocodylus porosus*) inhabits estuaries and rivers, as well as offshore islands throughout the northern parts of Western Australia, the Northern Territory and Queensland and is known to inhabit tidal areas within Trinity Inlet and the local area. Crocodiles have been recorded inhabiting water features in golf courses in the Cairns area including the nearby Half Moon Bay course at Yorkeys Knob. Of particular interest, there have been at least nine crocodile sightings between Yorkeys Knob and Holloways Beach since 2010 and one, possibly two, crocodiles were recorded in one of the five aquaculture ponds in the site and tracks were observed in the Richters Creek area.

While it is a listed species under the *Nature Conservation Act*, *Crocodylus porosus* is also a known predator. The species has been involved in a number of human fatalities in northern Australia since the 1980s. Crocodiles responsible for attacking people are mostly large males, and those responsible for fatalities are very large. The main reasons for crocodiles attacking humans are thought to be:

- territory defence
- nest defence
- hunting behaviour
- mistaken identity (e.g. attacks on people with dogs by small crocodiles)
- self-defence.

It is expected that the project will be neutral in terms of impacts on crocodiles. All areas of natural habitat will remain and there is expected to be little human activity in such areas. The strengthening of ecological buffers will mean that some land adjacent to Richters Creek to the south of the site will be restored. However this restoration will occur some distance away from the bank of the creek and is not likely increase the use of this area by crocodiles.

While new habitat created by the lake will support fish communities that may in turn provide food for crocodiles, the development is unlikely to provide nesting habitat. The issue of concern therefore is the risk to human safety of crocodiles, especially on the golf course and in and around the lake.

It is likely that saltwater crocodiles will always be a potential risk, being virtually impossible to exclude from entering the lake via its outer edge or the two lake overflow channels. They may enter the development from any surrounding area, although entry is most likely from Richters Creek where existing habitat is most favourable and there is an existing population. Large crocodiles may be able to scale the vertical walls proposed for the outer edge of the lake as there will be only 500 mm of freeboard at this location. However, surveillance will ensure that large animals are noted and, once inside the lake, specific animals can be trapped and re-located.

The project's Environmental Management Plan includes a Crocodile Management Strategy. This will be developed during detailed design. Key elements include excluding people from the lake, education, surveillance, and collaboration with Queensland's National Parks and Wildlife Service and the CRC in the operation of the statutory *Nature Conservation (Estuarine Crocodile) Conservation Plan 2007 and Management Program 2007–2017* which came into effect on 1 March 2008. Under this plan, Richters Creek is a Proactive Removal Area within Zone 2 and all confirmed sightings of crocodiles would result in the removal of these individuals.

Although crocodiles cannot be definitively excluded from the Aquis Resort, with appropriate design and management the risk can be managed. Crocodiles are a fact of life in the Cairns area and in Northern Australia and active management plans are in place for dealing with problem crocodiles. The main residual impact is that resort guests and staff may be unaware of appropriate crocodile safety behaviour and therefore engage in unsafe practices. Education is essential and is an integral; element of the Management Plan.

New developments located in close proximity to wetlands, particularly in the coastal zone, bring humans in closer contact with biting insects in their natural habitats, and may create new mosquito and biting midge breeding habitat. The Aquis Resort site adjoins Yorkeys, Richters, Thomatis and Half Moon Creeks, which are mangrove-lined and provide breeding habitat for both mosquitoes and biting midge.

The development of the project has the potential to increase existing freshwater breeding habitat for mosquito and biting midge larvae. Potential breeding habitat may be created in infrastructure such as stormwater / irrigation drains and grassy swales; well mulched and watered garden beds; dams and stormwater retention basins; and in newly created intertidal areas of the lake.

Although Council's Vector Control Plan activities are not strictly relevant to the Aquis Resort, liaison will be undertaken with the CRC Health Services unit during detailed design to formulate an appropriate detailed design and management response.

Monitoring of mosquitos and biting midge larvae will be conducted after construction to ensure mitigation measures are adequate. Monthly surveys for mosquitos and biting midge larvae, including detailed identification to species, will be undertaken to ensure Aquis guests are at minimal risk.

