ELLA BAY
Far North Queensland

Ella Bay Integrated Resort Proposal

SEIS Submission Response

Volume One

Report on Matters of National Environmental Significance (MNES)



Executive Summary

This report outlines Matters of National Environmental Significance (MNES) for the Ella Bay Integrated Resort and proposed road upgrade and provides information on the level of impact; how impacts will be managed and mitigated; and the resultant environmental outcomes that can be expected from the construction and operation of the development.

On 4 July 2005, the project was determined a 'controlled action' likely to affect Matters of National Environmental Significance (MNES) section 75 of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), with the controlling provisions being:

- World Heritage (sections 12 and 15A)
- Listed threatened species and communities (sections 18 and 18A).

1. The Proponent

The Proponent for the project is Satori Resorts Ella Bay Pty Ltd. Ella Bay Developments Pty Ltd and associated entities currently owns freehold title over Lot 320 NR157629 which covers an area of 470ha and an adjoining property Lot 337 NR53 “Little Cove” which has development approval for 70 residential lots and 30 villas.

2. The Action

2.1 Ella Bay Development

The proponent proposes to construct, develop and operate $1.4bn an integrated eco-focussed tourism and residential community and associated infrastructure at Ella Bay, including a suitable access route from Flying Fish Point. The project is referred to as the “Ella Bay Development”.

The property is located 10 kilometres north-east of Innisfail adjacent to the Ella Bay National Park and Wet Tropics Queensland World Heritage Area on the northern, western and partially the southern boundary. The eastern coastal boundary is formed by a narrow Esplanade along the dunal swale which is the western edge of the Great Barrier Reef Marine Park (GBRMP) and Great Barrier Reef World Heritage Area (GBRWHA).

The Ella Bay site is a former cattle property which has been cleared for over a century and subsequently is heavily degraded with introduced weeds.

The 470ha area will consist of;

- 214.0 ha of Conservation Covenant;
- 62.8 ha of land to be transferred to National Park;
- 132.0 ha of developable footprint; and
- 61.1 ha of open space, golf course and parkland;

The ecological goal of the development is to:

- Live sustainably with the minimum carbon footprint, utilising solar, harvesting and recycling water, and minimising pollution, through the general philosophy of ecological living and principles of sustainable development; and
- Protect and enhance the fauna and flora of the site and surrounds through responsible use and protection of the natural environment, by conservation and sustainable practices.

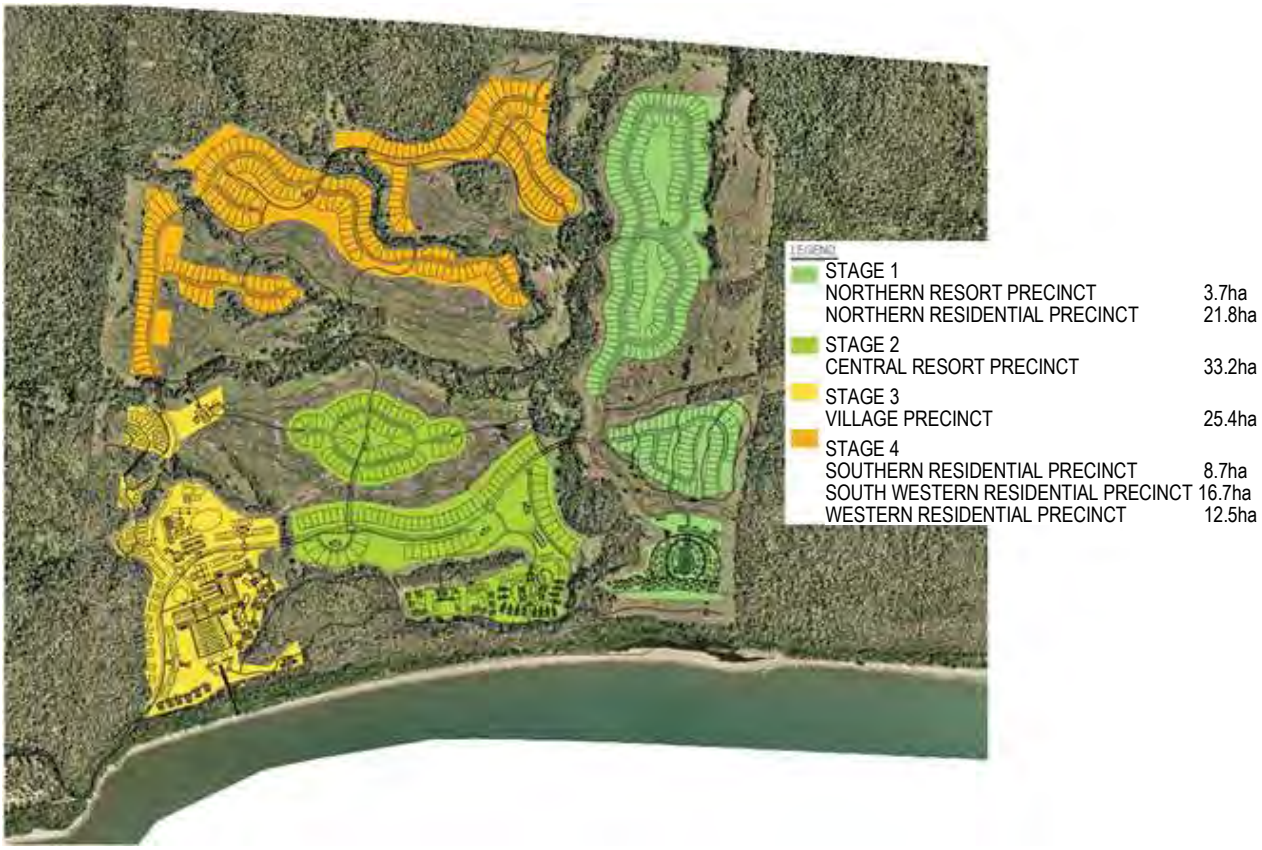
The development will incorporate a range of short term tourist accommodation; tourist hotels, holiday units and resort/residential style holiday accommodation and is expected to accommodate approximately 2000 tourists and 1200 permanent residents when the development is at full capacity and during the peak period of the dry season.

Volume 3 of the EIS, Volume 2 of the SEIS and this report describe the proposed development. The proposed development comprises: (Refer to Exec. Figure 2.1 Ella Bay Masterplan)

- Three (3) Resort precincts comprising 860 units and villas along the coastal side of the site The resorts will consist of single and two storey villas and resort/residential style in the northern precinct, single, two and three storey apartments in the central foreshore precinct and three to four storey and terraces around the village and golf clubhouse;
- Four (4) Residential precincts of 540 residences sited on the western boundary within existing cleared areas of the property;
- A Recreation/Open Space area comprising recreational amenities, community services and an 18 hole golf course;
- A mixed-use community village precinct forming a centre for visitors, with retail spaces, professional services, offices and restaurants;
- A research and educational area incorporating the welcome centre, a collaborative research institute, a cassowary research station, an international school and a sports centre; and
- Residential communal facilities including swimming pool, barbecue facilities, playgrounds, tennis courts and club house for each residential precinct.

Sustainability

The focus of the Ella Bay Development is the implementation of best practice in sustainable development and minimum 'carbon footprint'. The sustainable systems and technology will meet the day-to-day resource and infrastructure requirements of the community. These will include: site generated solar power and LPG generator backup, on-site water capture and treatment including: reticulated recycled water supply for non-potable uses; on-site stormwater management; energy efficient tropical building design, and environmentally-friendly transport alternatives.



Exec. Figure 2.1 Ella Bay Precinct Staging Plan (refer to Volume 7 Dwg 16)

2.2 The Ella Bay Road Upgrade

The Ella Bay Development proposal will include upgrade of the existing dirt road access to the site which will incorporate fauna impact mitigation measures based on environmentally sensitive road engineering and design. Ella Bay Road will be a 4790 metre long road constructed from Bay Road to the south west of Flying Fish Point to the Ella Bay Development in the north. Ella Bay Road will be required to safely convey residents, visitors and employees of the Ella Bay Development. The road is expected to convey a maximum design daily two way traffic of 4,138v/d with an annual average daily traffic (AADT) of 3,134v/d. The maximum design hourly two way traffic is 350v/h. (Volume 4 Appendix 3)

Ella Bay Road (Exec. Figure 2.3 and Exec. Figure 2.4) will consist of 2 stages.

Stage 1 will comprise a 4000 metre upgrade of the existing Ella Bay Road from Ruby Street in Flying Fish Point to the entry of Ella Bay Development. The road will be required to carry up to 1,000 vehicles per day prior to the commitment of stage 2.

Stage 2 will comprise a new 880m road that bypasses Flying Fish Point to the west, Stage 2 will include construction of a roundabout and approaches on Bay Road to direct Ella Bay traffic north behind Flying Fish Point through a new tunnel, and connection to the existing Ella Bay Road alignment to the north of Ruby Street.

The road will have a recommended speed of 60km/hr with extensive traffic calming to reduce the operational speed. The bike lane and traffic calming will be used to support the “change of focus” as people enter Ella Bay Road.

Significant parts of the road are proposed to be fenced to prevent cassowary-traffic interaction. The fencing will direct cassowaries to safe crossings at fauna underpasses. A purpose built cassowary underpass is to be constructed at a known crossing point north of Flying Fish Point, and two bridges built to cross creeks fully incorporating cassowary friendly design.

Mitigation measures will include frog fencing, bridges and fauna underpasses, a tunnel/fauna overpass (Flying Fish Point Bypass), a low speed environment, signs to increase driver awareness, planted retaining structures, replacement of existing culverts and run-off water quality management and monitoring.

The clearing requirement for the road will be 2.80 ha (compared to 2.47ha in the SEIS) due to a wider road width, alignment modifications for safety, to improve the road-side drainage to meet current standards and to save mature trees adjacent to the road.

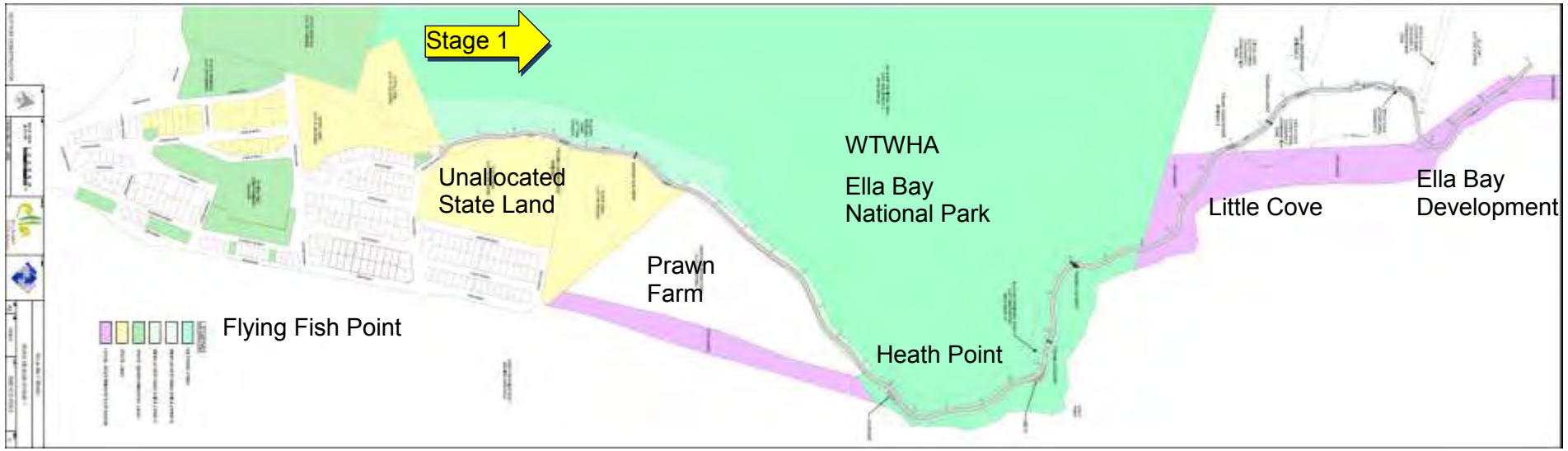
2.3 Construction

The Ella Bay Development will be completed over a fifteen year period, based on a staged construction plan. The development will start from the northern precincts and through along the coastal resort and village precincts.

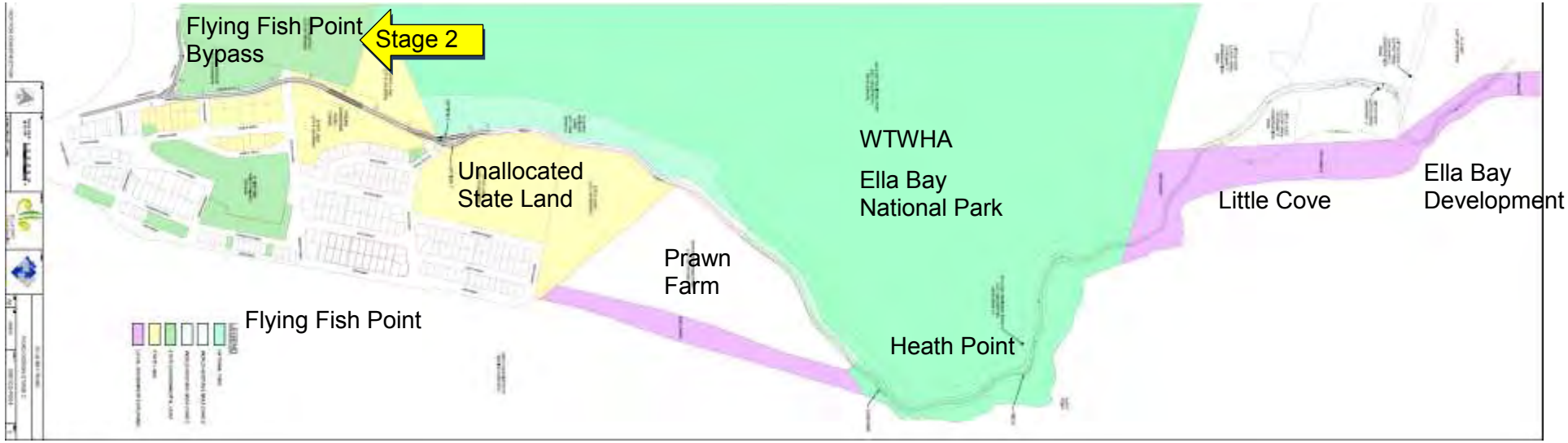
The majority of the environmental mitigation will precede the construction of the development;

- Revegetation staging of the site;
- Cassowary research centre;
- Construction of the Constructed wetlands; and
- Construction of the Stage 1 of Ella Bay Road including fencing, underpasses and traffic calming.

The initial revegetation before any major construction works will be to establish the east/west and northern section of the cassowary corridors to ensure positive contribution to cassowary habitat prior to clearing. Constructed wetlands for stormwater management will ensure additional permanent water supply for cassowaries and storm water management at the start of operations. Each precinct will have temporary fencing around the perimeter to prevent cassowary and construction vehicle interaction.



Exec Figure 2.2 Ella Bay Road Stage 1 Refer to Dwg EBR1CE-PD03



Exec Figure 2.3 Ella Bay Road Stage 1 Refer to Dwg EBR1CE-PD03

2.4 Project Rationale

The Ella Bay Development will provide a significant benefit and act as a catalyst project to the local Cassowary Coast community, bringing increased employment, training opportunities, population growth, increased economic activity and act as a catalyst project to a range of other investment, marketing and product development opportunities

Ella Bay is surrounded by the World Heritage Wet Tropical Rainforest and nestled against the Great Barrier Reef World Heritage Area. The development will be an Ecotourism Resort community comprising three resort precincts, which will be focussed on sustainability and ecology of the rainforest flora and fauna of the Seymour Range, lowlands and coastal wetlands.

The ecotourism focus, golfcourse, open space, sports facilities and the variety of Ella Bay accommodation will cater to the major tourism markets. In particular the cassowaries and large population of agile wallabies will become iconic features of the Ella Bay ecotourism adventure.

Ella Bay Development is at the forefront of cassowary research and rainforest conservation, and this will become a major draw card for the ecotourism, expedition style experiences with leading ecologists.

Ella Bay Development will strategically target tourism sustainability through development of a strong iconic location identity, catering directly to the market, providing diversity of experiences, fostering tourism ventures and attractions within close proximity and catering to the a base-load of local residents.

The Ella Bay Development will provide a significant financial stimulus to the Cassowary Coast region, through employment, investment and flow-on expenditure. The local Johnstone region which has witnessed a population and economic decline over the past 15 years will be revitalised.

The economic benefits include:

- An estimated total development value of $1.4 billion over fifteen years;
- An estimated total direct and indirect value of $2.1 billion over fifteen years;
- 5,325 person years of direct construction employment during the fifteen year construction period, peaking at 404 jobs in year 8;
- Wages and salaries of $158 million for the on-site construction workforce component;
- Once fully operational, 802 jobs for the operation of the new resorts, golf course, retail and associated facilities, with salaries and wages of $35 million per annum;
- An additional 2,550 people permanently living in the CCRC region; at completion of construction, an increase of 12% on the current Cassowary Coast population (Johnstone area only), or 0.6% growth per annum, equal to the current predicted growth of the area;
    - 1102 permanent residents living at Ella Bay;
    - 1325 permanent residents who are staff and their families new to CCRC living in CCRC; and
    - 122 permanent residents who are part of the permanent construction staff and their families new to CCRC living in CCRC.
- An average of 1,754 visitors staying at the resorts at any one time, adding 640,210 guest nights in the CCRC region;
- An increase in expenditure by visitors staying in the region of $256 million per annum;
- A major boost to the critical mass of the region in terms of tourism infrastructure and commercial accommodation, filling a spot at the quality end of the market;
- A new source of visitors for tourist attractions in the region, which currently rely on visitors travelling from other centres such as Cairns;
- Community benefits that include greater training and job opportunities for local people, particularly for younger people;
- An increase in the CCRC rates base estimated at $10 million per annum on construction completion;

- $50 million paid in State Government taxes and duties and $285 million in Federal payroll and company taxes over fifteen years;
- During construction, multiplier effects will include nominal of 184 support jobs offsite, plus 209 jobs arising from consumption induced expenditure Totalling 393 new jobs (OESR, 1997); and
- Once fully operational, multiplier effects will include 224 support jobs offsite, plus a further 254 jobs from consumption induced expenditure, totalling 478 new jobs.

The development will provide employment for some 802 full time jobs, 240 part time peak season jobs, 224 off site jobs and 254 flow on jobs totalling 1520 jobs which are not identified in the area for the next 20 years.

Indigenous unemployment within CCRC accounts for 3 times the unemployment rate of the non-indigenous population. The goal of Ella Bay Developments and part of an ongoing negotiation with the Bagirbarra and MAMU is for a Traditional Owner Levy and establishment of the Ella Bay Bagirbarra Development Trust. The goals are to:

- Promote Bagirbarra cultural heritage through tourism initiatives;
- Develop an Ella Bay Pty Ltd Bagirbarra Development Plan;
- Consult with Bagirbarra to understand their goals around training, employment and economic development;
- Support the Bagirbarra in their efforts to obtain economic independence through tourism and other initiatives;
- Liaise on behalf of Bagirbarra, if required, around the customization of training and the engagement of apprentices during construction phases;
- Assist the sustainability of Bagirbarra cultural heritage; *and*
- Provide opportunities for training, work experience, employment and economic development during pre-construction, construction and post-construction at Ella Bay.

3. Matters of National Environmental Significance

The proposed Ella Bay Integrated Resort and Residential will take place within freehold land Lot 320 on NR157629.

The proposed upgrade to Ella Bay Road will impact on the Wet Tropics World Heritage Area and Ella Bay National Park as well as state land and Esplanade.

3.1 Existing Environment

In 1883 the Ella Bay property boundary was shown on a registered survey and the property was initially cleared for agriculture by at least 1902. The narrow riparian corridors which are evident today are regrowth from that clearing. Due to these activities the property is generally degraded with significant areas of exotic weed infestations within fenced paddocks of introduced pasture grasses. Within the property and the adjacent Esplanade are mono-cultural stands of the weed, Pond Apple, (*Annona glabra)* and Hymenachne comprising approximately 14.9 Ha. The property also supports feral pigs in large numbers which are degrading the natural vegetation.