The design decisions to adopt a saline lake and limit flat or gently sloping edges will reduce the main risk of mosquitos and midges and standard management of construction via the EMP (Construction) can be expected to limit problems during construction.

Regardless of any design and management controls that the Aquis Resort can implement, mosquitos and midges already inhabit the site at times and cannot be excluded from the development. Some people are especially susceptible to bites from these insects and an active educational program is essential. Appropriate first aid facilities and trained staff will also be required.

21. CULTURAL HERITAGE

Aboriginal people have lived in Australia for at least 40 000 years. Throughout this time, there have been environmental and sea level changes, some of which appear to be described in local oral traditions. At the time of white settlement, Aboriginal people in the Cairns district were hunter / gatherer / fishers, exploiting the rich resources of the marine, estuarine, woodland and rainforest environment available in the area. Different clan groups owned and were responsible for their own clan territory, but people frequently lived in and used other clan territories. All parts of the land were known and named, and associated with stories of 'creation time', traditional and historical events, and / or traditional use. is the traditional owners of the land are the Yirrganydji. people

Following European settlement, Aboriginal people were displaced, and forcibly moved around. However, most people still know their origins, and wish to practice their culture as much as possible, including protecting significant cultural heritage places.

Three Indigenous cultural heritage (ICH) sites are registered on the Aquis Resort site. These consist of shell middens and a hearth oven. The sites are all located in natural vegetation along the eastern fringe of the Aquis Resort site and are clear of the footprint of the development and will not be affected. Other parts of the site, especially in the vegetated areas, have potential for ICH. The whole site is the subject of a Cultural Heritage Management Plan (CHMP) that is currently in preparation.

Non-Indigenous cultural heritage (NICH) values of the site are dominated by its history of cane growing and as an area of beachside weekend retreats for local business people. The cane-growing history is preserved to some extent by the barracks that still exist on the site, although these were modified in 1952 or thereabouts. The Yorkeys Knob area also was used during WWII for wounded and convalescing servicemen.

The current farm landscape reflects the works of the current owner to improve the flood immunity of the land and this is evidenced by the many drains and bunds that still exist, as well as the various structures on stumps or mounds.

Ten sites of NICH interest exist. These comprise farm buildings, exotic plantings, and farm infrastructure. One of these (the cane barracks) is considered to be locally significant while the balance do not meet this significance test. One additional site has a moderate potential for archaeological remains of a Chinese and European hut and remnant orchard, mango and banana trees potentially demonstrate areas which could relate to these remains.

Neither ICH nor NICH values are major constraints to the development.

In summary:

- The three identified ICH sites are all outside the development footprint and consequently there will be no direct impacts. This is subject to confirmation by the CHMP process. Care will need to be taken when operating in proximity to registered Aboriginal cultural heritage (or any other Aboriginal cultural heritage later identified), with the advice and agreement of the relevant Aboriginal party(s) sought, in accordance with the terms of the CHMP to ensure any harm to cultural heritage is avoided or minimised.
- With the exception of the potential Chinese and European hut site, all of the identified NICH sites will be impacted on as a result of the development for one of the following reasons:
  - because they are within the footprint of proposed works
  - because they are undesirable for other reasons (i.e. the tide gate acts as a waterway barrier that interferes with aquatic connectivity; exotic plantings conflict with biodiversity values)
  - the cane barracks may be able to be conserved and salvaged.

Preparation of a CHMP under the *Aboriginal Cultural Heritage Act 2003* (ACH Act) is substantially completed in consultation with the Yirrganydji people as the registered Aboriginal party or Aboriginal cultural heritage body in relation to the lands or waters within the site. Subject to the findings of future ICH studies under the CHMP, it is unlikely that there will be any impact on ICH. There is an opportunity to present ICH values as part of the Aquis Resort's interpretive and educational program.

Similarly, there is an opportunity to present NICH values as part of the Aquis Resort's interpretive and educational program as outlined in the Interpretation Strategy. The cane barracks may be able to be conserved and salvaged as part of this work.

22. MATTERS OF NES

Matters of national environmental significance (matters of NES) are defined under Part 3 of the EPBC Act. The Commonwealth Minister for the Environment has determined that the following controlling provisions be addressed by this EIS.

TABLE 4 RELEVANT CONTROLLING PROVISIONS

CONTROLLING PROVISION	DETAILS
World Heritage properties (sections 12 and 15A)	Great Barrier Reef World Heritage Area (GBRWHA) Wet Tropics of Queensland World Heritage Area (WTWHA)
National Heritage places (sections 15B and 15C)	Great Barrier Reef (GBR) National Heritage Place Wet Tropics of Queensland National Heritage Place Wet Tropics World Heritage Area (Indigenous Values)
Listed threatened species and communities (sections 18 and 18A).	Not specified
Listed migratory species (sections 20 and 20A).	Not specified
Great Barrier Reef Marine Park (sections 24B and 24C).	Great Barrier Reef Marine Park (GBRMP)

With respect to the above, the Aquis Resort site:

- is not within any area that is a matter of NES (although maps show that a small creek running into Richters Creek from the Aquis Resort site may actually include the 'low water' line)
- is adjacent to the GBRWHA (at its nearest point – Richters Creek – the site is basically adjacent to the boundary)
- is 3.5 km from the GBRMP
- is 6.3 km from the Commonwealth marine area
- is 2.5 km (line-of-sight) from the WTWHA (approximately 8.4 km via the Richters Creek / Thomatis Creek and Barron River corridor)
- is 1.1 km from the nearest listed ecological community .

In addition, the lake inlet pipeline:

- lies almost entirely within the GBRWHA
- at its nearest is 1.9 km from the GBRMP
- at its nearest is 4.1 km from the Commonwealth marine area.

In addition to consideration of particular species, the fundamental issue to be addressed for matters of NES is World Heritage status. World Heritage areas are recognised under the World Heritage Convention as having Outstanding Universal Value (OUV). OUV:

> … is the key reference point for the protection and management of world heritage properties and is the central idea of the World Heritage Convention. Broadly, the meaning of outstanding universal value follows the common sense interpretation of the words:
>
> - Outstanding: For properties to be of outstanding universal value they should be exceptional, or superlative – they should be the most remarkable places on Earth.
>
> - Universal: Properties need to be outstanding from a global perspective. World Heritage does not aim to recognise properties that are remarkable from solely a national or regional perspective. Countries are encouraged to develop other approaches to recognise these places. Australia does this through National Heritage listing.
>
> - Value: What makes a property outstanding and universal is its 'value', or the natural and/or cultural worth of a property. This is based on standards and processes established under the World Heritage Convention's Operational Guidelines.'

In assessing the impact of the Aquis Resort on matters of NES and OUV, it was necessary to determine for each controlling provisions, the:

- presence of matter (based on the protected matters search and/or other relevant research) and a discussion of the underlying values of the matter
- potential impact on the values
- proposed mitigation and effectiveness
- significance of mitigated impact on the values
- consistency with international obligations (where relevant).

For OUV this was a major exercise that involved first determining the basis of the World Heritage values for each of the four listing criteria at a regional level and then investigating those that occur or could occur on or near the Aquis Resort site. Listing criteria are:

- Major stages of the Earth's evolutionary history
- Ecological and biological processes
- Natural beauty and phenomena
- Habitats for conservation of biodiversity.

The likely impact on these values was then determined, along with proposed measures to avoid, minimise, or mitigate these impacts.

The following is a summary of identified values.

- The site abuts the GBRWHA and is connected to it by three creeks and adjacent natural vegetation. Overall, the OUV of the GBRWHA supported by the site and surrounds are:
- small (i.e. not regionally significant) onshore habitats surrounding the land cleared for cultivation and reasonably intact connectivity via the three creeks and the surrounding mangrove forests
- local (i.e. not regionally significant) resources for a small number of listed threatened species that are widespread throughout the area
- ecosystem services of various types that contribute to the function of the WHA and particular the protection of water quality

- local (but not regionally significant) examples of scenic amenity provided by the vegetated buffer between the site and the mouth of Richters Creek where few signs of human existence are present for beach users.