Access to the property is obtained from Ella Bay Road, an unsealed single lane road, which was probably formed in the early 1900's. The road runs beside or passes through areas of the Ella Bay National Park and WTWHA for 1.56km (length of WTWHA section). Current road use and maintenance is causing edge effects and dust pollution which is degrading the visual amenity and integrity of the WTWHA in the area, and during wet periods adding to the erosion and sedimentation burden of short sections of creeks running through the Wet Tropics and depositing into the Great Barrier Reef lagoon.

3.2 Assessment of MNES Environmental Impacts of Existing Land Use

The 'do nothing' case

The Ella Bay property was used for pastoral activities until recently. These activities have impacted on the Southern Cassowary through habitat loss and degradation, the spread of weeds and exotic grasses, impacts from feral pigs, and a high risk of road death and attack by

dogs. The previous cattle grazing and agricultural management practices degraded all remnant vegetation within the boundaries of the property. This has led to an incremental loss of 'essential' and 'general' cassowary habitat within and adjoining the property.

Cassowaries are threatened by unmitigated traffic along the Ella Bay road, which threatens car strike due to a lack of warning signage, slow points or exclusion fencing. Cassowaries in this area are known to have succumbed to dog attack; however no strategies to manage this risk are currently in place. Four cassowary deaths have been recorded in the local area, two from car impact and two from dog attack.

According to the Population Viability Analysis by Moore (SEIS) the Graham-Seymour Range cassowary sub-population is currently in a declining vortex whereby extinction of that sub-population appears to be inevitable. Many of the present indirect impacts of the local environment are cumulative and are contributing to this decline.

A change in management practices from agriculture over the past 3 years has seen an increase in surveyed cassowaries from 6 to 15 adults and sub-adults, indicating that the agricultural impact was a significant impact. It could be expected that with continuation of agriculture there would be an ongoing negative impact on and adjacent to the site.

From a regional significance perspective, the Ella Bay site is a large cleared 'island' surrounded by World Heritage Areas – Wet Tropics and Great Barrier Reef. Its minor benefit to the Wet Tropics values is that it provides access; although limited by internal fencing, for cassowaries to move through the site or utilize it for food sources. However this access has traditionally come with a high risk of dog attack or sufficient disturbance to disperse the cassowaries.

On a regional scale there is a high probability that the Graham-Seymour Range cassowary sub-population will be extinct with 60 years with the current levels of threat. This impact duration is permanent and the geographic extent will be regional. That is; the current "do nothing" scenario will most likely result in extinction of the Graham-Seymour Range cassowary sub-population within 60 years.

The weed Pond Apple is a serious threat to the WTWHA through spread into Ella Bay Swamp wetlands. Although Pond Apple is recognised as a Weed of National Significance (WONS) and identified as the #1 most serious weed threat to the Wet Tropics there has been no active enforcement within the Esplanade area or on the property over the past 20 plus years which has allowed the weeds to become established.

3.3 World Heritage Values

The Ella Bay Property borders the WTWHA on its northern, southern and western boundaries. Ella Bay Road lies adjacent to the Ella Bay National Park border as it passes the township of Flying Fish Point.

The GBRWHA and the reef lagoon adjoins to east coast of the Ella Bay site with an Esplanade. Ella Bay Road along Heath Point and north to Ella Bay adjoins to the GBRWHA.

The primary issues of concern are maintenance of World Heritage values and potential impacts of the road and Ella Bay development on the Southern Cassowary, Common Mist Frog and to a lesser extent, other threatened faunal species potentially having habitat in the WHA and the critically endangered Littoral Rainforest.

The WTWHA has been zoned in accordance with the Wet Tropics Management Plan (1998) in line with the management intent and integrity of the zone with the proposed road upgrade contained within Zone C. All areas adjacent to the Ella Bay property have been designated Zone B.

Assessment of WHA Listing Criteria (vii) - Visual Amenity

The Ella Bay property can only be viewed by the public from the water or by air. There are no roads, or walking tracks that allow for public view. While the cleared site is only visible from the air, some of the proposed development will be visible from the sea temporarily until landscape screening vegetation and/or revegetation is high enough to shield the view.

The net visual impact of Ella Bay Road Upgrade and of Ella Bay Integrated Resort on World Heritage Values will be temporary; during and immediately after construction and in places until landscape screening vegetation reaches greater than 10m in height.

The area traverses the Heath Point headland which provides magnificent views of the coast line and to Ella Bay. It is proposed that the scenic values be emphasised and showcased by the provision of a vista and vehicle amenity.

WHA Listing Criteria (viii) - Significant geomorphic or physiographic features

The WTWHA includes many significant geomorphic features including tropical rainforest ecosystems and wetlands. Downstream and consequential impacts have the potential to affect:

- The Ella Bay Swamp Wetland (Nationally Important Wetland) which lies to the north of the Ella Bay Development through urbanisation; and
- The Great Barrier Reef World Heritage Area, including coastal wetlands.

Within the proximity of Ella Bay Road and Ella Bay Development; the GBRWHA is zoned for general use and there are no significant marine features.

Extensive mitigation is proposed to minimise potential impacts from the Ella Bay Development and increased human activity on Ella Bay Swamp, WTWHA and to the GBRWHA from:

- Changes in hydrological flow from modification of existing drainage patterns, increased impervious surface, rainwater harvesting and groundwater abstraction; and
- Increase in pollutants from sediments, increased nutrients, herbicides, pesticides and Acid Sulphate Soils.

Mitigation is proposed adjacent to the northern wetlands and Ella Bay Swamp through the use of constructed wetlands to minimise any nutrient and sediment inflow, and “organic” management of the golf course areas that drain northerly. The constructed wetlands will also be used to control flow.

Exec Figure 3.1 Ella Bay Development showing constructed wetlands and organic golf holes with proximity to Ella Bay Swamp Wetland and Offset areas

Ella Bay will be self-sufficient in potable water supply through rainwater harvesting and backup ground water abstraction. Rainwater harvesting will not adversely affect the downstream hydrology, the modelling of flows and durations with management of retention and detention

has indicated that there will minimal change to the post-development flows and the creeks, wetland and dunal swale habitat will be preserved.

Groundwater is proposed to be abstracted from lower aquifer in times of low rainfall. It is not proposed to use or impact on the upper aquifer which could dry the wetlands. Groundwater abstraction modelling was undertaken and the bore is able to be pumped continuously as long as any net drawdown on the upper aquifer is less than a mean 0.1m greater than tidal forcing amplitude at the northern vegetation boundary or at the dunal swale.

While the constructed wetlands will be important in stormwater flow management the primary objective of the constructed wetlands is to remove sediment and nutrients from the development stormwater flows. The quality objective of the constructed wetlands and bioretention filters is to reduce the nutrients and sediment of post development discharge. The constructed wetlands will become permanent water sources and likely habitat for site species – particularly cassowaries and frogs; and potentially for migratory birds.

Wastewater from the development; grey water and sewerage, will be treated on site by a membrane bioreactor (MBR) and provide Class A^+ recycled water for non-potable domestic supply toilet flushing, cold water laundry and residential garden watering irrigation and for Open Space irrigation. The Open Space irrigation water may be stored for extended periods, held in open storage or combined with harvested stormwater and will irrigated at a minimum Class B standard. The results of a recycled water balance indicate that 98% beneficial reuse can be achieved with an irrigation area of 91 ha and a dedicated wet weather storage volume of 11 ML.

There is a low probability of PASS and ASS based on the preliminary soil sampling however to protect water quality and ecosystems, all areas of the proposed development and road requiring ground disturbances located below 5 metres AHD shall be subject to an acid sulphate soil investigation and management where identified in accordance with the Queensland State Planning Policy 2/02.

The downstream impacts of surface water along Ella Bay Road will be improved with regards to quality, sediment and there will be no change to stream hydrology. A high risk of temporary impact has been recognised during construction of the road.

The proposed mitigation measures will reduce the potential impact of groundwater, stormwater and treated effluent on World Heritage Values to the nationally significant Ella Bay Swamp Wetland, WTWHA rainforest and the Great Barrier Reef Marine Park.

Assessment of WHA Listing Criteria (ix) - Significant Ecological and Biological Processes

The potential impacts are those that could cause greater loss through consequential impact, such as vegetation clearing, fragmentation of habitat prevention of wildlife movement in important ecosystems and loss of biodiversity through facilitation of weed, pest and disease invasion. No important wildlife movement corridors have been identified for arboreal, terrestrial and aquatic ecosystems.

While the development will subject the area to a significant increase in population and potential anthropogenic impacts, extensive mitigation in terms of revegetation, and rehabilitation of degraded and weed infested vegetation will be undertaken. Cassowary and wildlife corridors will be established covenanted and provide connectivity between areas of vegetation and improve riparian corridors.

All areas of essential cassowary habitat will remain accessible within Ella Bay development site through the cassowary corridors and cassowary underpasses for creek crossings. The existing open areas of the proposed precinct location and of the golf course are rarely used by cassowaries; however the open spaces will be available for movement facilitation for cassowaries – as they are known to cross open and relatively flat spaces.

Suitable habitat for the EPBC Act listed stream-dwelling frogs, *Litoria rheocola* (Common Mistfrog) is confined to the southern section of the major north-south creekline on the southern

boundary and the south-western corner of the property where riffle zones are present. It is primarily located upstream and away from the proposed development area.

The proposed Masterplan has incorporated extensive conservation zones. A covenanted buffer will protect the adjacent WTWHA with a minimum 100m wide revegetated corridor from the development. The proposed North/South and East/West fauna corridors will be extended by revegetation to a minimum of 100m wide revegetated corridor.

These buffers and corridors will be maintained for conservation purposes creating a 'continuous' conservation area to facilitate fauna movement through the landscape, particularly allowing access to coastal habitat and increasing the carrying capacity for cassowaries

The total clearing including Ella Bay Development and Ella Bay Road will be 3.75ha and the total isolation of habitat will be 2.14ha. To minimise the impact of clearing revegetation totalling 50ha will be undertaken.

Clearing Areas						
	National Park	***WTWHA Of Concern***	***WTWHA Essential Cassowary habitat***	***Essential Cassowary habitat***	***Of Concern RE***	***Total Area***
Ella Bay Road	0.004 ha	0.33 ha	0.33 ha	1.80 ha	0.34 ha	2.80 ha
Ella Bay Development				0.70 ha	0.25 ha	0.95 ha
TOTAL	**0.004 ha**	**0.33 ha**	**0.33 ha**	**2.50 ha**	**0.59 ha**	**3.75 ha**

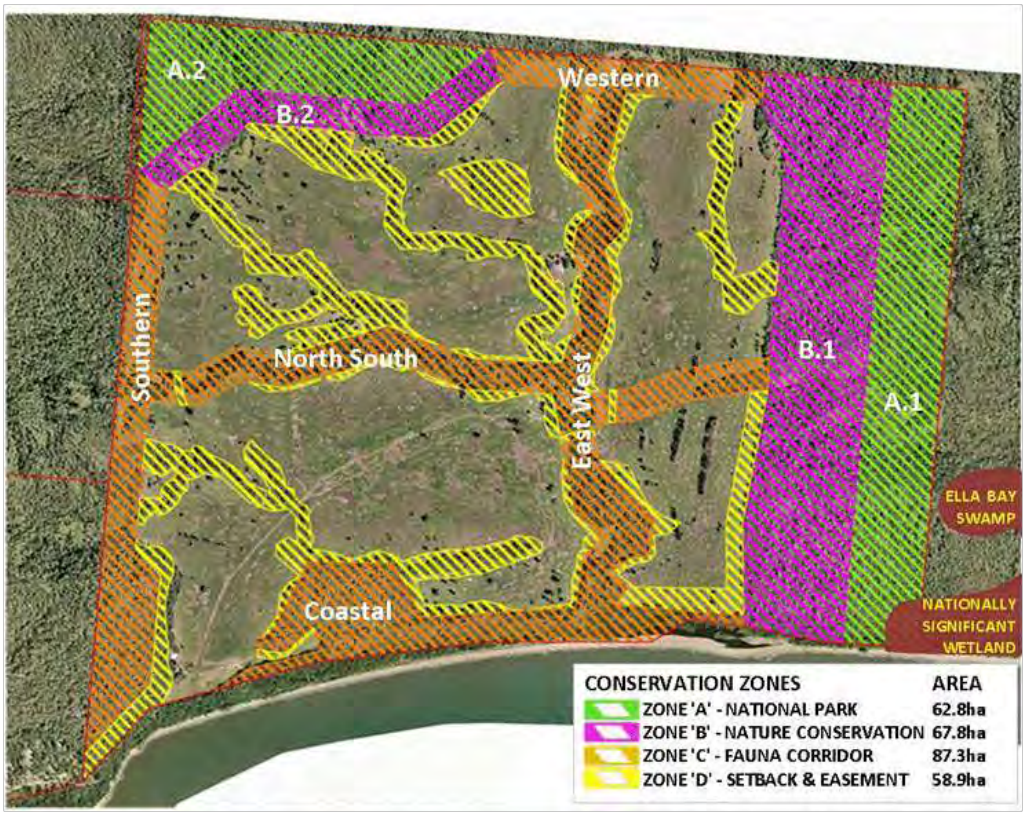
Clearing areas for Ella Bay Road Stage 1 & 2, plus clearing of Ella Bay Development site

Isolation Areas				
	Essential Cassowary habitat	***General Cassowary habitat***	***WTWHA Of Concern***	***Total Area***
Ella Bay Road	1.05 ha		0.02 ha	1.07 ha
Ella Bay Development		1.07 ha		1.07 ha
TOTAL	**1.05 ha**	**1.07 ha**	**0.02 ha**	**2.14 ha**

Isolation of habitat caused through fencing

The majority of the vegetated areas will be protected and managed by Conservation Management Zones:

Conservation Zone	Purpose	Area ha
Zone A	Transfer to National Park - Offset Package	62.8 ha
Zone B	Nature Conservation	67.8 ha
Zone C	Fauna Corridor	87.3 ha
Zone D	Setback & Easement	58.9 ha
Total		276.8 ha



Exec Figure 3.2 Ella Bay Conservation Zones

Great Barrier Reef World Heritage Area.

The inshore marine area of Ella Bay is possibly frequented by rare and threatened fauna such as the Irrawaddy and Indo-Pacific humpback dolphins, dugong and turtles.

Possible impacts and mitigation measures due to Stormwater and Groundwater have been mitigated. Other potential impacts are detailed in the *Marine Turtles Section 4.5* of this report. These measures are also appropriate for all marine species.

Assessment of National Heritage Values - Cultural and Historical Impacts

The Bagirbarra people are recognised as the Traditional Owners of the Ella Bay area and a Heads of Agreement has been signed to establish the Ella Bay Bagirbarra Development Trust to establish a cultural economy and assist with sustainability of the Bagirbarra cultural heritage.

The Welcome centre will feature Traditional Owner Cultural Heritage values and history and application of indigenous natural heritage management principles.

3.4 WTWHA and GBRWHA Impact Conclusion

The proposed development and operations of Ella Bay Development will not cause any significant loss of any World Heritage values, will not cause any World Heritage values to be degraded or damaged on a long-term basis, and will not cause any of the World Heritage values to be notably altered, modified, obscured or diminished for any significant period of time. There is an opportunity to increase the integrity of World Heritage values of the area by threatening process mitigation of significant weeds and road death of cassowaries; to enhance knowledge of appropriate cassowary protection measures and increase the awareness of residents, tourists and the general community of the importance of protecting World Heritage values through the measures proposed for this site.

4. Listed Threatened Species and Ecological Communities

4.1 Fauna and Flora Surveys and Assessment

The Proponent has undertaken further surveys and reports to add detail to the EIS and SEIS. No additional EPBC species have been recorded.

The proponent has undertaken:

- Further cassowary surveys and trials of cassowary fencing, escape gates and surveys of water availability and fauna underpass usage;
- Further Fauna surveys and survey of Chytrid fungus infection in frogs, marine turtle review and feral pig trapping;
- Further flora surveys, baseline vegetation monitoring, weed mapping, weed and vegetation management studies, and trialled cyclone tolerant cassowary tree revegetation; and
- Completed a number of environmental management plans that relate to MNES significance.

4.2 Southern Cassowary

Existing Status of species and habitat:

The endangered Southern Cassowary, *Casuarius casuarius johnsonii*, is present at Ella Bay and within the environs and essential cassowary habitat is the predominant vegetation on and around the site

Cassowaries have been identified along the Ella Bay access road and around the Ella Bay property as part of a sub-population known as the Graham-Seymour Range population. ,

Population viability analysis indicates that the Graham-Seymour Range cassowary population, estimated to be 51-73 independent birds, along with other coastal cassowary subpopulations south of Cairns, is undergoing a population decline and will have a high probability of extinction within 60 for these isolated population with current levels of threat.

Ella Bay property and Ella Bay Road form the south-eastern boundary of the Graham-Seymour Range cassowary population and the home ranges of the birds sighted during the field survey predominantly lie to the west and north of the survey areas.

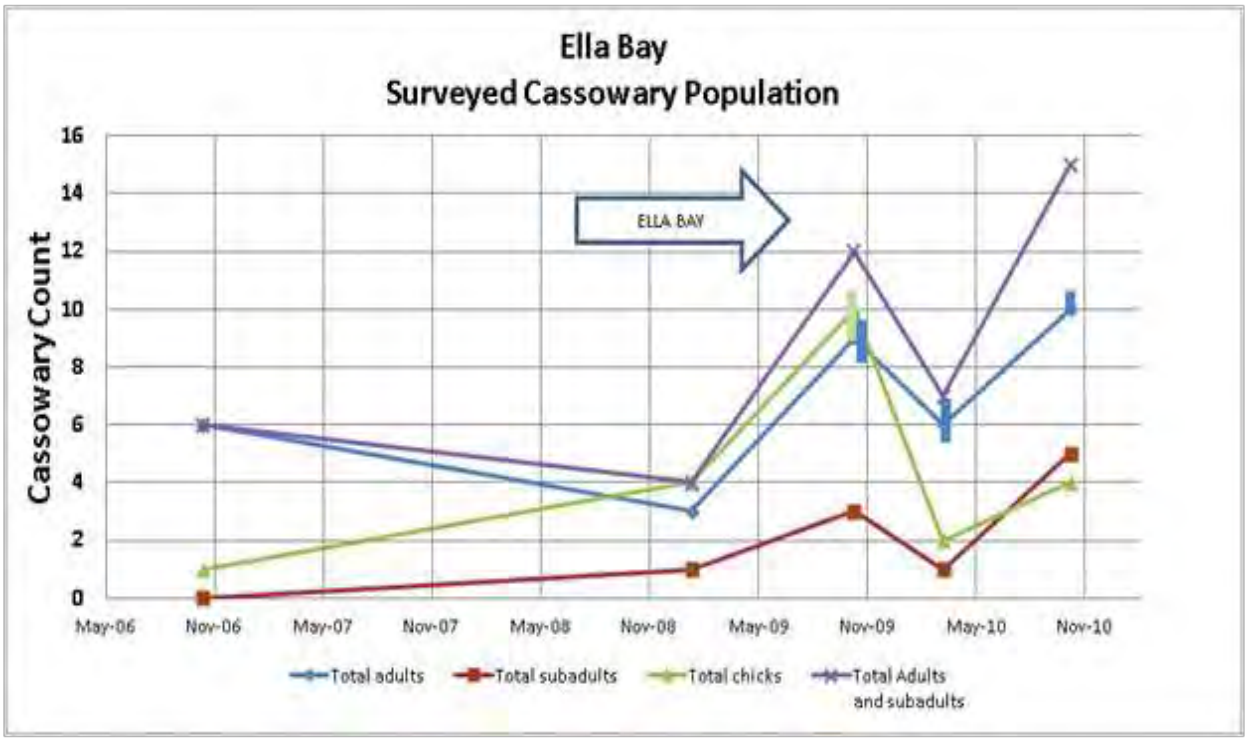
Cassowary Abundance, Age Class Structure and Sex Ratio

Moore (SEIS PVA) estimated the cassowary density of the Ella Bay Property and Little Cove was one adult per 3.2 km2 (/320ha). Based on the vegetated area (229ha) of Ella Bay property less than one cassowary could be supported. Since Moore's original survey, further surveys have been undertaken in both Wet and Dry seasons.