The site is 2.5 km line of sight from the WTWHA and has only a tenuous connection with the WHA through 8.4 km of waterways that are interrupted by the Barron Gorge and the coastal escarpment. Overall, the OUV of the WTWHA supported by the site and surrounds to a small degree are:

- remnants of lowland rainforest communities and associated species of a type representative of the nearby WTWHA in a landscape mosaic that assists in the maintenance of local biodiversity by encouraging species movements between habitats, including those contained within the WTWHA
- locally-significant ICH values
- opportunities for presenting the values of the Wet Tropics.

Detailed fieldwork and consequential assessment revealed that the Aquis Resort site contains:

- one listed threatened flora species (*Myrmecodia beccarii*)
- one listed threatened fauna species (*Pteropus conspicillatus*)
- no listed threatened ecological communities
- 13 migratory species (excluding aquatic species), namely:
  - the estuarine crocodile (*Crocodylus porosus*)
  - 12 birds of which:
    - five birds considered to be terrestrial migrants within the Australian mainland and all are relatively common species that occur over a wide area
    - two primarily aerial species (Apus pacificus and Hirundapus caudacutus) are summer migrants from the northern hemisphere (these species may forage over a wide range of natural and manmade habitats)
- the nearshore and offshore waters within 5 km of the site may support:
  - 13 nationally threatened aquatic species (five are assessed as having a moderate likelihood of occurrence, eight are assessed as having a low likelihood of occurrence)
  - 17 nationally migratory species (eight moderate likelihood, nine low likelihood)
  - 67 listed marine species (including fish, sharks, mammals and reptiles) (18 moderate likelihood, 29 low likelihood)
  - 12 whales and other cetaceans (nine moderate likelihood, three low likelihood).

In terms of impacts on the values:

- The construction process (including acid sulfate soil, agricultural contamination, and general soil and water issues) can be adequately managed by normal construction management techniques as committed.
- The protection of 99% of the 53 ha of natural vegetation on site and its enhancement by a further 56 ha, together with the removal of five waterway barriers, will enhance on-site habitat and the connectivity provided by the site to the GBR and its catchment.
- The use of treated sewage effluent as a potable water substitute and the adoption of water sensitive urban design techniques will remove 133 t/a of sediment and nutrients when compared with the existing cane farm.
- Water quality modelling of the lake and the receiving waters shows that water quality of the discharge is expected to be superior to that of Richters Creek into which it will be discharged.
- There will be a range of visual impacts:

- Tall buildings on the site will be able to be seen from offshore, from some elevated houses at Yorkeys Knob and Smithfield, and will be glimpsed above the mangroves as seen from the Cairns Esplanade; but will not be seen from Green Island, Fitzroy Island, Palm Cove, Redlynch or Redlynch Valley Road. The site will be clearly visible from arriving and departing aircraft.
- The existing quiet beach at the mouth of Richters Creek will lose its perceived naturalness and seclusion.
- The lighting associated with this major complex will be noticeable over a wide distance, either directly or as night-time glow, and from a distance may appear to be similar to or compatible with airport lighting.
- There are unlikely to be any visual impacts on the GBRWHA, its OUV and associated aesthetic attributes, or on intangible perceptions or responses, as the built form will be no more visible from offshore than Cairns CBD buildings.

The Aquis Resort is consistent with the objects of the *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth), the *Great Barrier Reef Marine Park Act*, and all associated international obligations.

23. ENVIRONMENTAL MANAGEMENT PLAN

The previous chapters have described the role that environmental management will play in the design, construction, and operation of the Aquis Resort and refer to an EMP (Construction) and a number of environmental strategies. These are both part of an overall environmental management framework selected to mitigate and manage impacts and deliver project objectives. Its initial development will set out requirements for the adoption of best practice, collaboration/partnerships with stakeholders and the achievement of better than benchmark outcomes a major precursor to the detailed design phase.

The environmental strategies described previously have been derived from the EIS process and include a raft of recommendations for impact avoidance, minimisation, mitigation, and monitoring. It is apparent that the detail presented varies between the general and the specific and that considerable work is required to allow the necessary tasks to be identified in detail. This is normal for a project the size of the Aquis Resort in the early stages of concept development and an appropriate management framework is needed to guide future work. It is recognised that management is needed at all future phases of the project, namely:

- planning
- detailed design
- construction
- operation.