In all five surveys were undertaken and show an increase in reported (photographically identified) numbers in the past four years with an increase from 6 (2006) to 15 (2010) adult and subadult cassowaries indicating that the population is healthy and that the number of females to males is sustainable.

The following trends have been observed from the surveys:

- The number of adults has increased over the survey period;
- The number of subadults has increased;
- The number of chicks has fluctuated greatly and is not in relation to the number of subadults; and
- The number of adults monitored during the wet season surveys is lower than from the previous dry season survey.



Exec Figure 4.1 Comparison of Cassowary population estimates and arrow showing change from agriculture.

The surveys have been undertaken at different times of the year and under different weather conditions. However a number of anthropogenic changes have also occurred during that timeframe. The property ceased being a cattle property mid-2008. While cassowaries and cattle are not competitive for food sources the impact of the farm workings: cattle dogs, chemicals and human activity may have contributed. Additionally the proponent has restricted access to pig dogs and hunters and engaged in a pig culling program and has culled over 100 pigs since 2008.

Summary of Cassowary Surveys

The number of adult cassowaries recorded in 2006 to 2010 in the immediate vicinity of Ella Bay Development and the access road has increased from 6 adults to 10 adults. The population appears to have a higher density than that reported by Moore.

The number of females reported total of 2 (possibly 3) is lower than expected from the sex bias ratio of 1.5:1 however, there is ambiguity in sex determination through monitoring photographs and the extent of the surveyed area.

The number of sub-adults recorded has increased since 2006 from zero to between 3 and 5 probably representing movement of the sub-adults around Ella Bay. The age class structure and recruitment appears to be sustainable.

The total number of cassowaries, of females and of subadults for recruitment has shown an increase in reported numbers and indicates a local healthy population.

Habitat within the Ella Bay property

The majority of the Ella Bay property has been cleared since at least 1902. Narrow strips of riparian vegetation have regrown along the creek banks and provide some feeding resources for cassowaries and movement corridors traversing east-west and north-south. However, the viability of the property for the cassowary is reduced due to the impact of this anthropogenic impact and resulting weed infestation.

Moore in the EIS analysed the habitat based on his mapping of habitat types and subsequently the habitat has been reassessed taking into account post EIS cassowary usage, vegetation and water availability survey without substantive change.

The Ella Bay conservation strategy will be to place the majority of existing essential and general cassowary habitat under conservation covenant, plus create a covenanted vegetated fauna corridor bisecting north/south and east/west. The fauna corridor will be a minimum of 100m in width. The majority of the existing riparian vegetation is less than 100m in width and has recovered from previous agricultural clearing to either remnant status or with revegetation and closing of edge effects will become remnant.

Habitat Use along Ella Bay Road

Moore (SEIS) developed a risk assessment approach to the "risk of accessing the habitat". Moore used field survey data from his previous survey (Nov 2006), together with vegetation mapping (EIS Vol 8 A6.1) and professional opinion to map areas as high, moderate or low quality Cassowary habitat value. According to this method of evaluating cassowary habitat, as the level of anthropogenic threat increases, the usefulness of otherwise suitable cassowary habitat decreases.

Moore's habitat value was reassessed with reference to the post EIS flora survey, cassowary surveys and to water availability without substantive change.

Moore's assessment was based on his professional experience of the impact of dogs and traffic and a number of areas which were mapped as having a high probability of death or injury to cassowaries accessing these areas from dog attack and car strike due to the unfenced road. Recent history of four recent cassowary deaths in the area correlate to this risk based value.

The Flying Fish Point reserve although categorised as negative value habitat, remains important to the continued presence of cassowaries in this south-east section of Seymour Range. Although the streams between Flying Fish Point and Heath Point flowing to the Reserve are ephemeral, the Reserve provides both food and water resources for cassowaries for most of the year.

As such, measures to reduce the level of risk to cassowaries using the reserve, such as the fence and funnel strategy, will effectively increase the habitat value of Flying Fish Point Reserve and the adjoining sections of the Ella Bay Road from the current negative value habitat to moderate value habitat.

Ella Bay Development Cassowary Mitigation Measures

The primary objective of cassowary mitigation strategies of Ella Bay Development is to facilitate the continuation of normal cassowary behaviour while minimising the possibility of adverse contact between cassowaries and humans.

The mitigation strategies are an integral component of the Ella Bay Development and have been developed to protect both the cassowaries known to use the area, as well as to achieve a net benefit for the population as a whole. The goal is for cassowary numbers, carrying capacity and resistance to cyclonic disturbance to improve, locally and regionally.

Fauna Corridors and Cassowary Access

The proposed conservation zones, fauna corridors and fauna underpasses will maintain unimpeded cassowary movement access around the Ella Bay development. The area of access will consist of the fauna corridors and the extensive open space formed by the golf course fairways. The conservation zones and open space cover all of the cassowary evidence from the five surveys with the exception of 2ha of clearing and isolation of Essential and General habitat.

Cassowary movement corridors around the site will be unimpeded pre-development to post-development. The total area of the conservation covenant and open space is 336 ha of the 470ha.

Exec Figure 4.2 **Cassowary accessible areas (green shading) totalling 336ha out of a 470ha with movement corridors. The white outline is the edge of the conservation zoned areas. The markers are from all surveys.**

Revegetation totalling 50ha will provide a substantial increase in habitat; of this revegetation 45ha will be high quality cassowary fruiting habitat which will significantly increase Essential habitat and 5ha will be non-fruiting habitat which will become General habitat. Non-fruiting revegetation will be used to the east of the main north/south creek so that cassowaries will not be enticed to the resort areas.

Rehabilitation totalling 64ha will change weed infested non-remnant habitat of which approximately half is mapped currently as rehabilitating habitat into essential or general habitat.

The future habitat designation after completion of the development and maturity of the vegetation will be:

- Essential 238ha
- General 39ha
- Cleared/isolated 2ha

All of the Essential and General habitat above will be protected under conservation zoning. The area accessible to cassowaries will also include the landscaped golf course open areas which will increase the accessible area by a further 61ha to a total of 336ha of the 470ha available.

The existing riparian zone ranges in width from 30 to 50m wide for the majority with some areas up to 100m wide. The planned north/south and east/west cassowary corridors will increase all the riparian vegetation in the main corridors to at least 100m wide. A number of additional corridors radiate between the main corridors and the perimeter vegetation and will maintain the current movement patterns.

There will be extensive increase in the area of permanent water from the constructed wetlands. The majority of the constructed wetlands will be proximal or within the fauna corridor and discharge into the creeks.

Ella Bay Development Precinct Fencing

The Ella Bay Development will lead to a significant increase in internal traffic flows within the property compared to the near non-existent current traffic flow.

To mitigate against the interaction all the roads within the precincts will be perimeter fenced with pool style fencing and the precincts will be linked by bridges or low speed gated crossings linking. The roadways will be included within the precinct fencing to eliminate cassowary road trauma. The creeks will be crossed by elevated bridges (cassowary underpasses) to provide fauna habitat connectivity throughout the site to all Open Space/Recreation and Conservation areas.

Exec Figure 4.3 **Cassowary access will be maintained through fauna underpasses shown in yellow and gated level crossings shown in red.**

There will be an extensive network of pedestrian and bicycle pathways throughout the open space with the pedestrian/bicycle pathways located along the edge of the main fauna corridors. The pathways will be elevated above the forest floor where crossing the main cassowary corridors to separate cassowaries and people, and to provide unhindered cassowary use of the creek and associated vegetation.

Summary of Ella Bay Road Fauna Mitigation Measures

Ella Bay Road will be constructed in two stages with Stage 1 utilising the existing road alignment from Flying Fish Point to Ella Bay and Stage 2 bypassing Flying Fish Point.

The cassowary mitigation measures have focussed on:

- Excluding cassowaries from the road;
- Excluding cassowary visibility of the roadside;
- Providing a safe crossing with attractant vegetation;
- Providing an escape mechanism if the cassowary accesses the road; and
- Slowing the traffic in case of a cassowary on the road.

The road will use a fence and funnel mitigation to exclude cassowaries from accessing the road for the majority of its length and underpasses to allow access to the habitat on the east of the road. The proposed bypass including fauna overpass through the narrow southern extension of the Seymour Range will ensure connectivity to the lower end of range.

The fence will be 1.8m high shadecloth directing the cassowaries to fauna underpasses and the overpass located at known crossing points. In other locations the steep natural terrain or embankment heights will provide additional exclusion. The fence will include a one-way escape gate to minimise the risk of cassowaries being trapped in the road reserve.

Ella Bay Road will be a low speed environment (60km/h) and to ensure effective speed control; fixed and psychological calming will be used to increase driver awareness. Extensive traffic calming will be used to reduce the operational speed.

The mitigation will include

- Fauna Underpasses – 3 (Stage 1);
- Fauna Overpass– 1 (Stage 2);
- Small Fauna Underpasses with furniture – 4;
- Cassowary fencing and escape gates; and
- Frog Fence - 25m either side of streams;

To protect essential habitat; mature trees have been protected where possible to provide canopy shading with over 20 trees requiring guard rail protection because of their proximity to the road. To achieve this level of tree retention the road alignment has been modified to specifically avoid the trees and road safety mitigation added where the alignment has remained too close to the tree.

Ella Bay Road Fencing

The mitigation will comprise three cassowary underpasses and one overpass. The roadside will be fenced to funnel the cassowaries to the underpass/overpass. The fence will be a 1.8m high neutral coloured (dark grey/black/green) shadecloth to provide a visual and a softer resilient barrier that will not damage the birds. The fence alignment will run 3m to 12m within the vegetation parallel to the road alignment, to minimise visibility from the road.

The fence will be installed to follow the natural contours to reduce the risk of erosion and visual impact and will be constructed predominately with only hand pruning of native flora. The fence will not be installed where the road edge and surrounding slopes are steeper than 1:1 or where the embankment is vertically greater than 1.5m e.g. gabions walls.

The Ella Bay body corporate will be responsible for regular on-going monitoring, repairs and on-going maintenance of the integrity of the fence.

In the event of significant cyclone risk, the fence will be pulled to the ground and tied with cable ties to keep it rolled up and safe from damage. The fence will only be pulled down immediately prior, and during cyclonic weather events.

Additional traffic management procedures will be required to minimise the risk of cassowary vehicle strike while the fence is down; temporary warning signs will be used identifying that the fence has been dropped and the vehicle speed limit reduced to 40km/hr.

Mitigation during Preconstruction, Construction and Operations

Potential impacts on the cassowary from the construction and operation of the Ella Bay Development and access road are outlined in detail in the Southern Cassowary Environmental Management Sub-Plan (Volume Three) also Volume 6.1m *Update of Habitat Assessment of Ella Bay for the Southern Cassowary* and Volume Four *Ella Bay Road and Environmental Design Report* Chapters 10 and 11 which specifically address road construction management. In particular, the Sub-Plan details the necessary management actions, performance criteria, timeframes, reporting requirements and costs associated with effective cassowary management on site.

The objective of the mitigation is:

- To avoid injury to cassowaries or damage to cassowary habitat as a result of Ella Bay Development activities; and
- To maintain the normal foraging and breeding behaviour of the cassowary during the construction of the Ella Bay Development and Ella Bay road.

The proposed mitigation will reduce the impact of increased human population from Ella Bay Development on the World Heritage values, making these threats relatively small and the development will not have a significant impact on the Southern Cassowary.

In all stages of the development, a strong emphasis will be on education of the workforce, contractors, residents and guests through inductions and the Welcome Centre, of the significance of the cassowary, and measures to prevent or discourage inappropriate interactions and behaviour.

A *Southern Cassowary Management Sub-Plan* has been prepared to mitigate impacts. During the construction phase staging of revegetation and rehabilitation of fauna movement corridors will be important in providing compensatory habitat.

4.3 Stream Dwelling Frogs

The EPBC listed endangered Common Mistfrog *(Litoria rheocola)* has been recorded in both the 2006 and 2008 surveys on Ella Bay property and along Ella Bay Road. The *L. rheocola* reported by Alford was confirmed as infected by *Batrachochytrium dendrobatidis* (Chytrid fungus) and that *B.* dendrobatidis has recently invaded the entire Wet Tropics region. Unlike the devastation to the frog population at high altitudes the fungus is not impacting on the frogs due to higher day time average temperatures.

A *Stream Dwelling Rainforest Frog Species Management Sub-plan* has been prepared to manage impacts including handling procedures. The *Weed Management Sub-plan* will ensure chemicals are frog and aquatic friendly

There will be no increase in threats to the long-term persistence or interference with the recovery process of *Litoria rheocola* populations resulting from the proposed development and the mitigation measures will contribute to a net positive impact.

4.4 Spectacled Flying-fox

Several individual Spectacled Flying-foxes were observed near Little Cove, on Ella Bay, and feeding in trees at Flying Fish Point. The Ella Bay site is not frequented and the habitat is not currently critical to the Spectacled Flying-fox.

A Spectacled Flying-fox Management Sub-plan has been prepared, and all staff, construction workers, residents, will be provided with information on the species significance and human Lyssavirus disease risk management.

4.5 Marine Turtles

No marine turtles were reported during the surveys by BAAM in 2006 and 2008, however turtle nesting activity was recorded by Constable in 2008/2009. Of the nine nests recorded within the Ella Bay Development area none were viable.

The beach in the vicinity of the Ella Bay site is limited in suitability for turtle nesting; it is steeply sloping with dense foreshore vegetation and limited low dunes suitable for nesting. The low dunes are subject to overtopping in extreme weather from wave run-up inundating nests. Dune vegetation includes several exotic weeds (e.g. Singapore daisy), which can impede turtle nesting.

A *Marine Turtle Species Management Sub-plan* has been prepared to manage potential impacts.

4.6 Vegetation Communities and Flora Species

There are a number of areas EPBC Act listed Critically Endangered ecological communities '*Littoral Rain Forest and Coastal Vine Thickets of Eastern Australia*' on the Ella Bay property and along Ella Bay Road. The critically endangered communities are not within the development footprint or within the clearing area or impact of the Ella Bay Road upgrade. The communities on the Ella Bay property will be protected by conservation covenanting.

A *Significant Flora Management Sub-plan* and the *Weed Management Sub-plan* have been prepared to manage the impact on the ecological community and to control exotic species including Pond apple (*Annona glabra)*.

4.7 Migratory Bird Species

The following Migratory Bird species were reported as part of the fauna surveys; Cattle Egret, White-bellied Sea-eagle, Spectacled Monarch, Black-faced Monarch, Rufous Fantail and Rainbow Bee-eater. In addition the following species were identified to potentially occur; Barn Swallow, White-throated Needle-tail and Fork-tailed Swift.

All observed migratory species are considered to be common within the bioregion and local area.

5. Offsets

A comprehensive compensatory Offset Strategy is proposed for the project. The Proponent's goal is that there will be a long term positive outcome from the Offset Package and onsite mitigation. The package has been integrated into; and supports the aims of the Recovery Plan for the Southern Cassowary (Latch 2007). The Proponent's actions are designed to enhance the movement and ultimately the long term survival of cassowaries within the local Ella Bay Development and in the regional context.

Although extensive mitigation has been included in the design and environmental management plans of the Ella Bay Development and Ella Bay Road to minimise the environmental threats and impacts, the current anthropogenic impacts are overwhelming and will lead to extinction of the local cassowary subpopulation.

The proponent's goal is that there will be a long term positive outcome from the Offset Package and onsite mitigation such that the short term "do nothing" prediction of extinction of the Graham-Seymour subpopulation of cassowaries is reversed. (Moore, 2007)

5.1 Ella Bay Offset Package

The offset package has been developed for residual impacts from the proposed development and road upgrade after all available impact mitigation strategies have been exhausted.

As part of the offset proposal the proponent has purchased a property totalling 63.62 ha located within a strategic regional habitat connectivity corridor; identified within the Recovery Plan for the Southern Cassowary as an area of key ecological function, broad movement corridors and appropriate rehabilitating habitat. The land is contiguous with Eubenangee Swamp National Park on the south and western boundary and WTWHA on the northern boundary.

The land has been procured and the time period for transfer to National Parks will be less than 12 months.

The offset property will undergo extensive revegetation/rehabilitation to create a habitat corridor linking a World Heritage area and Eubenangee Swamp National Park. A revegetation management plan has been prepared.

To offset on- and off-site impacts of the development that are not able to be mitigated; the Offset Package will include:

- Provision of 63.62 ha of Southern Cassowary corridor part (Southern Cassowary Recovery Plan) identified as Lots 5RP747500, 6RP713994, and 7RP713994 to be donated to National Parks and revegetation and on-going management for 5 years;
- Provision of 2 portions comprising 22.60ha and 40.18ha of Southern Cassowary habitat identified as the northern and South-western corner of Lot NR320 N157629 to be donated to National Parks;
- Provision of a research package as nominated in Table 5.3.

Land-based Offset				
Action Summary	*Offset Area*	*Contribution*	*Value (est.)*	*Timing*
Queensland VMA & NCA *For clearing of 3.77ha and revocation of 0.014 ha National Park* EB REF CZ A.1	22.60 ha	In perpetuity regional corridor and essential cassowary habitat protection. Legally handed over to State for National Park	$ 250,000	<1 year
EPBC Direct Impact *For edge effect and isolation of 18.55 ha* EB REF CZ A.2	40.18 ha	In perpetuity essential cassowary habitat protection and extension of protection to Ella Bay Swamp Wetland. Legally handed over to State for National Park.	$ 450,000	<1 year
EPBC Indirect Impact Eubenangee Offset Property	63.62 ha	In perpetuity key regional cassowary corridor protection. Legally handed over to State for National Park.	$ 400,000	<1 year
Implementation of Management Strategy for Eubenangee Offset Property		Establishment of vegetated connectivity corridor between key habitats	estimated $ 500,000+	1-3 years
TOTAL	126.42 ha		$ 1,600,000	

Table 5.1 Land based direct offsets

Indirect Offsets			
Action Summary	*Contribution*	*Value (est.)*	*Timing*
Cassowary tracking	UQ/QPWS/Ella Bay project Using GPS telemetry to track rehabilitated juvenile Cassowaries	$30,000	In progress <1 year
Cassowary Diet and DNA analysis	University of Queensland/QPWS project Determining Cassowary Diet and Energetics through Remote Sensing,	$30,000	In progress <1 year
Cassowary Fencing & Escape Gate Research Project	Ella Bay Developments. Design, develop and trial Cassowary Fence & Escape Gate	$100,000	complete
Impact of Ella Bay Development on cassowaries, fauna and flora.	James Cook University Environmental impacts of Ella Bay Development access and internal roads, design of strategies to mitigate road impacts on adjacent habitats and internal corridors, and monitoring of road mitigation strategies	$130,000	Before and after construction +3 year
TOTAL		$290,000	

Table 5.2 Research based indirect offset package

5.2 Offset Package Matrix

The offset package has been designed for maximum immediate outcome as per the Offsets Matrix tool (DEWR 2007). Table 5.4 provides a review of the key characteristics of the Proponent's offset package proposal.

	IMMEDIATE OUTCOME (less than 12 months)	MEDIUM TERM OUTCOME (within 1 to two years)	LONG TERM OUTCOMES (greater than 2 years)
HIGH LEVEL OF CERTAINTY technique used regularly with effective results good quality scientific data is available on key conservation needs of the matter of NES	22.60 ha of essential cassowary habitat for ecological cassowary corridor on private land to be gifted to National Parks; 40.18 ha of essential cassowary habitat including the southern extent of the nationally significant Ella Bay Swamp Wetland on private land to be gifted to National Parks; 63.62 ha Eubenangee offset property to be gifted to National Parks; 67.80 ha of buffer from World Heritage/ National Park will be placed in Conservation Covenants; and 87.30 ha of fauna corridors will be placed in Conservation Covenants. Research - Cassowary Tracking. Juvenile Tagging and Tracking – research has been 50% completed		Research - impact of Ella Bay Development on cassowaries, fauna and flora
MEDIUM LEVEL OF CERTAINTY -approach has successfully been used previously in relation to this or highly similar matter of NES	Eubenangee offset property: Creation of essential cassowary habitat under a Revegetation Management Strategy (with precedence). Research – Cassowary fencing and escape gate project - complete	Targeted Survey: Specific monitoring of cassowary usage of Eubenangee offset habitat corridor	
LOW LEVEL OF CERTAINTY New or untested on-ground conservation activity limited scientific data on the matter of NES	Research – Cassowary diet and DNA analysis.		Education Programs Frog fencing erected at creek crossings on Ella Bay Road

Table 5.3 Offset Package Matrix based on Offsets Matrix tool (DEWR 2007)

6. Review of the EIS and SEIS

On 4 July 2005, the Ella Bay Development proposal was referred as 'controlled action' under Section 75 of the EPBC Act. An EIS was prepared and submitted to the Coordinator-General on April 3rd 2007 and subsequently advertised.

A Supplementary EIS was prepared in response to a change to include “a suitable access route from Flying Fish Point to Ella Bay” and publically advertised from 12th April 2008.

This Submission Response provides additional information to address final issues in submissions on the SEIS. Issues raised in the submissions are addressed in detail in Volume 2. The major issues raised were:

- Stormwater Treatment and Wetlands Management;
- Requirement for post SEIS fauna and flora surveys;
- Domestic pets;
- Potential impact on cassowary population;
- Ella Bay Road Alignment and upgrade; and
- Fauna impact and mitigation.

Contents Volume One

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1. Introduction

This report outlines the Matters of National Environmental Significance (MNES) issues for the Ella Bay Integrated Resort (EBIR) and proposed road upgrade and provides information on the level of impact; how impacts will be managed and mitigated; and the resultant environmental outcomes that can be expected from the construction and operation of the development.

On 4 July 2005, the project was determined a 'controlled action' likely to affect Matters of National Environmental Significance (MNES) section 75 of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), with the controlling provisions being:

- World Heritage (sections 12 and 15A)
- Listed threatened species and communities (sections 18 and 18A).

In addressing the impacts on MNES this report will also respond to the Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) submissions dated the 22nd May 2008 and 28th May 2008 on the Supplementary Environmental Impact Statement. For ease of reference, Volume 2 of this submission provides a summary of the proponent's responses to comments and questions.

This report summarises the substantive MNES implications of, and should be read in conjunction with, the Ella Bay Integrated Resort Environmental Impact Statement (EIS) and the Ella Bay Integrated Resort Supplementary Environmental Impact Statement (SEIS) and the ongoing research undertaken since both those documents were submitted to the Commonwealth and the Queensland Coordinator-General contained in the volumes of this submission.

1.1 Proponent – Satori Resorts Ella Bay Pty Ltd

Satori Resorts Ella Bay Pty Ltd is responsible for the Ella Bay Integrated Resort Proposal. Satori Resorts Ella Bay Pty Ltd is a member of the Ella Bay Developments Group of Companies and is headed by Company Director, Rod Lamb.

The proponent along with associated businesses has successfully undertaken other developments in Queensland including unit developments and mining infrastructure to the value of over $100m over the past 20 years.

Ella Bay Developments Pty Ltd and associated entities currently owns freehold title over Lot 320 NR157629 which covers an area of 470ha and an adjoining property Lot 337 NR53 "Little Cove" which has development approval for 70 residential lots and 30 villas.

Note that the area within the property boundary totals 469.9ha whereas the area of the registered title is 449.2ha. The property includes two unconstructed road easements which will contribute an additional 20ha on road closure. From herein the property will be described as being of 470ha.

1.2 Environmental Record

Past record – Rod Lamb and Ella Bay Pty Ltd have no negative environmental history – no rejections and no fines recorded from past development activities.

Other EPBC referrals and projects - NIL

A number of research activities have been funded as a result of this project. The most significant of these is the support of ongoing research into appropriate methods to track cassowaries, and to allow them to effectively and safely cross roads. It is proposed to continue supporting regional research throughout this project, as per the proposed research programmes in the Offsets policy and the research facilities identified on-site.

2. Project Description (The Action)

2.1 Ella Bay Development

The proponent proposes to construct, develop and operate an integrated tourism and residential community and associated infrastructure at Ella Bay, including a suitable access route from Flying Fish Point. The project is referred to as the "Ella Bay Development".

The project is located on the Cassowary Coast 80 kilometres south of Cairns and 10 kilometres north-east of Innisfail. The property is located adjacent to the Ella Bay National Park and Wet Tropics Queensland World Heritage Area on the northern, western and partially the southern boundary. The eastern coastal boundary is formed by a narrow Esplanade along the dunal swale which is the western edge of the Great Barrier Reef Marine Park (GBRMP) and Great Barrier Reef World Heritage Area (GBRWHA). (Refer to Figure 2.1 Project Location)

The Ella Bay site is a former cattle property which has been cleared for over a century and subsequently is heavily degraded with introduced weeds.

The 470ha area will consist of (refer to Table 2.1 for detail);

- 214.0 ha of Conservation Covenant;
- 62.8 ha of land to be transferred to National Park;
- 132.0 ha of developable footprint; and
- 61.1 ha of open space, golf course and parkland;

The ecological goal of the development is to:

- Live sustainably with the minimum carbon footprint, utilising solar, harvesting and recycling water, and minimising pollution, through the general philosophy of ecological living and principles of sustainable development; and
- Protect and enhance the fauna and flora of the site and surrounds through responsible use and protection of the natural environment, by conservation and sustainable practices.

Comprehensive research and surveys have been undertaken on the area, including endangered flora and fauna species to determine their extent on-site and ensure appropriate management regimes are identified and implemented to protect them, now and into the future.

The development is expected to accommodate approximately 1200 permanent residents and 2000 tourists when the development is at full capacity and during the peak period of the dry season.

Volume 3 of the EIS, Volume 2 of the SEIS and this report describe the proposed development. The proposed development comprises: (Refer to Figure 2.2 Ella Bay Masterplan)

- Three (3) Resort precincts comprising 860 units and villas along the coastal side of the site The resorts will consist of single and two storey villas in the northern precinct, single, two and three storey apartments in the central foreshore precinct and three to four storey and terraces around the village and golf clubhouse (refer to Volume 6.5a Local Area Plan);
- Four (4) Residential precincts of 540 residences sited on the western boundary within existing cleared areas of the property;
- A Recreation/Open Space area comprising recreational amenities, community services and an 18 hole golf course.
- A mixed-use community village precinct forming a centre for visitors, with retail spaces, professional services, offices and restaurants.
- A research and educational area incorporating the welcome centre, a collaborative research institute, a cassowary research station, an international school and a sports centre
- Residential communal facilities including swimming pool, barbecue facilities, playgrounds, tennis courts and club house for each residential precinct. The clubhouse will also be suitably designed with shutters for category 5 cyclones.

2.1.1 Sustainability

The focus of the Ella Bay Development is the implementation of best practice in sustainable development and minimum 'carbon footprint'. The sustainable systems and technology will meet the day-to-day resource and infrastructure requirements of the community. These will include: site generated solar power and LPG generator backup, on-site water capture and treatment including: reticulated recycled water supply for non-potable uses; on-site stormwater management; energy efficient tropical building design, and environmentally-friendly transport alternatives.

The Masterplan incorporates a range of environmental design, energy and water efficiency principles to promote a high degree of sustainability which will apply to all buildings including residential, resort, commercial and retail. (Refer to EIS Volume 2 and SEIS Volume 2 and SEIS Appendix A2.9)

The Proponent's Environmentally Sensitive Design approach in this area would be based upon achieving energy efficiency in key areas include:

- providing comprehensive management information systems to measure and monitor energy demand patterns for residences, commercial facilities and resorts at Ella Bay;
- efficient building design with efficient lighting;
- promoting the use of innovative sustainable alternatives such as wet back/chilled water air conditioning, to avoid the use of conventional air conditioning systems;
- mandating the use of high efficiency four or five star rated appliances;
- adopting high efficiency electric motors (either DC or 3 phase) where appropriate;
- supplying reticulated LP gas for solar hot water boosting, cooking and drying to all residential buildings;
- setting and using appropriate benchmarks together with financial measures and indicators to monitor energy consumption;
- using extensive solar PV installations and other renewable sources of energy wherever possible;
- installing a low carbon emitting, stand by power generation system;
- use of motion sensor activated night street lighting for efficiency and `dark sky' policy; and
- Use of Solar peak charged electric vehicles onsite for commuting, and maintenance.

All buildings; residences, apartment and resort villa accommodation will be required to achieve a minimum 5 star energy-efficiency rating and have grid connected photovoltaic cells (solar power panels) (3kWp Min). Any excess green power generated will be sold back into the internal Ella Bay Development grid or credited against backup power supply.

2.1.2 Masterplan Revisions

Following the SEIS consultation process, the development footprint and conservation covenant areas were revised. A detailed table of all changes to the Masterplan is included in Appendix 1 of this volume. The development footprint revisions include;

- The total clearing required for the development on the Ella Bay site has been reduced to 0.95 ha;
- All development has been setback a minimum of 100m from the National Park;
- The development footprint has been setback a minimum of 50m, or 20m, 15m, 10m from the riparian boundary of creeks and vegetation. These areas will be managed under conservation covenants;
- The fauna corridor have been enhanced by the addition of bridges (fauna underpasses) to enable cassowary movement to the coastal dunal swale;
- The revegetation schedule has been modified to ensure that revegetation has taken place in advance of development and that the net available food source for cassowaries is maintained as positive;
- The development schedule has been modified to provide a more consistent rate of construction to minimise the impact of construction;

- The stormwater treatment, constructed wetlands and bioretention filters have been detailed for the northern precincts;
- Groundwater bore abstraction location and operation have been defined; and
- The minimum development floor height has been modified to account for the impacts of climate change caused sea level rise and to withstand a 100 ARI year storm surge.

Further details of the building constraints including precinct areas, footprint, allowable site coverage and building levels and overall building height are detailed in the Volume 6.5a Local Area Plan and Table 2.2.

Description	Quantity
Dwellings	
Total number of dwellings	1400
Number of units	860
Number of residential Lots	540
Regional Ecosystem mapping *revised 2008 mapping	
Cleared area (Existing)	241 ha
Non remnant	33 ha
Not of concern	73 ha
Of concern	103 ha
Endangered	20 ha
Total vegetated area	229 ha
Ella Bay Property Clearing	
Clearing Non Remnant	0.10 ha
Clearing Not of Concern	0.60 ha
Clearing Of Concern	0.25 ha
Total Clearing	0.95 ha
Conservation Zones and Covenants	
Transferred to National Park	62.8 ha
Conservation covenant B	67.8 ha
Conservation covenant C	87.3 ha
Conservation Zone D	58.9 ha
Revegetation and Rehabilitation	
Revegetation	50.0 ha
Rehabilitation	64.3 ha

Table 2:1 Ella Bay Development Key quantities (From to Appendix 2 – List of Quantities)

Precinct	Precinct Area	Max. Building height	Max. number Storeys	Maximum Lot Coverage Residential
Northern Resort Precinct	13.7 ha	10 m	2 Storey	400m²
Village Precinct	25.4 ha	18 m/ 15m**	4 Storey	400m²
Central Resort Precinct	33.2 ha	15 m/ 10m*	3 / 2 Storey	400m²
Northern Residential Precinct	21.8 ha	8 m	2 Storey	400m²
Southern Residential Precinct	8.7 ha	8 m	2 Storey	400m²
South-Western Residential Precinct	16.7 ha	8 m	2 Storey	400m²
Western Residential Precinct	12.5 ha	8 m	2 Storey	400m²
Total Precinct	132.0 ha			
Open Space / Golf Course area	61.1 ha			

* Maximum height for Resort residential buildings in Central Resort Precinct 10m

** Building height restricted to 15m where the ground floor elevation is greater than 20m AHD

Table 2:2 Local Area Plan key constraints (refer to Volume 6.5a Local Area Plan)

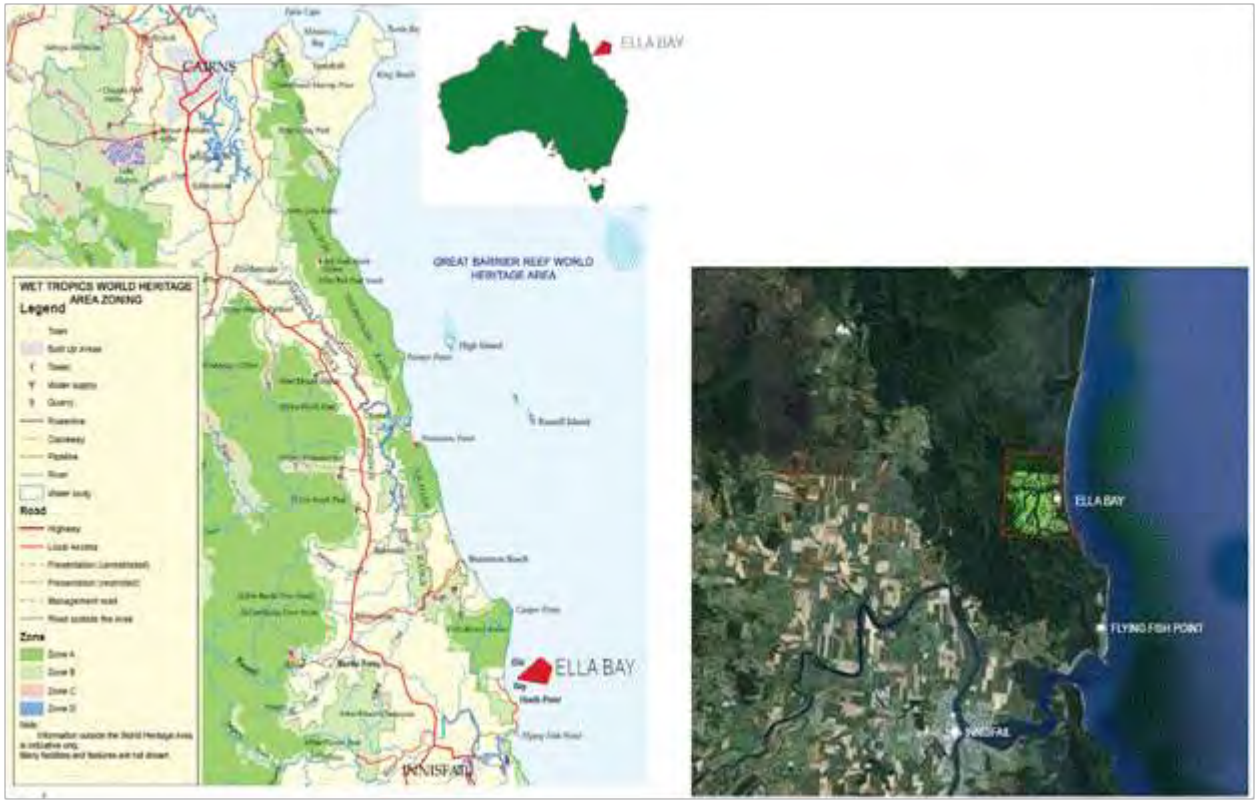

Figure 2:1 Project location (refer to Volume 7 Dwg 4)

Figure 2:2 Ella Bay Masterplan Conceptual Layout (refer to Volume 7 Dwg 15)

Figure 2:3 Ella Bay Precinct Staging Plan (refer to Volume 7 Dwg 16)

2.2 The Ella Bay Road Upgrade

Ella Bay is 88km south (by road) from Cairns and accessed by passing through Innisfail and Flying Fish Point. Access from Flying Fish Point to Ella Bay is via the existing unsealed Ella Bay Road. The unsealed road currently conveys up to 150 vehicles per day (Cronk 2009).

The Ella Bay Development proposal will include upgrade of the existing dirt road access to the site which will incorporate fauna impact mitigation measures based on environmentally sensitive road engineering and design. Ella Bay Road will be a 4790 metre long road constructed from Bay Road to the south west of Flying Fish Point to the Ella Bay Development in the north. Ella Bay Road will be required to safely convey residents, visitors and employees of the Ella Bay Development. The road is expected to convey a maximum design daily two way traffic of 4,138v/d with an annual average daily traffic (AADT) of 3,134v/d. The maximum design hourly two way traffic is 350v/h. (Volume 4 Appendix 3)

Ella Bay Road (Figure 2:6 and Figure 2:7) will consist of 2 stages. Note the final length is 4790 metres as Stage 1 includes 90m of Ella Bay Road which will not form part of the final alignment.

Stage 1 will comprise a 4000 metre upgrade of the existing Ella Bay Road from Ruby Street in Flying Fish Point to the entry of Ella Bay Development. The road will be required to carry up to 1,000 vehicles per day (year 5) prior to the commitment of stage 2. The road will be constructed to the full width as part of Stage 1 works.

Stage 2 will comprise a new 880m road that bypasses Flying Fish Point to the west, Stage 2 will include construction of a roundabout and approaches on Bay Road to direct Ella Bay traffic north behind Flying Fish Point through a new tunnel, and connection to the existing Ella Bay Road alignment to the north of Ruby Street.

The roadwidth chosen for the recommended speed of 60km/hr will be a sealed pavement width of 10.0m comprising 2 x 3.5m lanes with a 1.5m delineated shoulder each side. The 1.5m wide shoulder will be suitable for use as a bikeway and will be delineated to provide a bicycle lane in both directions.

Extensive traffic calming comprising delineated roadside shoulders, cassowary signage, transverse line markings, chicanes and/or raised speed platforms will be used to reduce the operational speed. The bike lane and traffic calming will be used to support the “change of focus” as people enter Ella Bay Road (Volume 7 - Dwg EBR1-DD01-22).

Localised “pull off” lanes of 2.5m total sealed shoulder will be provided for service vehicles and for discretionary stopping of cars. The road widening will be local to service areas e.g. fauna bridge, fauna culverts and escape gates.

Stage 1	**4000m**	**Upgrade of the existing Ella Bay Road from Flying Fish Point**
Council road reserve	1040m*	Upgrade to existing Ella Bay Road alignment - unsurveyed road on Council controlled land. Includes a road bridge as a cassowary underpass and a small fauna underpass.
World Heritage Area National Park	1560m*	Upgrade to existing Ella Bay Road alignment as it runs through Zone C Wet Tropics WHA includes two small fauna underpasses. Note that WTWHA and Ella Bay NP do not share the same boundary
Ella Bay National Park	1080m*	
Council road reserve	360m	Upgrade to existing Ella Bay Road alignment along Council Esplanade.
Freehold/Ella Bay	700m	New alignment along road easement through Freehold property (Little Cove road easement Existing DA). This is a relatively flat section of road which crosses two creeks, incorporating two bridges for fauna underpasses and one small fauna underpass.
Council Esplanade	340m	Upgrade dirt track within the esplanade abutting the Ella Bay property.

Stage 2	880m	New Road - Flying Fish Point Bypass
Council road reserve		Includes new roundabout intersection at Alice Street
	350m	New road on unformed road reserve extension to Alice Street.
Unallocated State Land	440m	New road on USL. Passes through Graham-Seymour Range via a 100m tunnel through the lowest point of the ridge. Includes realignment of first 40 metres of the Stage 1 construction.
Ella Bay National Park	0	Corner of road passes through NP (Option 2)
Council road reserve	90m	Joins Stage 1 road
World Heritage Area	0	
Freehold	0	

Table 2:3 Ella Bay Road Tenure (refer to Volume 4 Ella Bay Road Design and Environmental Management Report)

** Note The length of road for the council road reserve is based on using the WTWHA road length. The WTWHA border and the Ella Bay National Park border do not share the same border along Ella Bay Road. Ella Bay Road crosses through the boundary of WTWHA opposite the Seahaven Prawn Farm and then traverses 1560m through the WTWHA Zone C until the Esplanade past Heath Point. Ella Bay Road crosses through the boundary of Ella Bay National Park near Heath Point and then traverses 1080m through the WTWHA and Ella Bay National Park until the Esplanade past Heath Point.*

The existing road hugs the coastline and there is little fragmentation of habitat. Potential fragmentation of habitat could potentially occur on the outskirts of Flying Fish Point with a parcel of USL (Unallocated State Land) comprising 17.5 ha. The existing unsealed Ella Bay Road is to be incorporated into the upgrade.