The overall management framework is proposed to take the form an Environmental Management Plan (Planning) (EMP (Planning)). The primary functions of the EMP (Planning) are to:

- identify and recommend measures to manage the environmental factors identified in the EIS
- provide environmental input to the project design
- facilitate communication between the EIS team and the project design team
- assist in managing the construction phase and contract documentation.

The EMP (Planning) is designed to provide recommendations for management measures required to be implemented (including design recommendations, reporting, monitoring and auditing, and legislative requirements) for all relevant environmental elements. It will be developed post-approval and will include matters relating to all conditions of approval.

During the Planning Phase (i.e. following receipt of land use approval) Aquis will:

- incorporate all avoidance and mitigation principles described in the EIS and associated technical reports (expanded as required to address identified values and possible impacting processes) – this is essentially ‘mitigation by design’ and involves actions to avoid or minimise impacts
- develop an EMP (Planning) that provides guidance for impact mitigation through the (post-approval) detailed design, construction, and operation phases (expanding on the environmental management strategies previously described to protect the values under consideration in an holistic and integrated manner).

It is at this planning stage that all the environmental management strategies are converted to management plans by the application of additional information and more detailed consideration of design and construction issues. Each element addressed by the EMP (Planning) will include recommendations for future mitigation during design, construction, and operation. The latter matters will receive more detailed attention in the subsequent EMP (Construction) and EMP (Operation & Maintenance).

In particular:

- The principal construction management tool is the **EMP (Construction)** which will be prepared by the appointed contractor(s). In addition to covering a range of legal and corporate matters unique to the project and the contractor, the EMP (Construction) will deal comprehensively with all management needs via detailed sub-plans appropriate to the element.
- The operational and maintenance phase also requires environmental management via an **EMP (Operation & Maintenance)** that includes matters raised throughout the EIS. As for construction, this will include detailed sub-plans. Key issues are:
  - maintenance of the lake / flood mitigation works and associated water quality issues
  - maintenance of rehabilitation works (watering, weed control)
  - maintenance of drainage structures and all WSUD elements (regular removal of silt and weeds, repair of erosion)
  - actions arising from the Integrated Emergency Management Plan
  - control of environmental impacts of emergencies (i.e. fuel spills and control of any water contaminated by wash down or firefighting activities).

24. TRANSPORT

The transport task associated with the staged construction and operation of the Aquis Resort is significant. The principle transport demands the development will generate will be associated with the movement of workers, construction materials and disposal of surplus earthworks materials off site during the construction phases; and the ongoing transfer of guests and visitors and transport of staff for the operation of the resort. These activities will generate 4750 traffic movements per day in the peak of construction activity and 19 700 traffic movements per average day in the peak tourist season. The need to remove approximately 2.8 million cubic metres of earthworks material from site is a significant component of the construction materials transport task.

As a guiding principle, the proponent proposes to enter into an Infrastructure Agreement with the Department of Transport and Main Roads (DTMR) and CRC on the basis that:

- the cost of works required to maintain the safety and efficiency of the State and Local Controlled Road network as a direct consequence of the Aquis development will be met by the proponent
- the proponent will contribute its proportionate share of the cost of the upgrades to the State and Local Controlled Road Network taking into account existing thresholds for upgrades required to meet planned future growth in Cairns
- cost sharing arrangements would be identified for shared trunk infrastructure and for accelerated deterioration of pavement assets.

The State Controlled Road network in proximity to the Aquis Resort is the Captain Cook Highway and Cairns Western Arterial Road (CWAR). The Captain Cook Highway, between the Airport Avenue at North Cairns and the Yorkeys Knob Road Roundabout, currently operates at an adequate level of service (i.e. acceptable safety and flow conditions) and it is anticipated that the construction and operational phases of the development will not significantly impact the function of the Captain Cook Highway, as the Aquis Resort peak periods are not coincident with those on the highway. The Captain Cook Highway north of the Yorkeys Knob Road roundabout currently has operational issues necessitating a response such as the Smithfield Bypass which is being planned by DTMR. As the bypass planning is not yet complete, it is not yet possible to establish how the connection to the Captain Cook Highway will be configured.

The CWAR currently has poor level of service on the section between the Freshwater Creek Bridge and the Captain Cook Highway. There is an imminent need for the upgrading of this link to four lanes. Implementation of the four lane upgrade coincident with the opening of Stage 1 of Aquis Resort in 2019 would result in an adequate level of service being maintained on CWAR.

Yorkeys Knob Road and Dunne Road will be significantly impacted during the construction and operational phases. It is proposed to upgrade Yorkeys Knob Road to a four lane divided standard and elevate to provide flood immunity equivalent to that on CWAR. Subject to the outcomes of the DTMR Smithfield Bypass planning study, it is proposed to realign Yorkeys Knob Road to have a direct connection onto the Captain Cook Highway at the Caravonica roundabout. It is also proposed to upgrade Dunne Road to a two lane divided standard with augmented geometry to improve safety outcomes. No improvement to flood immunity on Dunne Road is proposed.

The rail freight task created by Aquis will result in the need for four trains per week in addition to the current 14 trains that service Cairns. The current commercial operators will provide the additional services as the demand is created.

The Cairns Airport will experience an overall 22% increase in international and domestic flights. North Queensland Airports have advised the airport has sufficient latent capacity to meet this need. A suite of management processes will be implemented to mitigate or avoid potential impacts associated with bird strike and radar operations.

Ports North advises they have planning in place to upgrade cargo handling and marina facilities should the demand created by Aquis Resort present a business case for the investment.

In relation to public transport needs associated with the development, it is planned that the Aquis Resort will engage a fleet of high occupancy vehicles to supplement taxi, limousine, mini-bus and other commercial operators to meet the transport need. A facility will be provided to allow public buses to safely pick up and drop off passengers.

The use of active transport modes by staff, including walking and cycling, will be encouraged by the provision of suitable trip end facilities to allow secure parking of bicycles, showering and change rooms. This will form part of an overall strategy to incentivise less reliance on motor vehicles for staff trips.

25. INFRASTRUCTURE

Servicing of the Aquis Resort represents significant demands on water, waste water, power and telecommunications infrastructure. A key aspect of the project will be the implementation of design initiatives and management procedures to minimise the demands on utility services during construction and operation.

As a guiding principle the proponent proposes that it enter into an Infrastructure Agreement with Council on the basis that:

- the development is considered as separate to and independent of the Council Trunk Infrastructure Contribution Policy
- the cost of dedicated trunk infrastructure to connect the development to the existing network where it has capacity is met by the proponent
- the proponent will contribute its proportionate share of the cost of the upgrades to the transport network
- cost-sharing arrangements would be identified for shared trunk infrastructure.

A strategy of separating the potable and non-potable water supply demands has established that Class A+ reuse water will be used for toilet flushing, irrigation and external wash down activities. This has translated to average peak season water demand of 3.88 ML/day of potable water and 4.16 ML/d of re-use water.

The Cairns region bulk potable water supply is currently at capacity and will require augmentation in the very near future. Council have identified two potential sources in the Mulgrave Aquifers and the Barron River at Lake Placid, both of which have a number of approvals and permitting issues that require resolution. Augmentation of the bulk water supply is required now and no later than 2019 when Stage 1 of the Aquis Resort commences operation.

Water treatment facilities are situated at Freshwater Water Treatment Plant (WTP) and demands will exceed capacity in the next two to three years. Council has planning in place for an additional WTP at Gordonvale and also at Kamerunga in line with the Barron River bulk water source. Additional water treatment capacity is required by 2016/17 and no later than 2019.

Current bulk water storage capacity at the University reservoir is fully committed and additional potable water storage of approximately 10 ML is required for Aquis. It is proposed to provide the storage on site so as to buffer impacts and provide security of supply arising from external system failure in a natural disaster.

A dedicated 300 mm diameter water supply main will be provided in the Yorkeys Knob Road corridor connecting to the existing trunk network in the Captain Cook Highway. This will be augmented by a secondary supply main in the Dunne Road corridor connecting into the trunk network in Macgregor Road.

In relation to waste water, the Aquis Resort, (fully developed), will generate a waste water load of 5.64 ML/day at average dry weather flow. The latent capacity of the Marlin Coast WWTP is 2 ML/day and hence will require augmentation to treat the additional waste water generation and also to produce sufficient reuse water to meet the demand generated by Aquis.