Significant parts of the road are proposed to be fenced to prevent cassowary-traffic interaction. The fencing will direct cassowaries to safe crossings at fauna underpasses. One way escape gates will be included in the design to allow exit from the road corridor. A purpose built cassowary underpass is to be constructed at a known crossing point between the Seymour Range to the USL (Unallocated State Land) north of Flying Fish Point, and two bridges built to cross creeks fully incorporating cassowary friendly design.

The cassowary exclusion fence will be neutral coloured (dark grey/green) shadecloth to blend into the vegetation; 1800mm high and set 100mm off ground. (Refer to Volume 6.1*j*). The fence will be set approximately 3 to 10 metres in the vegetation along the access road and will traverse around large trees and significant vegetation ensuring any clearing is minor. A map of the proposed fence location, alignment is at (Dwg EBR1-PD08). The proponent has developed and trialled the escape gates which comprise opposing rows of ball-ended HDPE fingers designed to be non-injurious to the cassowary anatomy. (Volume 6.1*i*)

The cassowary exclusion fence will be part of a range of innovative fauna and environmental management measures including frog fencing, bridges and fauna underpasses, a tunnel/fauna overpass, a low speed environment, signs to increase driver awareness, planted retaining structures, replacement of existing culverts and run-off water quality management and monitoring.

Detailed flora surveys have been conducted to map all significant trees (>30cm diameter trunk) for Stage 1 and the route alignment optimised to preserve mature trees in particular those with canopy connectivity. The design of the road alignment was undertaken in the most flora sensitive manner feasible without affecting road user safety.

The clearing requirement for the road has increased to 2.80 ha (compared to 2.47ha in the SEIS) due to the wider road width, alignment modifications for safety, to improve the road-side drainage to meet current standards and to save mature trees adjacent to the road.

Further details on the access road are contained in the Volume 4 *Ella Bay Road Design and Environmental Management Report* and in Volume 7 Ella Bay Road drawings.

2.2.1 Changes from previous reports

The road alignment and design have been improved from the EIS and SEIS with regards to both vehicle safety and to environmental needs. The route selection has been confirmed along the existing Ella Bay Road route through further detailed analysis of the route options.

The changes from the EIS and SEIS for the road design are:

- The road will be constructed to the final design width and environmental mitigation in stage 1 (refer to drawing EBR1CE-PD09,10 and EBR1CE-DD(01-22);
- Stage 2 will be implemented once the road traffic exceeds 1,000 v/d;
- The road way will have the same nominal width of 2 x 3.5m lanes as the SEIS (Refer to Volume 4 Chapter 5);
- The road shoulder has been increased from 1m in the SEIS to 2 x 1.5m and there will be no constrained sections;
- The overall road width will be 10m but will have localised lane and shoulder widening at horizontal corners of less than 119m radius (Refer to Volume 4 Chapter 5);
- The tunnel for Stage 2 has been realigned so that the tunnel faces north and minimises the visibility from the Great Barrier Reef Marine Park and minimises noise to Flying Fish Point (refer to drawing EBR1CE-PD04 and EBR2CE-DD(01-08);
- A preliminary road safety audit has been conducted and the road modified accordingly to ensure vehicle safety (Refer to Volume 4 Appendix 4);
- A noise assessment has concluded that the road noise of Ella Bay Road at 33m to 41m will be equivalent to the road noise of the current Kuranda Range Road conditions at 100m (Refer to Volume 4 Appendix 6);
- The Multi Criteria Analysis presented in the SEIS has been revised and the alignment of Option D has been retained and further refined (Refer to Volume 4 Appendix 2) ;
- The road demographics have been revised resulting in some minor changes to that presented in the EIS & SEIS (Refer to Volume 4 Appendix 3); and
- A Visual Landscape Assessment has been completed. (Refer to Volume 4 Appendix 1)

The changes from the EIS and SEIS for environmental mitigation are:

- The cassowary fence design has been modified to 1.8m high and the fence and a cassowary one way escape gate have been successfully trialled (refer to Volume 6.1*i* and Volume 6.1*j* and drawings EBR1CE-DD(40-42));
- The cassowary underpass has been modified to match bridges where cassowaries have been observed to utilise (refer Volume 6.1h and drawings EBR1CE-DD(60-62));
- A frog fence will be installed for 25 m each side of ephemeral and permanent streams (refer to Volume 4 Chapter 8);
- Four fauna culverts (for small fauna) have been designed and included (refer to Volume 4 Chapter 8 and Drawings EBR1CE-DD(30-33)) ;
- The clearing envelope has been detailed and has avoided clearing mature trees and those trees that provide canopy connectivity where possible (refer to Volume 4 Chapter 9); and
- The revegetation plan has been detailed including for drains, vegetated gabions, batters, bioretention swales and fauna underpasses.

2.3 Construction

The Ella Bay Development will be completed over a fifteen year period, based on a staged construction plan. The development has been divided into a number of precincts, which will enable staging. The development will start from the northern precincts and through along the

coastal resort and village precincts. A portion of the infrastructure has been decentralised to facilitate the staging process and the completion of staging will overlap. (Refer to Figure 2:4)

The majority of the environmental mitigation will precede the construction of the development;

- Revegetation staging of the site;
- Cassowary research centre;
- Construction of the Constructed wetlands; and
- Construction of the Stage 1 of Ella Bay Road including fencing, underpasses and traffic calming.

The construction will be sensitive to the wet season and all major earthworks will be restricted during this period and erosion and sediment control implemented to minimise any potential stormwater impacts.

The focus of the construction phase will be to:

- Protect the cassowary and other fauna;
- Ensure revegetation is phased to provide a positive net habitat;
- Ensure that creeks and wetlands are protected through sediment controls;
- Minimise the export/import and transfer of weeds; and
- reduce energy consumption, waste and maximise opportunities for recycle;

The revegetation staging has been designed such that there will be a positive contribution to cassowary habitat prior to clearing. The initial revegetation before any major construction works will be to establish the east/west and northern section of the cassowary corridors. The constructed wetlands will require a two year establishment period for vegetation growth and the wetland earthworks will be initiated at the start of each precinct. This will ensure additional permanent water supply for cassowaries and storm water management at the start of operations. Each precinct will have temporary fencing around the perimeter to prevent cassowary and construction vehicle interaction.

The construction of the northern precincts will precede the construction of the resort and retail areas in the Central and Village precincts. The proposed precinct staging is identified in Figure 2:5.

Some infrastructure associated with the Village precinct and Open space area will be required during the Stage 1 construction of the Northern Precincts (Refer to Figure 2:4):

- Welcome Centre for construction worker and resident induction and tourist education;
- Rainforest Nursery to assist in the stock supply for the revegetation and landscaping process;
- Entry/Exit vehicle control and machinery wash-down facility to prevent spread of weeds;
- Groundwater supply pumping and storage;
- Community recycle and waste plant; and
- Sewerage treatment plant and recycled water storage.

Stage 2 will include construction/landscaping of the open space golf course and Country Club and the start of the education and recreation facilities.

The staging of the project will obviously be dependent on market demand and it is the proponent's intention to limit the construction supply to match the demand for the various products. The proposed staging of the project will allow sustainable construction techniques to be continuously improved during the period of development.

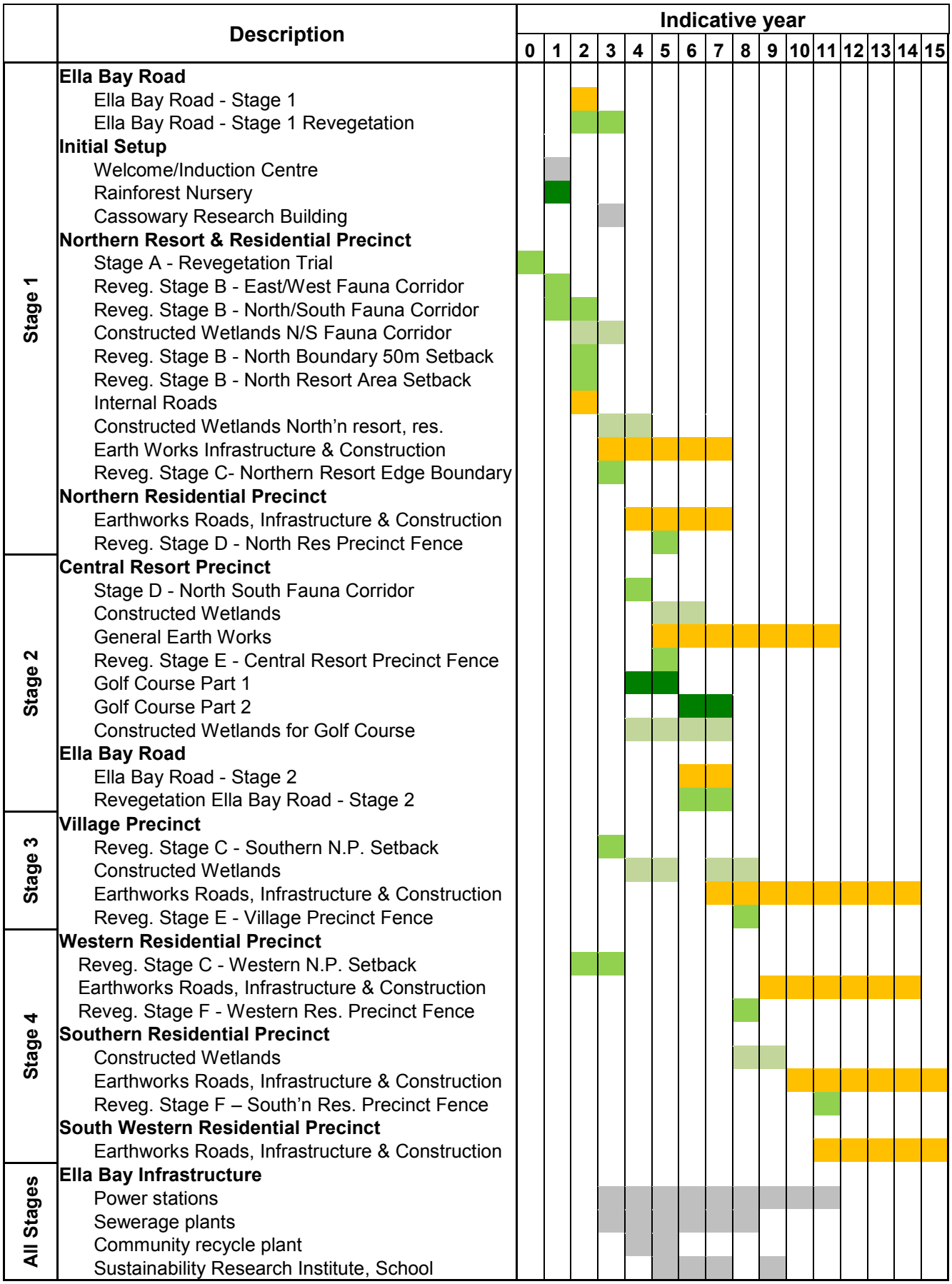

Figure 2:4 Proposed Precinct Staging

Figure 2:5 Precinct staging with construction starting in the Northern precincts

Figure 2:6 Ella Bay Road Stage 1 Refer to Dwg EBR1CE-PD03

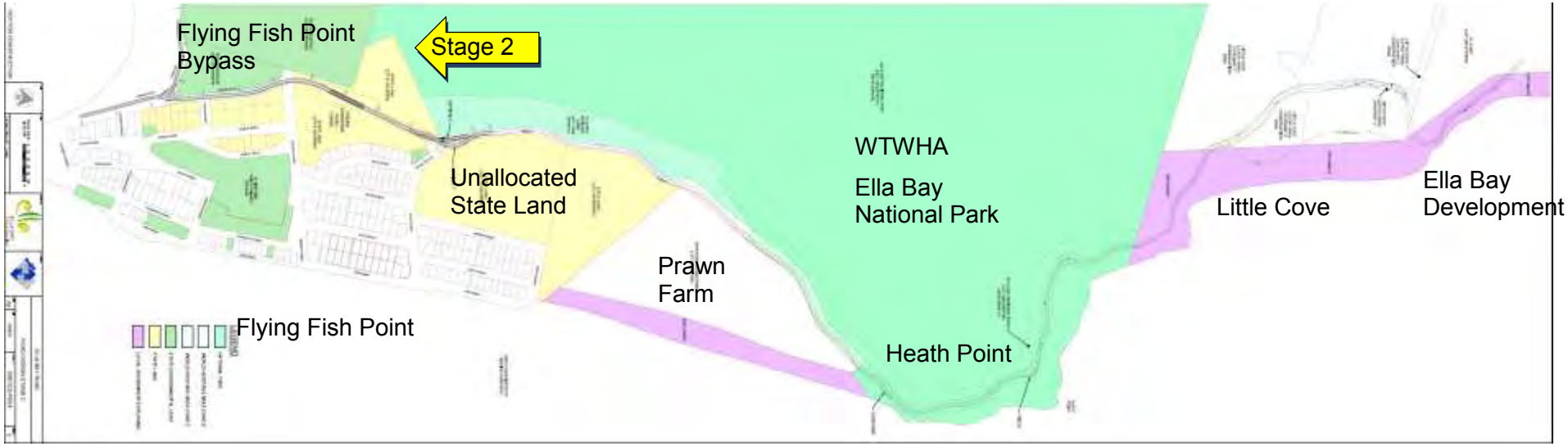

Figure 2:7 Ella Bay Road Stage 2 Refer to Dwg EBR1CE-PD04

2.4 Project Rationale

The Ella Bay Development will provide a significant benefit to the local community, bringing increased employment, training opportunities, population growth, increased economic activity arising from spending by new workers and residents, as well as multiplier effects from individual and business spending flows through the local economy.

The Ella Bay Development will act as a catalyst project to a range of other investment, marketing and product development opportunities and provide increased tourism within the Cassowary Coast.

The global economy has changed significantly in the period since the SEIS and the preparation of this submission response. The Global Financial Crisis has resulted in a significant contraction in development construction, tourism and led to stagnation of economic growth of FNQ creating an uncertainty in the local economies and increasing unemployment. Innisfail is at the centre of this uncertainty being neither a tourist destination nor an employment centre.

The project rationale has been addressed extensively in the EIS, this summary includes updated material and demographic edits (refer to Volume Four Appendix 3: *Revision to Road Usage Demographics for Ella Bay Road*)

2.4.1 Tourism Justification

Ella Bay is located in one of the two locations in the world where two World Heritage areas meet. Surrounded by the World Heritage Wet Tropical Rainforest and nestled against the Great Barrier Reef World Heritage Area. The development will be an Ecotourism Resort community comprising three resort precincts, which will be focussed on sustainability and ecology of the rainforest flora and fauna of the Seymour Range, lowlands and coastal wetlands.

> *Ecotourism – "ecologically sustainable tourism with a primary focus on experiencing natural areas, that fosters environmental and cultural understanding, appreciation and conservation"* *Ecotourism Association of Australia*

Despite being only 90km south of Cairns and closer to Cairns Airport than the Daintree, Mission Beach and Port Douglas; Innisfail does not feature as a destination for the Tropical North within advertising, brochures or website of Queensland Tourism. Further focus on Rainforests and National Parks does not include either Ella Bay National Park or Eubenangee National Park. (TQ, 2012)

Tourism around Innisfail is practically non-existent; with the recent closure of the Johnstone River Crocodile Farm; the closest attractions are the:

- MAMU Canopy walk (33km);
- Paronella Park (18km);
- Babinda Boulders (30km);
- Misty Mountains Wilderness Walk (18km); and
- Eubenangee wetlands (30kms).

Further closures have occurred within the Cassowary Coast of the five star resorts of Bedarra Island, and Dunk Island located off Mission Beach and Elandra at Mission Beach since Cyclone Yasi.

Ella Bay Development will fill this void and become a catalyst project that will reinvigorate many businesses within the Cassowary Coast and provide initiatives for further tourism. The once thriving Innisfail commercial fishing port will readily gear up for reef experience tours and fishing adventures.

The ecotourism focus, golfcourse, open space, sports facilities and the variety of Ella Bay accommodation will cater to the major tourism markets. In particular the cassowaries and large population of agile wallabies will become iconic features of the Ella Bay ecotourism adventure.

Ella Bay Development is at the forefront of cassowary research and rainforest conservation, and this will become a major draw card for the ecotourism. The fauna and flora research and monitoring will be a focus for cultural rainforest walks and will enable expedition style and Voluntourism experiences with leading ecologists.

The Ella Bay Development proposes a range of quality sporting and community facilities such as golf course, ovals, greens, tennis courts, pools, etc which will be used to promote sports tourism to the area.

The domestic market is dominated by the Connectors and Social Funseekers (TQ, 2011) with a combined market share of 57% and the largest growth segment in the holiday market; The Active Explorers (11%). This market has been identified as the long-term growth market and is the major target market of Ella Bay Development.

The international market predominately comprises visitors from Japan, UK, China and the USA, with growth of the Chinese segment. The 18 hole championship Golf Course, with wallabies and the occasional cassowary will be a major attraction to international visitors where golf, ecotourism and visiting the reef fill limited available destination time.

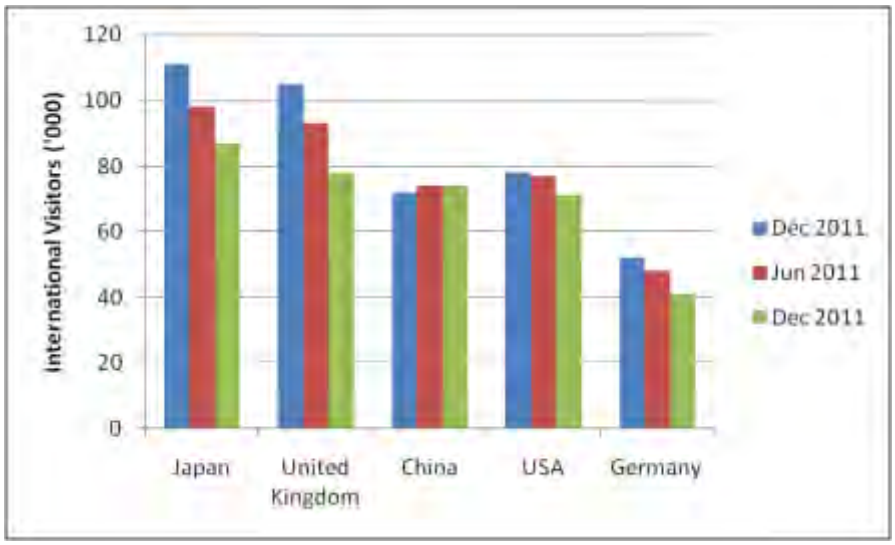

Figure 2:8 Breakdown of International Visitors to FNQ (Source Tourism Queensland Snapshots)

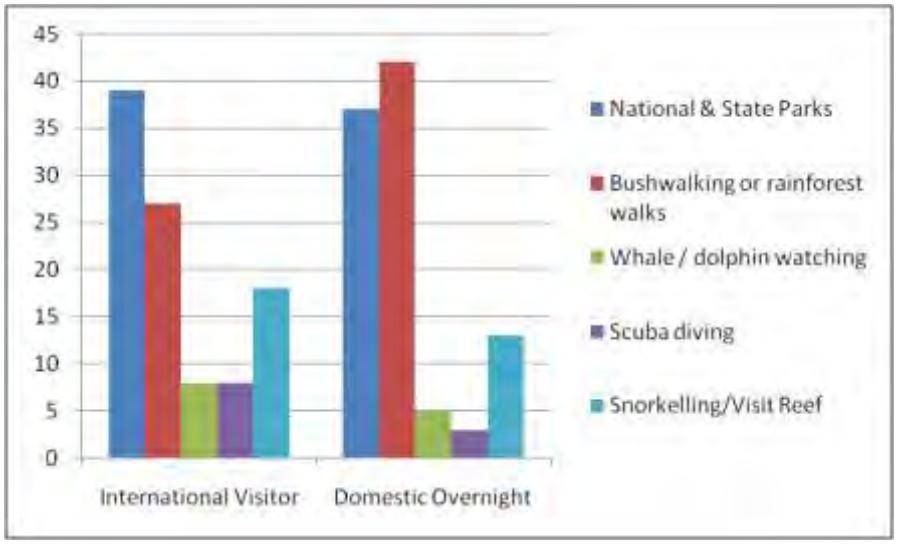

Figure 2:9 Visitor Activity Participation Profile (*Source: Tourism Research Australia, International Visitor Survey and National Visitor Survey, 2009)*

Ella Bay Development will strategically target tourism sustainability through development of a strong iconic location identity, catering directly to the market, providing diversity of experiences,

fostering tourism ventures and attractions within close proximity and catering to the a base-load of local residents.

2.4.2 Economic Justification

The Ella Bay Development will provide a significant financial stimulus to the Cassowary Coast region, through employment, investment and flow-on expenditure. The local Johnstone region has witnessed a gradual population decrease over the past 15 years with a migration of predominately young people out of the area seeking employment. (ABS, 1996, 2006)

The Cassowary Coast region has a dominance of the lowest socio-economic group (40%) which is twice the state average and 25% higher than the average in Far North Queensland. The area is over represented by labouring with nearly twice the number of labourers (20%) to the state average (11.9%) (CCRC 2011).

Unemployment in the local Johnstone region (Cassowary Coast (R) – Johnston Area) has increased over the past few years to 9.4% (compared to the Queensland rate of 5.5%) (1,016), with Indigenous unemployment comprising greater than 16%.

Category 5 Cyclones Larry and Yasi have left an indelible mark on the community and economy which was initially devastated and then through reconstruction saw an influx of short term employment and insurance money to the current low of investment and employment opportunities.

The project value of the Ella Bay Development has been estimated at $1.4bn over fifteen years based on a staged construction. A more uniform construction schedule has reduced the peak workforce demands required in the previously proposed early completion of the Village Precinct.

The economic benefits include:

- An estimated total development value of $1.4 billion over fifteen years;
- An estimated total direct and indirect value of $2.1 billion over fifteen years;
- 5,325 person years of direct construction employment during the fifteen year construction period, peaking at 404 jobs in year 8;
- Wages and salaries of $158 million for the on-site construction workforce component;
- Once fully operational, 802 jobs for the operation of the new resorts, golf course, retail and associated facilities, with salaries and wages of $35 million per annum;
- An additional 2,550 people permanently living in the CCRC region; at completion of construction, an increase of 12% on the current Cassowary Coast population (Johnstone area only), or 0.6% growth per annum, equal to the current predicted growth of the area;
    - 1102 permanent residents living at Ella Bay;
    - 1325 permanent residents who are staff and their families new to CCRC living in CCRC; and
    - 122 permanent residents who are part of the permanent construction staff and their families new to CCRC living in CCRC.
- An average of 1,754 visitors staying at the resorts at any one time, adding 640,210 guest nights in the CCRC region;
- An increase in expenditure by visitors staying in the region of $256 million per annum;
- A major boost to the critical mass of the region in terms of tourism infrastructure and commercial accommodation, filling a spot at the quality end of the market;
- A new source of visitors for tourist attractions in the region, which currently rely on visitors travelling from other centres such as Cairns;
- Community benefits that include greater training and job opportunities for local people, particularly for younger people;
- An increase in the CCRC rates base estimated at $10 million per annum on construction completion;
- $50 million paid in State Government taxes and duties and $285 million in Federal payroll and company taxes over fifteen years;

- During construction, multiplier effects will include nominal of 184 support jobs offsite, plus 209 jobs arising from consumption induced expenditure Totalling 393 new jobs (OESR, 1997); and
- Once fully operational, multiplier effects will include 224 support jobs offsite, plus a further 254 jobs from consumption induced expenditure, totalling 478 new jobs.

The development will provide employment for some 802 full time jobs, 240 part time peak season jobs, 224 off site jobs and 254 flow on jobs totalling 1520 jobs which are not identified in the area for the next 20 years. The size of the residential component is significantly less than the identified workforce. It is envisaged that the residential development will only provide a minor component of the workforce.

The development will provide direct and indirect benefits to the wider Cassowary Coast community and economy through:

- Increased activity in the region from the development and construction of the project;
- Activity and purchases of the resorts and commercial operators located at Ella Bay once they become operational;
- The employment in these businesses and the wages and salaries paid to employees;
- The benefits to industry, especially tourism, as the project raises the awareness, quality and quantity of tourism product;
- The benefits to the local community arising from increased job and training opportunities, improved infrastructure and new facilities; and
- Wages paid to employees, who spend locally on their personal needs.

The CCRC rate base will be differentially increased with the unimproved value of the land after development significantly exceeding the region average per lot/unit. Additional rates will be added from the golf course, laundry, retail areas, sporting fields etc. The total rate base of the CCRC will increase by approximately 33% for a 12% increase in the population from Ella Bay including visitors.

Indigenous unemployment within CCRC accounts for 3 times the unemployment rate of the non-indigenous population. The goal of Ella Bay Developments and part of an ongoing negotiation with the Bagirbarra and MAMU is for a Traditional Owner Levy and establishment of the Ella Bay Bagirbarra Development Trust. The goals are to:

- Promote Bagirbarra cultural heritage through tourism initiatives;
- Develop an Ella Bay Pty Ltd Bagirbarra Development Plan;
- Consult with Bagirbarra to understand their goals around training, employment and economic development;
- Support the Bagirbarra in their efforts to obtain economic independence through tourism and other initiatives;
- Liaise on behalf of Bagirbarra, if required, around the customization of training and the engagement of apprentices during construction phases;
- Assist the sustainability of Bagirbarra cultural heritage; *and*
- Provide opportunities for training, work experience, employment and economic development during pre-construction, construction and post-construction at Ella Bay.

Traditional Owner employment will be through;

- Traditional Cultural Learning & Experience Centre featured in the Welcome Centre which will promote Traditional Owner culture, language and dance;
- Traditional Owner Cultural Guides will promote cultural interpretation walks, cultural information guidance, traditional dancers, communicate traditional language and internal cultural advice;
- Potential Traditional Owner tourism opportunities for example, a Healing centre;
- Potential Traditional Owner employment opportunities relating to management of the land and wildlife, including revegetation etc.

2.5 Addendum

Cassowary Coast Regional Council Social Housing and Accommodation Impact

Background Information

Post the submission of the EIS and SEIS documentation, the local area has realised the amalgamation of the former Cardwell Shire Council and former Johnstone Shire Council creating the currently titled Cassowary Coast Regional Council (CCRC) which extensively covers 4,701 square kilometres from Garradunga in the north to Cardwell in the south (approximately 150 km of Bruce Hwy north - south).

In February 2011 the area experience its second major cyclonic event within five years. Cyclone Yasi caused extensive damage to the area and its negative flow on social and economic affects still being highly evident today.

ABS data illustrates that the CCRC region is not consistent with the average Queensland demographics with the area experiencing a contraction in population of 4% over the past 10 years. Additionally the labouring workforce is over represented with nearly twice the number of labourers (20%) to the state average (11.9%) (CCRC 2011) and unemployment in the local Johnstone region (Cassowary Coast (R) – Johnston Area) has increased over the past few years to 9.4% (compared to the Queensland rate of 5.5%) (1,016), with Indigenous unemployment greater than 16%.

The median total household income of $923 represents a 25% reduction to QLD average of $1,227 (ABS, 2011) which is a reflection of the high unemployment rate, the over-representation of labouring jobs and the lack of jobs being the primary driver for the contraction in population.

The projected growth for the Innisfail area from CCRC Priority Infrastructure Planning (pre 2011 census results) which has been used in CCRC planning for the area is 1.3%.

Population & Economy

	2001 Census	2006 Census	2011 Census	% change 2001-2011
Total persons(a)	31,397	30,287	30,133	-4%
Median age of persons	38	41	44	16%
Median total personal income ($/weekly)	336	424	497	48%
Median total household income ($/weekly)	629	825	923	47%
Median mortgage repayment ($/monthly)	737	897	1,300	76%
Median rent ($/weekly)	110	139	200	82%

Table 1: CCRC Population & Economy Census Data *Source: Compiled from ABS Census 2011*

Housing and Property Development Market

In last year the region recorded 330 established dwelling sales. Over the last 5 years sales numbers have decreased by 59%, however the 2008 numbers appear to be inconsistent with the median number of sales. The median sales price peaked in 2008 at $290,000 and has now decreased 20%.

For the December quarter 2011 detached houses median price of $232,667 for the region is 42% less than the QLD average $405,000 (DHPW, 2011), which is a reflection of the 25% less weekly household income of $923 compared to the QLD average of $1,227 (ABS, 2011) and high unemployment rate of 9.4%.

Since 2006 a constant level of proposed lots for development has been coming through the approvals system; however the number of lot certifications dramatically reduced to less than 50 lots total for the last 2 years.

	2008	2009	2010	2011	2012	% change 2008-2012
Dwelling Sales	808	384	449	280	330	-59%
House Sales Price Median ($)	290,000	275,833	270,00	288,500	232,000	-20%
Vacant Lot Sales	288	110	154	79	91	-68%
Vacant Lot Sales Price Median ($)	135,000	135,000	130,000	140,000	100,000	-26%
New Lot Certification	206	175	209	45	4	-98%
Available/closing stock for development	1,021	904	857	873	883	-14%

Table 2: CCRC Property Market Highlight Data *Source: Compiled OESR, 2012*

Over the last 4 years the region's available stock for development which is planned for in the short term has remained steady at around 900 lots and as of the end of March quarter 2012, 883 lots have development permit approval with 477 (54%) of those lots currently having operational works approvals with CCRC (OESR, 2012).

Quarter	RaL Approval	Operational Works Approval	% with Operational Works
Jun qtr 2009	841	342	41%
Sep qtr 2009	889	399	45%
Dec qtr 2009	816	423	52%
Mar qtr 2010	857	401	47%
Jun qtr 2010	898	401	45%
Sep qtr 2010	899	401	45%
Dec qtr 2010	866	368	42%
Mar qtr 2011	873	431	49%
Jun qtr 2011	876	431	49%
Sep qtr 2011	891	469	53%
Dec qtr 2011	883	469	53%
Mar qtr 2012	883	477	54%

Table 3: CCRC Stock of approved lots by type *Source: OESR, 2012*

Rental Housing Market

The QLD rental housing vacancy rate for June 2012 quarter was 3.1%, however no specific data has been identified for the rental vacancy rates for Innisfail or the Cassowary Coast. The "Rest of QLD" vacancy rate is at 3.3% (HPW, 2012), which is above the healthy vacancy rate of 3% stated by the Department of Housing and Public Works QLD.

Based on new RTA data the rental market for the CCR had an 20% increase in new bonds over the last three years, with the Innisfail area actually showing a decrease of 9%, while the median weekly price for Innisfail had a 8% increase over the same period. *Full list of median prices and new rentals from 2010 -2012 for CCRC region refer to appendix 1: Median weekly rents for the Jun 2010, Jun 2011, Jun 2012 quarter for all postcodes in the Cassowary Coast Regional Council area.*

	2001	2006	2009	2010	2011	2012	% change period
CCRC Rent Median (Census) ($/weekly)	$110	$139			$200		81%
QLD Rent Median (Census) ($/weekly)	$145	$200			$300		106%
Innisfail (only) Rent Median 3 Detached House (RTA) ($/weekly)				$260	$260	$280	8%
QLD Rent Median 3 Detached House (RTA) ($/weekly)				$330	$345		5%
Innisfail (only) new bonds (RTA)				128	119	117	-9%
CCRC new bonds (RTA)				508	596	612	20%

Table 4: CCRC & Innisfail Rental Market Highlight Data *Source: Compiled from DHPW 2011, ABS Census 2011, RTA 2012*

Internet classifieds search using www.realestate.com.au on 4th September 2012 the Innisfail area and its immediate surrounding area (<30 minutes) listed 37 available rentals within the $150 - $350 which is within the price bracket of the median weekly three bedroom rent for Innisfail of $280 p/w, and total of 40 available rental dwellings with a price cap of $600 p/w. The table below also includes cumulative rental availability for areas within 45 and 60 minutes.

Rental availability	**$150 - $350** ($/weekly)	**<$600** ($/weekly)
Total 30 min	37	40
Total 45min	52	58
Total 60 min	91	105

Table 5: Innisfail and surroundings rental availability *Source: Generated using* www.realestate.com.au *– on 4/09/2012*

** Refer to figure 2 for area locations*

Commercial Accommodation Market

Commercial and short term accommodation availability investigation resulted in a range of available establishments and styles within Innisfail and surrounding areas. Within the Innisfail area (<30 minutes) 28 active commercial establishments were found with a total of available beds of 981 (Table 6). There were a number of other temporary accommodation sites which were closed.

An estimated additional 42 establishments are located within the 45 and 60 minutes excluding resort style and holiday rental accommodation which are mainly available in Mission Beach and other beach front areas.

Enquiries with local commercial accommodation business owners indicated that additional beds could be made available if required and that the hotel/accommodation business has generally decreased over the last few years especially post cyclone Yasi.

Hostel and backpackers' business owners informed that very rarely occupancy rates have been above 85% over the last few years.

Seasonal workers still make up a large percentage of the backpacker and cheaper accommodation cliental. Local business and backpacker owners estimate that the banana industry employs up 70% of its labouring workforce from seasonal workers during the warmer

months (October to December), however the sugar industry seasonal worker intake has reduced to less that 15% due to more efficient machinery and methods.

Area (travel time)	Motel Villages	Caravan Park Tourist Park	Hotel Bar Style	Hostel Lodge Backpackers	B&B Style	Total for Area
Number of establishments (30 min):	3	7	9	7	2	**28**
Number of beds (30 min):	110	250	109	500	12	**981**
Number of establishments (45 min):		5	3	2	2	**12**
Number of establishments (60 Min):	7	6	5	4	8	**30**

Table 6: Innisfail and surroundings commercial accommodation availability

Source: Data compiled from Internet search using Google on 22nd August 2012, phone calls to establishments on 4th September 2012 and real estate agencies

** Resort style accommodation and holiday rentals were not considered*

*** Refer to figure 2 for area locations*

Ella Bay Development Housing Requirements

The proponent has prepared a revised Ella Bay Demographics report *(refer to SEIS Submission Response Volume Four – Appendix 3 Revision to Road Usage Demographics for Ella Bay Road).* The construction planning has been revised to a 15 year period, and the number of construction workforce will average 355 jobs yearly from year 2 and peak at 404 jobs in year 8.

Operational jobs will steadily increase from year 6 to 802 jobs by year 15 with an 240 part time seasonal jobs.

Description	Revised Ella Bay Demographics	EIS & EIS
Population		
Maximum	3,304	3,044
Nominal	2,856	2,539
Residents		
Maximum	1,274	1,404
Nominal	1,102	1,404
Visitors		
Maximum	2,030	1,640
Nominal	1,754	1,135
Staff		
Maximum	1042	1240 (760)**
Nominal	802	930
Construction workforce		
Maximum	404	990
Nominal	355	

Table 7: Revised Ella Bay Demographics *Source: Ella Bay MNES Volume 4 – Appendix 3 page 243*

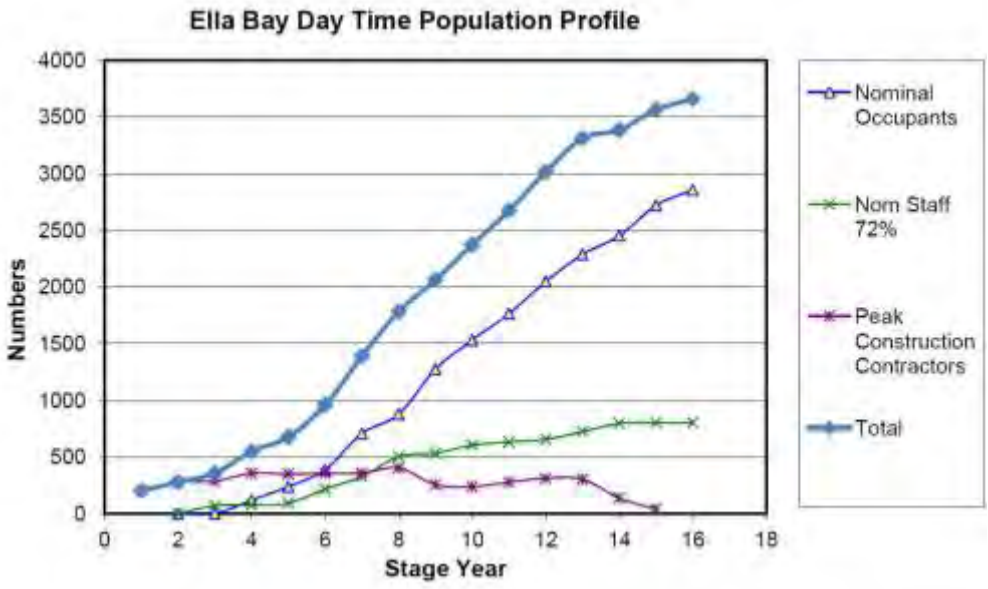

Figure 1: Ella Bay Day Time Population Profile *Source: Ella Bay MNES Volume 4 – Appendix 3 page 255*

In the EIS it was estimated that 20% of the construction jobs could be filled from within the current local area population. It is now believed that the local area workforce will be a considerably larger proportion of the overall workforce given the unemployment rate, and the lack of local jobs. Many Innisfail people travel to Cairns for better employment opportunities.

The proportion of local area workforce will increase during the transition from construction to operations and the mixture of accommodation requirements will change over time.

The current available workforce and future settlement location for the migrating workforce will be greater than the Innisfail and Flying Fish Point township area. The Cassowary Coast Regional Council area covers the area from Garradunga in the north to Cardwell, 150 km south down the Bruce Hwy, a 2 hour drive.

The average QLD one-way commute time for the construction industry is 32.5 minutes (payscale, 2012) and it is not uncommon for commute trip times to be close to 60 minutes.

Local residents and business owners informed that during the region's reconstruction post cyclone Larry 2006 and cyclone Yasi 2010 workers from the region's extremity commuted daily to work sites within the Innisfail area. Builders and construction workers came from Cairns and Gordonvale from the north and west from Atherton, Malanda, Milla Milla, Ravenshoe and other tablelands locations. Ingham and Townsville area workers and builders stayed for the week and returned home for weekends.

By taking commuting into consideration figure 2 indicates three different ranges and its estimated commute travel time to and from Ella Bay. Figure 3 highlights the extent of the Cassowary Coast Regional Council area. Within one hour travel time the availability and range of workforce, accommodation and housing is vast.

A strategic employment and training program partnership with the local Tropical North QLD TAFE campuses (Innisfail and Atherton) will assist in providing locals with training opportunities to fulfil a large percentage of the required operational jobs. The Innisfail campus which was built after cyclone Larry and opened in 2010 is a modern, well-equipped facility with a wide range of quality training programs include Aboriginal and Torres Strait Islander studies, adult education, business, information technology, health and community care, nursing, outdoor industries, tourism, hospitality and engineering (TAFE, 2012).