A dedicated 500 mm diameter waste water rising main will be reticulated from the Aquis Resort along Dunne Road to the Marlin Coast WWTP. A return 250 mm diameter pressure main will bring reuse water back from the Marlin Coast plant to a 4 ML non-potable water storage on site. The storage will also be fed by rainfall harvested and screened from roof runoff and hardstand areas.

The power demands of the development are potentially significant and a focus of the Aquis Resort will be energy reduction and conservation. Pivotal to this will be the provision of a central energy plant for the entire development and the use of a central chilled water facility to service air conditioning requirements. There will be a need for Ergon to bring forward plans for the development of a new Smithfield 132/22 kV Zone Substation situated on a site set aside on Macgregor Road. Reticulation of power from the zone sub-station to the Aquis Resort will be via 3 x 22 kV feeders to the central energy plant.

Communications to Yorkeys Knob is provided by low capacity copper infrastructure. The roll-out of the NBN will meet land line and broadband communications and data needs. A further upgrade of the local mobile phone network will be required.

26. THE NO-DEVELOPMENT OPTION

To a large extent, the impacts of not proceeding with the Aquis Resort project are the opposite of those of proceeding. That is, adverse impacts of proceeding with the project become benefits of not proceeding and vice versa. However, impact assessment is concerned with 'alternative futures' and even without the development, there will be changes on the site such as on-going export of sediments and nutrients, weed and pest invasion, occasional acid runoff, and seasonal air emissions associated with cane farming. The obvious impacts of not proceeding are as summarised below.

Beneficial impacts of not proceeding with the development of the Aquis Resort are likely to include:

- avoidance of the production of potential greenhouse gas emissions of approximately 51.5 kilotonnes per year (largely associated with international travel and high per capita energy use)
- continuing production of approximately 13 000 tonnes of sugar cane per year (15% of current Barron delta production)
- maintenance of current rural landscape
- no impacts on amenity from construction activities (dust, noise, traffic) and from operation (noise, light)
- no pressure on housing and community infrastructure.

Adverse impacts of not proceeding with the development of the Aquis Resort are likely to include:

- lost opportunity to protect 53 ha of natural vegetation that is not currently protected against threats from agricultural activities and degradation due to un-managed weeds and pests
- lost opportunity to restore 56 ha of new habitat, strengthen degraded waterways, and remove obstacles to fish passage (undersized culverts and tide gates), and deal with acid drainage from existing watercourses
- lost opportunity for preservation and interpretation of biodiversity values
- lost opportunity for preservation and interpretation of Indigenous and non-Indigenous cultural values
- ongoing risk to aviation (bird strike) and potential river migration due to presence of 6ha of abandoned aquaculture ponds
- lost opportunity to provide safe refuge for local residents during natural disasters
- continued net export of 292 tonnes of pollutants per year from agricultural activities and forgone opportunity to use treated WWTP effluent
- ongoing seasonal air emissions associated with cane farming
- loss of regional economic stimulus arising from capital expenditure of A$8.15 billion and annual revenue of A$11 billion/annum
- lost opportunity for significant employment in the construction sector over the period 2015-2023
- foregone increase in Queensland Government Revenue of A$1 billion/annum
- lost opportunities for 20 000 direct employment and 35 000 indirect employment from Aquis operations
- lost opportunity to establish Cairns/Queensland as an international resort destination
- lost opportunity for improvements to flood immunity of access to Yorkeys Knob Road
- lost opportunity for utilisation of current surplus capacity at Cairns Airport and tourism infrastructure in the region

- lost opportunity for increased sports and recreation facilities for the Yorkeys Knob community
- lost opportunity for a significant contribution to the development of community sporting and entertainments facilities suitable for an international tourism destination.

This EIS concludes that the impact of the Aquis Resort on its site and surrounds is quite insignificant, and, in terms of water quality and connectivity, is actually beneficial.

The significant impacts are social and economic and these are both adverse and beneficial. It is not possible to invest over $8 billion over a few years in an economy of the size of Cairns' without having a substantial effect on every sector.

AQUIS RESORT AT THE GREAT BARRIER REEF PTY LTD

ENVIRONMENTAL IMPACT STATEMENT

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THE AQUIS EIS TEAM

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