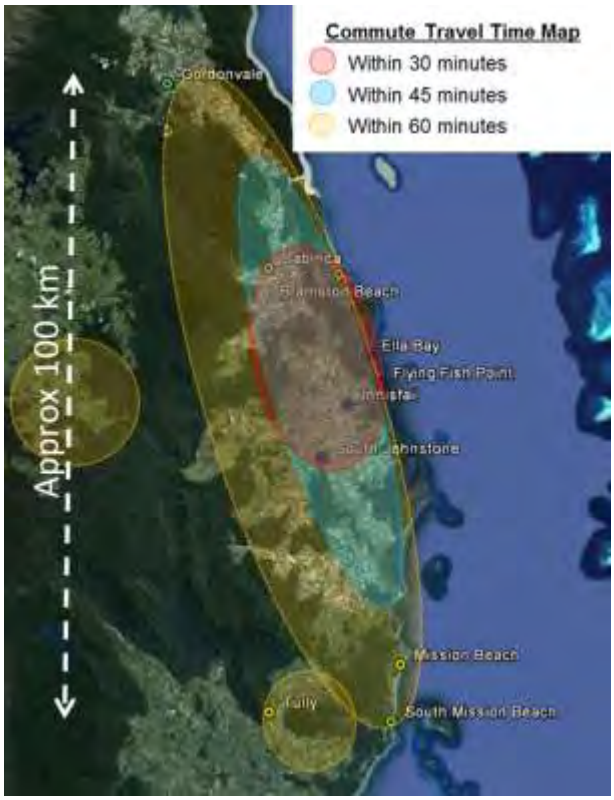

Figure 2: Commute Travel Time Map

Figure 3: CCRC map

Construction Workforce

The proponent has estimated a conservative percentage of local workforce participation and it is thought that this will be much higher in practice as a many contracts will go to Cairns based companies who employ Innisfail locals, and Cairns based employees who would travel. Local workforce intake has been started at 20% due to nature of initial construction contracts (road and stage 1 resort). The CCRC area has a large percentage of labouring workforce (CCRC 2011); this will promote a gradual increase in locals being able to fill the required jobs.

	Ella Bay Workforce Mix	Local Employment %	Comment
Construction	**Large Road Contract**	30%	Road and resort construction contracts. Small local intake of workers, mostly labourers.
	Civil Construction	50%	Local earthmoving contractors, equipment and their staff. Includes areas within 60 minutes commute and in cases Cairns region.
	House Construction	70%	Local house builders and small construction companies. Includes areas within 60 minutes commute and in cases Cairns region.

Table 8: Estimated Ella Bay Workforce Mix

Some construction workers may choose to settle into the area with their families, this will create a demand for house sales which will steadily increase as the project gears up. The workers and their families will then become locals and contribute to the population and economic growth to the area. An estimated 10% of the migrating workforce will choose to bring their families and rental accommodation will be required.

The peak commercial accommodation requirement will be approximately 200 beds from years 2 to 8.

	Construction						
Year	Peak Construction Jobs Required	Migrating Workers	Commercial Accommodation Required	House Purchase	Rental House Apartment Required	Locals Existing Residents	% of local Workforce
1	200	160	144		16	40	20%
2	280	210	185	5	21	70	25%
3	280	205	176	10	20	75	27%
4	350	240	203	15	23	110	31%
5	350	225	185	20	21	125	36%
6	350	205	162	25	18	145	41%
7	350	185	140	30	16	165	47%
8	400	205	162	25	18	195	49%
9	250	125	95	20	11	125	50%
10	250	125	99	15	11	125	50%
11	280	139	116	10	13	141	50%
12	300	150	131	5	15	150	50%
13	300	150	135		15	150	50%
14	150	75	68		8	75	50%
15	50	25	23		3	25	50%
				180			

Table 9: Estimated Ella Bay Construction Jobs Housing Requirements

Operational Workforce

The percentage of local workforce will increase with the operational phase. The hospitality sector will be catered by means of strategic employment and training programs in partnership with local community and education providers.

Due to the more permanent nature of the jobs, many workers migrating from other areas will bring families and seek rental houses (estimated at 40%) and purchase houses to accommodate their family needs. Some of the construction workers will switch over to operational jobs when construction is finished, which will increase the local workforce.

Operational Resorts	**Managers, Chefs, etc**	10%	High number of these specialised positions will require relocation to area along with their families. These families will establish into the area and become locals.
	Accountants, Admin, Supervisors	50%	Training and employment program with the local TAFE will assist in providing correct training for locals to fulfil these duties.
	Maids, Cleaners, Groundsmen	70%	Training and employment program with the local TAFE will assist in providing correct training for locals to fulfil these duties.
	Hospitality	40%	High turnover and seasonal employment. These jobs will also be affected by the dry/wet season visitor numbers.
Services	**Shops, tourism**	70%	High opportunity for local's investment into small business and shops.
	Nursery, laundry, garbage, maintenance	80%	Employed or contracted by the body corporate or contractor companies.
	Indigenous	100%	Traditional owner employment program.

Table 10: Estimated Ella Bay Operational Workforce Mix

Year	Permanent Resort and Body Corp						
	Operational Jobs Required	Migrating Workers	Commercial Accommodation Required	House Purchase	Rental House Apartment Required	Locals Existing residents	% of local Workforce
1							
2							
3							
4	80	48	29		19	32	40%
5	90	50	30		20	40	44%
6	110	55	27	10	18	55	50%
7	240	109	53	20	36	131	55%
8	360	143	74	20	49	217	60%
9	560	190	99	25	66	370	66%
10	610	180	93	25	62	430	70%
11	700	172	85	30	57	528	75%
12	750	170	84	30	56	580	77%
13	790	160	78	30	52	630	80%
14	870	170	84	30	56	700	80%
15	970	190	96	30	64	780	80%
				250			

Table 11: Estimated Ella Bay Operational Jobs Housing Requirements

Total Workforce Accommodation

The impact in demand from commercial accommodation will peak in year 8 with estimated requirement of 236 beds (Table 12). Commercial accommodation market should not be negatively affected by Ella Bay workforce due to the relatively large supply in the area (980 Innisfail alone) which will cope with the initial requirement of 200 beds and the gradual demand increase.

Rental market requirements peak in year 9 with estimated 79 dwellings being required. The possible settlement location and availability for these workers who choose to rent is extensive and this demand should only have a small affect to the median rental prices for the CCRC area. Currently there are 91 dwellings registered on one internet classifieds site available within the area <$350 week.

The experience with Cyclone Larry and Yasi where a greater number of temporary workers were involved in the recovery work for the area than that projected for Ella Bay construction was that temporary accommodation and rental house pricing were not compromised. The numbers for temporary accommodation required for Ella Bay would not be consume the local vacancies.

The estimated total new house demand (not including Ella Bay houses) of 430 over the 15 years will not impact the supply and demand for the area. The area's new lot supply has been steady over the last 4 years around 900 lots with operational works approval in between 41% - 53%. Of note is that the total number of lots in the CCRC planning to 2031 is 790 lots for Innisfail.

Accommodation at Ella Bay

The residential component of Ella Bay will provide only a small number of houses which may be occupied by managers, chefs and senior resort staff – allow 5% of the houses – 25. It is likely that some of the casual jobs would be expected to be filled by children and partners of the houses - allow 5% - 25

Temporary and permanent accommodation including backpacker accommodation will be available within the Ella Bay unit complexes and it is expected that up to 100 of the workforce would use this type of accommodation especially during part time seasonal work.

In total it is expected that about 150 of operations staff will live at Ella Bay.

Year	Totals					
	Total Workers	Commercial Accommodation Required	House Purchase	Rental House Apartment Required	Locals Existing residents	% of local Workforce
1	200	144	0	16	40	20%
2	280	185	5	21	70	25%
3	280	176	10	20	75	27%
4	430	231	15	42	142	33%
5	440	215	20	41	165	38%
6	460	189	35	36	200	43%
7	590	193	50	51	296	50%
8	760	236	45	67	412	54%
9	810	194	45	77	495	61%
10	860	192	40	73	555	65%
11	980	201	40	70	669	68%
12	1050	215	35	71	730	70%
13	1090	213	30	67	780	72%
14	1020	152	30	64	775	76%
15	1020	119	30	67	805	79%
			430			

Table 12: Estimated Ella Bay Total Workforce Housing Requirements

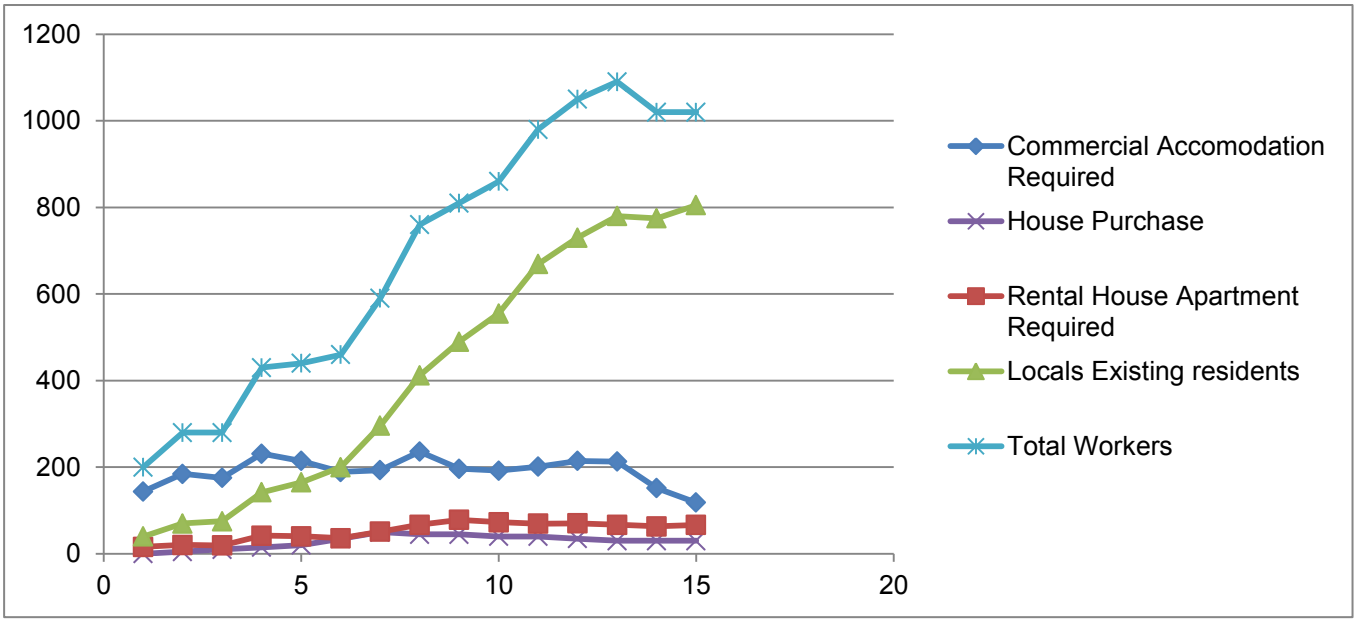

Figure 4: Estimated Ella Bay Total Workforce Housing Requirements

Table 12 and figure 4, the Ella Bay workforce demand is a steady increase in both numbers and local workforce percentage.

Housing Effects and Management Strategy

Initial analysis contained in this report has identified that the use of short term commercial accommodation and rental availability should provide the initial construction requirement without negative affects to the community, in fact it could be seen that it will cause a greatly needed boost to the region's economy.

It is not considered that Camp style worker accommodation will be required as there is an existing vacant supply, as well as recently closed accommodation businesses.

There are no known proposed significant developments within the area, and the opposite is the case with local businesses closing and population declining.

If required a worker accommodation strategy would be further developed in association with the Department of Housing and Public Works (Housing Services).

Addendum References

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Residential Tenancies Authority, Median weekly rents for the Jun 2010, Jun 2011, Jun 2012 quarter for all postcodes in the Cassowary Coast Regional Council area, source: Residential Tenancies Authority, Rental Bond Lodgements, Data sent via e-mail from RTA to Daniel Figueiredo – Appendix 1

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Addendum Appendix 1 - *Median weekly rents for the Jun 2010, Jun 2011, Jun 2012 quarter for all postcodes in the Cassowary Coast Regional Council area.*

Median weekly rents for the Jun 2010 quarter for all postcodes in the Cassowary Coast Regional Council area

PC/LGA Locality	1 Bed Flats/Units		2 Bed Flats/Units		3 Bed Flats/Units		2 Bed Houses		3 Bed Houses		4 Bed Houses		2 Bed Townhouses		3 Bed Townhouses	
	Rent ($)	New Bonds	Rent ($)	New Bonds	Rent ($)	New Bonds	Rent ($)	New Bonds	Rent ($)	New Bonds	Rent ($)	New Bonds	Rent ($)	New Bonds	Rent ($)	New Bonds
Cassowary Coast Regional Council	170	63	180	95	250	11	240	27	270	86	325	22	n.a.	4	n.a.	1
4849	n.a.	2	190	10					260	6	n.a.	2	n.a.	2	n.a.	1
4852	n.a.	1	240	17	n.a.	1	250	6	330	23	390	8	n.a.	7		
4854	180	7	230	8	n.a.	2	n.a.	3	250	11	n.a.	3				
4855									n.a.	2						
4856							n.a.	2	n.a.	1						
4857											n.a.	3				
4858			n.a.	2					n.a.	1						
4859			n.a.	1			n.a.	4	n.a.	1						
4860	n.a.	3	175	57	250	8	230	12	280	42	250	8				
		36		180		22		54		172		44		129		608

Median weekly rents for the Jun 2011 quarter for all postcodes in the Cassowary Coast Regional Council area

PC/LGA Locality	1 Bed Flats/Units		2 Bed Flats/Units		3 Bed Flats/Units		2 Bed Houses		3 Bed Houses		4 Bed Houses		2 Bed Townhouses		3 Bed Townhouses	
	Rent ($)	New Bonds	Rent ($)	New Bonds	Rent ($)	New Bonds	Rent ($)	New Bonds	Rent ($)	New Bonds	Rent ($)	New Bonds	Rent ($)	New Bonds	Rent ($)	New Bonds
Cassowary Coast Regional Council	190	27	220	105	220	19	240	28	290	89	360	30	250	5	n.a.	1
4849	240	7	195	10	400	5	n.a.	3	280	9	500	5	n.a.	2	n.a.	
4852	200	5	250	34	n.a.	1	260	12	330	30	480	8	n.a.	3		
4854	n.a.	1	220	20	n.a.	2	n.a.	2	300	14	330	6				
4855																
4856							n.a.	2	n.a.	3						
4857																
4858					n.a.	1	n.a.	1	220	6	n.a.	1				
4859			n.a.	1	n.a.	2							n.a.	1		
4860	170	14	180	40	185	8	220	8	260	38	350	10				
		54		210		38		56		178		60		16		118

Median weekly rents for the Jun 2012 quarter for all postcodes in the Cassowary Coast Regional Council area

PC/LGA Locality	1 Bed Flats/Units		2 Bed Flats/Units		3 Bed Flats/Units		2 Bed Houses		3 Bed Houses		4 Bed Houses		2 Bed Townhouses		3 Bed Townhouses	
	Rent ($)	New Bonds	Rent ($)	New Bonds	Rent ($)	New Bonds	Rent ($)	New Bonds	Rent ($)	New Bonds	Rent ($)	New Bonds	Rent ($)	New Bonds	Rent ($)	New Bonds
Cassowary Coast Regional Council	180	14	225	86	260	14	260	35	300	121	380	36	395	11	500	9
4849	n.a.	4	290	16	520	7	275	5	350	20			n.a.	4	500	7
4852	n.a.	2	260	22	n.a.	1	330	10	340	28	450	15	n.a.	3	n.a.	1
4854	n.a.	4	350	6	n.a.	1	290	6	330	19	350	7				
4855			n.a.	2			n.a.	1	n.a.	3						
4856							n.a.	2	n.a.	4						
4857																
4858			n.a.	1					290	5						
4859			n.a.	1					n.a.	1						
4860	n.a.	4	185	35	220	5	230	11	280	43	280	14	n.a.	4	n.a.	1
		28		172		28		70		242		72		28		117

3. Matters of National Environmental Significance

The relevant controlling provisions under the Matters of National Environmental Significance (MNES) section 75 of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), are:

- World Heritage (sections 12 and 15A)
- Listed threatened species and communities (sections 18 and 18A).

The key issues are impacts to the World Heritage values of both the Wet Tropics and Great Barrier Reef World Heritage areas, and to the following listed species:

- Southern Cassowary - *Casuarius casuarius johnsonii;*
- Stream dwelling frogs – *Litoria rheocola* (Common Mistfrog) and *Nyctimystes dayi* (Australian Lacelid);
- Spectacled Flying-fox - *Pteropus conspicillatus;*
- Marine Turtles species and
- Flora Species

3.1 Additional information Studies

A number of additional surveys and reports which are relevant to issues of MNES have been prepared. These reports provide additional detail to the EIS and SEIS, and there are no fundamental changes to the Action.

A detailed report on the Ella Bay Road Upgrade and Flying Fish Point Bypass has been prepared: Volume Four, Ella Bay Road Design and Environmental Management Report. The following Appendices are contained within that report:

- Appendix 1. Visual Landscape Assessment Ella Bay Road;
- Appendix 2. Revision to Multi Criteria Analysis of Ella Bay Road Options;
- Appendix 3. Revision to Road Usage Demographics for Ella Bay Road;
- Appendix 4. Road Safety Audit of Ella Bay Road;
- Appendix 5. Revegetation Planting List; and
- Appendix 6. Noise Report.

Flora, fauna and water studies were reported in the EIS and SEIS. Further surveys were requested by SEWPAC and are included in this submission response. The flora and fauna (including additional cassowary surveys) are addressed in Section 4.1 *Fauna and Flora Surveys and Assessment*.

A number of water related studies were undertaken and are included in Volume 6 of this report (number reference is to Volume 6):

- 6.4 a Coastal Inundation Study ;
- 6.4 b Integrated Water Management Plan;
- 6.4 c WSUD Stormwater Objectives;
- 6.4 d Northern Precinct Stormwater Management Plan;
- 6.4 e Groundwater Resource Evaluation Supplemental Report;
- 6.4 f Groundwater Resource Evaluation; and
- 6.4 g Water Monitoring Results.

A number of Masterplan reports were undertaken or updated and are included in Volume 6 of this report (number reference is to Volume 6):

- 6.5 a Local Area Plan;

- 6.5 b Visual Assessment and Mitigation;
- 6.5 c Architectural Inundation Report;
- 6.5 d Beach Access Report;
- 6.5 e Walking Track Design Report; and
- 6.5 f Conservation Zones at Ella Bay.

3.2 Existing Environment

3.2.1 Tenures impacted by the proposed action

The proposed Ella Bay Integrated Resort and Residential will take place within freehold land Lot 320 on NR157629 which has a registered area of 449.2ha. The property includes two unconstructed road easements which will contribute an additional 20ha on road closure. From here on the property will be described as being of 470ha.

The proposed upgrade to Ella Bay Road will affect other lots (refer to Volume 7 drawing EBR1CE-DD0070):

Stage 1 - Ella Bay Road Upgrade

- Wet Tropics World Heritage Area;
- Lot 1024 NPW 151 Ella Bay National Park;
- CCRC road reserve;
- Esplanade - gazetted unformed road; and
- Lot 337 NR53 Easement A. Adjoining freehold property existing road easement;

Stage 2 - Flying Fish Point Bypass

- CCRC road reserve Alice St gazetted unformed road;
- Lot 8 USL35566 State Land;
- Option 1 Lot 18 USL35566 State Land; and
- Option 2 Lot 1024 NPW 151 Ella Bay National Park.

3.2.2 Ella Bay property

There are number of impacts on Matters of National Environmental Significance (MNES) associated with the historical and existing land use of the property and access road that contribute to degradation of the World Heritage values of the surrounding areas.

In 1883 the Ella Bay property boundary was shown on a registered survey along with several streets within Musgrave (now Flying Fish Point) (Surveyor Generals Office Brisbane, 1883). The property was also surveyed in 1898 showing stands of trees and the current registered property features (Surveyor Generals Office Brisbane, 1898). Of note (refer figure 3.1) is the location of the creek and shoreline which match the existing locations and that the southern section of the Esplanade was originally cleared.

The property was initially cleared for agriculture by at least 1902 and there are numerous newspaper reports from the early 1900's of Ella Bay being one the major banana growing areas in Queensland. (Brisbane Courier 1903, Sydney Morning Herald 1906, Rockhampton Morning Bulletin 1903) The newspaper articles report that the land was leased to Chinese farmers and there were over 100 men working the site, that 500 acres had been cleared for bananas and there was a 340ft long jetty built in 1902 to load steamers with bananas to Brisbane.

In a 1903 newspaper article –

> *"Mr E B Wareham, Queensland inspector from the Adelaide Steamship Company: In the course of an interview, gave particulars of developments at Ella Bay, a few miles north of the Johnstone River. "Twelve months ago the place was covered with scrub; now there is an export trade of 1000 bunches of bananas and five tons of maize weekly."*
>
> - The Northern Courier, Oct 1903.

A later 1943 (Army Topographical map extract Figure 3.2) shows the extent of the clearing with all the lower sections of the creeks having been cleared. The narrow riparian corridors which are evident today are regrowth from that clearing. (Army 1943) The property has been continuously used for agricultural purposes, principally in recent years to graze cattle.

These activities have created grasslands dominated by introduced aggressive grasses and invasive weeds which have started to disperse into the adjoining National Park. The property is generally degraded with significant areas of exotic weed infestations within fenced paddocks of introduced pasture grasses. Cattle also have degraded vegetation at the edge of the property and site creeks through grazing and trampling and aided in the spread of weeds.

The edge effect from the previous agricultural activities within the existing vegetation of the development site is extensive and in the vegetation bordering the development edge effects are characterised by Pond Apple and other weed infestations, logging roads, clearing over boundaries, historical fence remnants and on the dunal swale area from camping. The northern section of the western boundary of the property has been over-cleared into the WTWHA by some 50 to 80m.

On the property and adjacent are mono-cultural stands of the weed, Pond Apple, *Annona glabra* and Hymenachne comprising approx 14.9 Ha. (Refer to Volume Six, 6.2d *Weed Mapping Survey Jan 2010*). Pond Apple and Hymenachne are one of the most threatening environmental weeds to the Wet Tropics and are designated a Weed of National Significance (WONS). The Pond Apple is an attractive food source for local fauna, particularly the Southern Cassowary, and is readily dispersed into adjacent areas of the Wet Tropics and is in danger of spreading into Ella Bay Swamp Wetland (Refer to Volume Six, 6.2a,b). The majority of the Pond Apple is located in the dunal swale at the east of the property within the gazetted Esplanade.

The property also supports feral pigs in large numbers (over 100 trapped since Oct 2008). Feral pigs are the major pest animal in the Wet Tropics (Wet Tropics Management Authority- State of Conservation Report 1998 to IUCN p5). They degrade natural vegetation and water quality, cause erosion and encourage the establishment and spread of weeds by wallowing and rooting around the edges of watercourses and swamps. Feral pigs also destroy the habitat of small native animals, spread disease and parasites and compete for the food with, and predate upon the eggs of the Southern Cassowary. (Mitchell, J., CSIRO, 1998)

Chytrid fungus (Batrachochytrium Dendrobatidis) has caused devastation to the high-altitude frog population and has been surveyed and identified as occurring on the site and at multiple sites within 20 km of the Ella Bay however on the coastal area the fungus appears to be active only in the cooler months and is quickly killed by increase in temperature without appearing to impact on the frog population (Alford 2009).

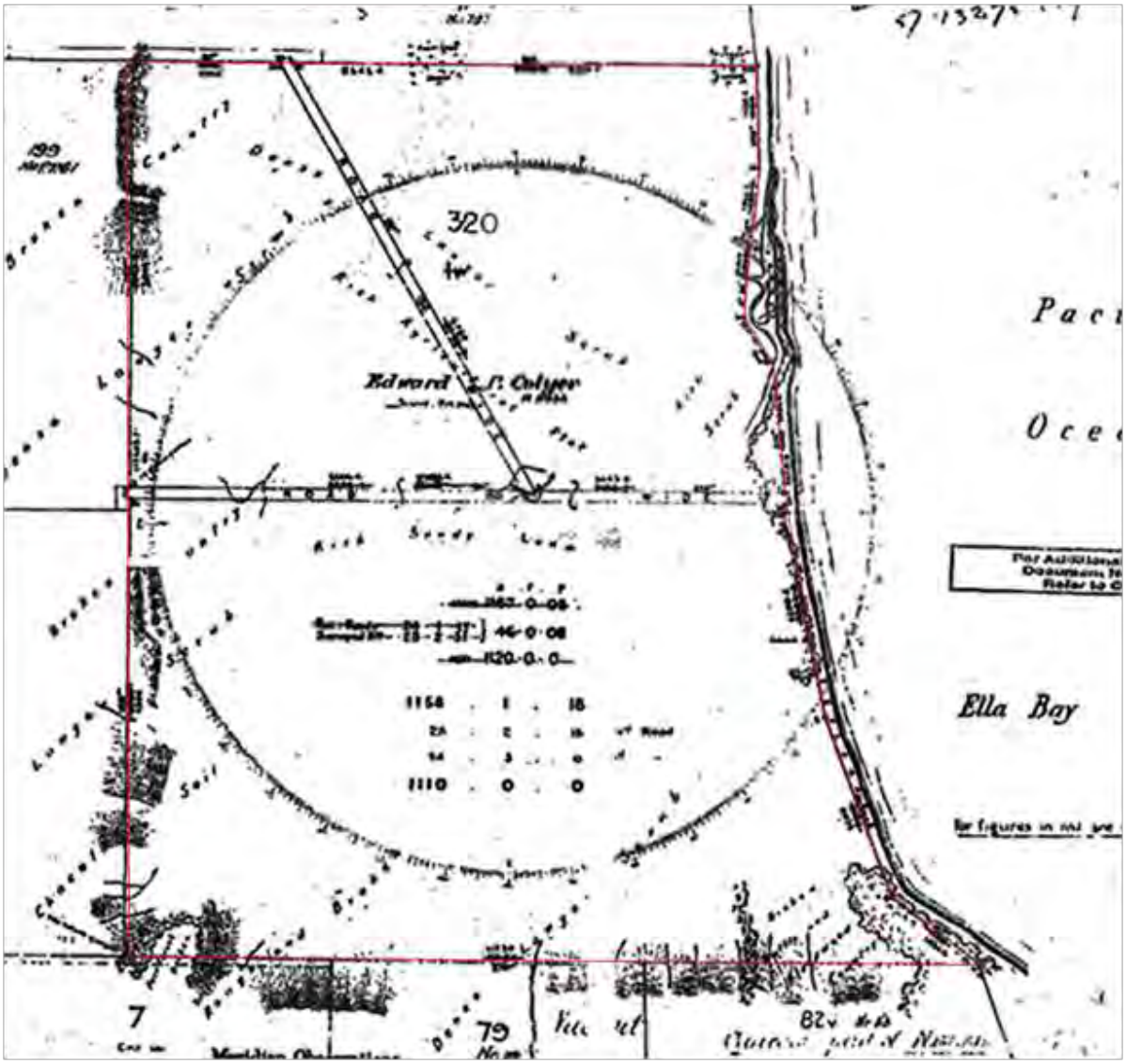

Figure 3:1 Extract of 1898 survey of Ella Bay property. Ella Bay boundary added in red for clarity

The site does provide limited access (due to barbed wire fences) for the cassowary to pass through the open paddocks of the site to and from the adjacent protected areas and a food source in the form of Pond Apple as described above.

Currently, there are no mechanisms in place to manage any of the edge effects described here. The only existing requirement of the landowner of Ella Bay is the control of Pond Apple and Hymenachne on the property as these are listed as a WONS and a Class 2 pest in Queensland. However, it was not removed from the Ella Bay property and is unlikely to be using previous property management practises. More importantly, there are no statutory obligation on the landowner to manage the interface between the property and the adjacent Wet Tropics.

World Heritage Area Nomination

This site was not included within the Wet Tropics World Heritage Area during the listing process in the 1980's assessment program although it is surrounded by WHA and nearly 18,000ha of private (freehold) land was included. (Thorsell, J.,1988) World Heritage Nomination IUCN Summary. The site was in freehold title, and as it was almost totally cleared, considered to be sufficiently degraded and deficient of World Heritage values.

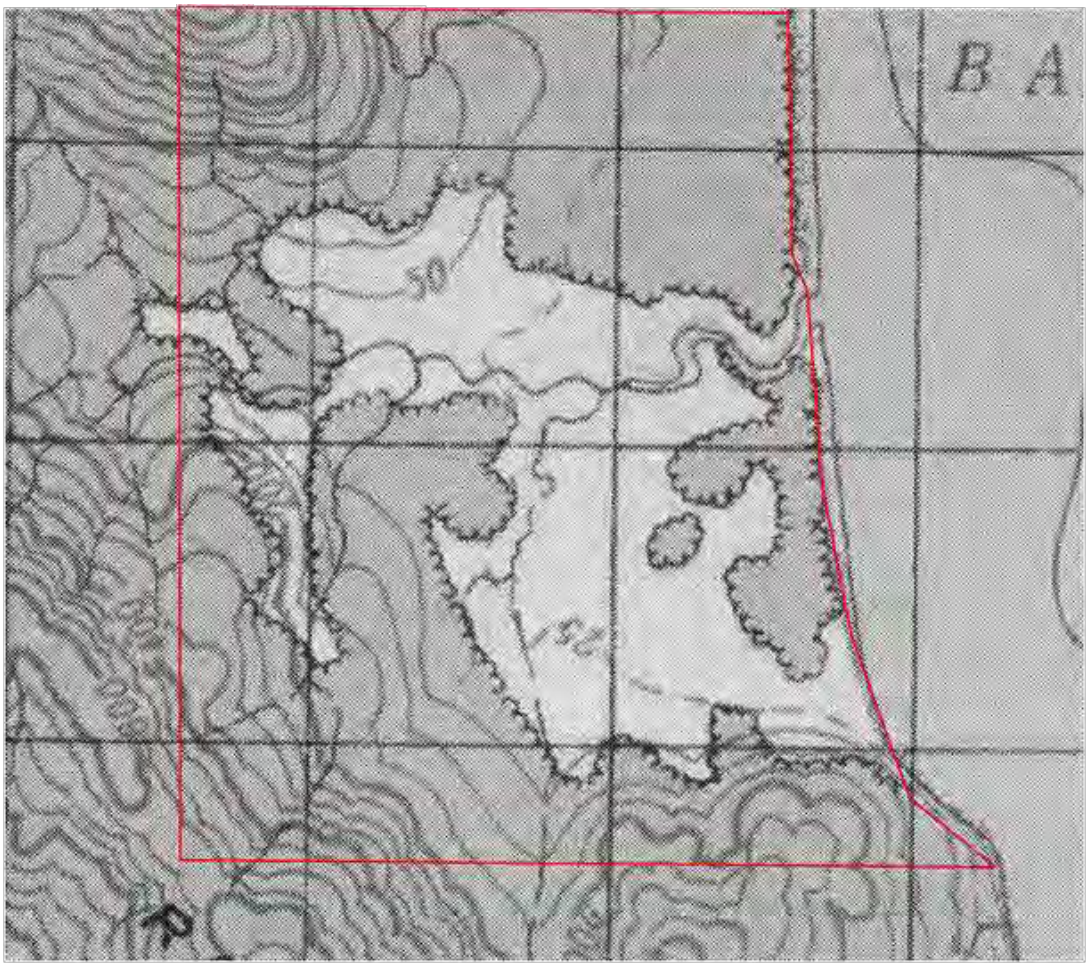

Figure 3:2 Extract from army topographical map 1943 showing extent of clearing along riparian creeks. Ella boundary added in red.

3.2.3 Ella Bay Road

Access to the property is obtained from Ella Bay Road, an unsealed single lane road, managed by the Cassowary Coast Regional Council. Ella Bay Road was probably formed in the early 1900's although the earliest mention was for an initial government survey of Ella Bay Road in 1912 (Brisbane Courier, 1912) and a note of a bridge (tender for bridge, Cairns Post 1917). The road is shown along the same alignment in the 1943 Army topographical map.

The road cuts into the steep rocky coastline to the south, linking the property with Flying Fish Point. The road runs beside or passes through areas of the Ella Bay National Park in this section for 1.56km (length of WHA section). Current road use and maintenance is causing edge effects and dust pollution which is degrading the visual amenity and integrity of the WTWHA in the area, and during wet periods adding to the erosion and sedimentation burden of short sections of creeks running through the Wet Tropics and depositing into the Great Barrier Reef lagoon.

The road maintenance regime for the dirt road especially following intense rain or cyclone clean-up is adding to incremental creep of edge effect as the road corridor disturbance widens.

3.3 Assessment of MNES Environmental Impacts of Existing Land Use

3.3.1.1 The 'do nothing' case

It is important to assess the potential impacts of the proposed resort development within the context of the 'do nothing' case. The Ella Bay property was used for pastoral activities until recently. These activities have impacted on the Southern Cassowary through habitat loss and

degradation, the spread of weeds and exotic grasses, impacts from feral pigs, and a high risk of road death and attack by dogs.

The previous cattle grazing and agricultural management practices degraded all remnant vegetation within the boundaries of the property. This has led to incremental losses of 'essential' and 'general' cassowary habitat within and adjoining the property. The remnant vegetation along the drainage lines and foreshore has been degraded, and the wide vegetated buffers of essential cassowary habitat adjoining the Ella Bay National Park on the northern and western boundaries of the property are at considerable risk of attenuation or removal.

The Ella Bay property is infested with weeds and introduced grasses, which are readily dispersed by the cassowary and other species into adjoining areas of important cassowary habitat. One weed of particular concern is the Pond Apple, (*Annona glabra)*. Pond Apple is considered to be the most serious threat to the Wet Tropics bioregion (Werren 2001). Already, pond apple has caused a number of the wetlands to become endangered or restricted bioregional ecosystems. Of particular concern are the swampland communities of the adjacent Ella Bay National Park which due to the disturbance created by Cyclone Larry, are likely to present suitable edaphic conditions for this weed to penetrate otherwise undisturbed areas.

The Pond Apple is an attractive food source for cassowaries, and cassowaries are an effective dispersing agent for the Pond Apple. However, it tends to dominate a community, replacing a diverse annual cycle of fruits with a monoculture. This makes an area unsuitable for cassowary foraging for all but the Pond Apple fruiting season. There is approximately 14.9ha of monoculture or intensive Pond Apple.

The Ella Bay property and surrounding areas are also supporting large numbers of feral pigs. Feral pigs threaten the Southern Cassowary through degradation of habitat and water quality by wallowing and rooting around watercourses and swamps. Pigs also compete for food and have been reported to destroy nests and eat eggs.

A further impact of existing pastoral activities on the Southern Cassowary is continued unmitigated traffic along the Ella Bay road, which threatens car strike due to a lack of warning signage, slow points or exclusion fencing. Even though cassowaries are known to cross the road at a number of points to access coastal vegetation only one cassowary warning sign is present for the whole of the road length. At present, there are no adequate measures in place to reduce the risk of cassowary road death. Cassowaries accessing some areas of vegetation along the eastern side of the Ella Bay road, such as the Flying Fish Point Reserve, are also at a very high risk of dog attack. Cassowaries in this area are known to have succumbed to dog attack; however no strategies to manage this risk are currently in place.

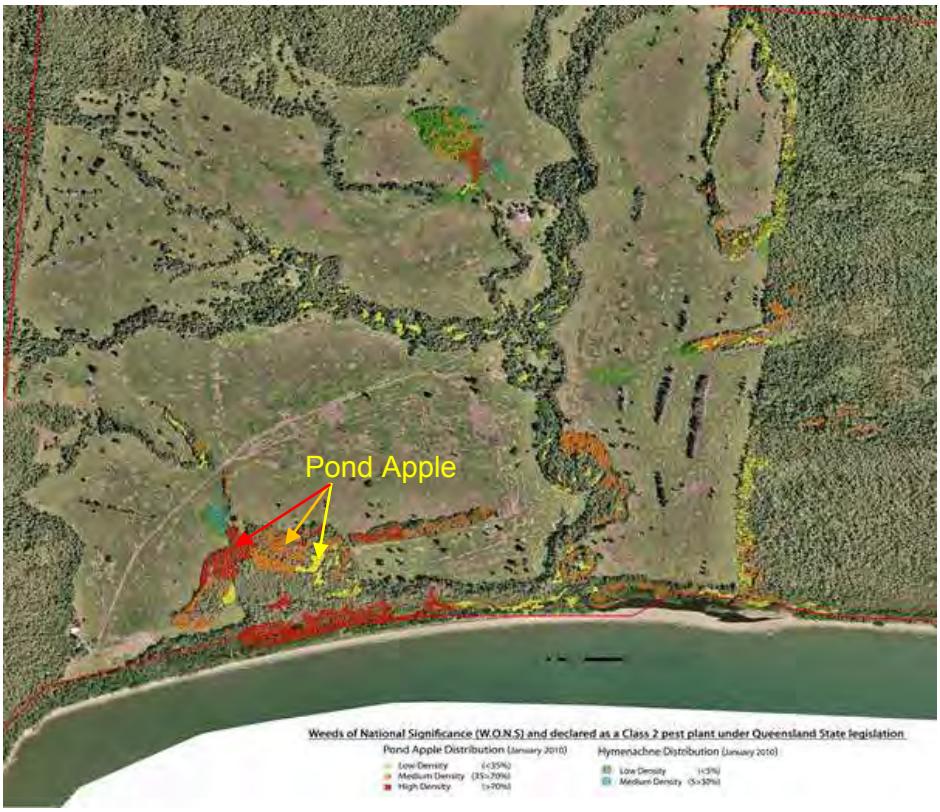

Figure 3:3 Pond Apple (red >70%, orange 35>70% & yellow <35%) and Hymenachne infestations (green) January 2010 (refer to Volume 6.2d *Weed mapping Ella Bay)*

Known cassowary deaths have occurred;

- Ella Bay Road 28/10/2002 Chick - 100mtrs South of Ella Bay NP sign – hit by car (QPWS unpublished)
- Flying Fish Point Road 23/03/2006 Adult – likely hit by car (QPWS unpublished)
- Little Cove Development - 24/12/2011 Male Adult – dogs (pers. obs)
- Flying Fish Point 2007 - Female Adult – dogs (Moore Feb 2009 survey)

Impacts associated with the continuation of existing pastoral activities have been compared with potential impacts from development of the EBIR (SEIS & Volume Six 6.1L). This analysis concluded the generic potential for impact was more or less identical between the two actions.

However, as freehold ownership includes an 'as of right' entitlement to agricultural activities within the property, there are few, if any, mitigation strategies to protect or conserve cassowary habitat. The only relevant requirement of landholders is to control Pond Apple on the property as it is listed as a Class 2 pest in Queensland. However, the majority of Pond Apple at Ella Bay is located on the coastal Esplanade and there has no control of this major infestation nor has it been removed from the Ella Bay property and is unlikely to be controlled with the current property management practises. Moreover, there is no statutory obligation on the landowner to fence off drainage lines or remnant vegetation to prevent further habitat degradation and there is no obligation to revegetate already cleared land or restore degraded habitat.

On a regional scale Moore (SEIS & Volume Six 6.1L) reported that the Graham-Seymour Range cassowary population

> *"is a linear subpopulation which has lost all connectivity with the larger cassowary populations to the west, the Graham Seymour Range population is currently experiencing high levels of anthropogenic impact, and declining rapidly as a result."*

The time frame predicted by Moore's modelling for extinction is 60 years for isolated populations with the current levels of threat: (SEIS & Volume Six 6.1L - PVA page 28 Summary of all Models)

"In the absence of future dispersal between the two currently connected coastal populations of Graham Range and Seymour Range, all PVA models indicate there is a high probability that both populations will die out within 60 years."

Moore also concluded that "*Natural catastrophes in the form of severe cyclones and the environmental uncertainties of climate change, are hastening this decline.*"

According to Moore's PVA the Graham-Seymour Range cassowary sub-population is currently in a declining vortex whereby extinction of that sub-population appears to be inevitable. Many of the present indirect impacts of the local environment are cumulative and are contributing to this decline. That is; the current "do nothing" scenario will result in extinction of the Graham-Seymour Range cassowary sub-population.

3.3.2 The Impacts of Existing Land

The property has been managed by the Proponent since the middle of 2008. Since that time a number of cassowary surveys have established an increase in the number of surveyed cassowaries. (Volume 6 6.1b, 6.1c, 6.1d, 6.1e, 6.1L) The surveys show an increase in the total of adults and subadults from 6 to 15 cassowaries (refer to Figure 3:4).

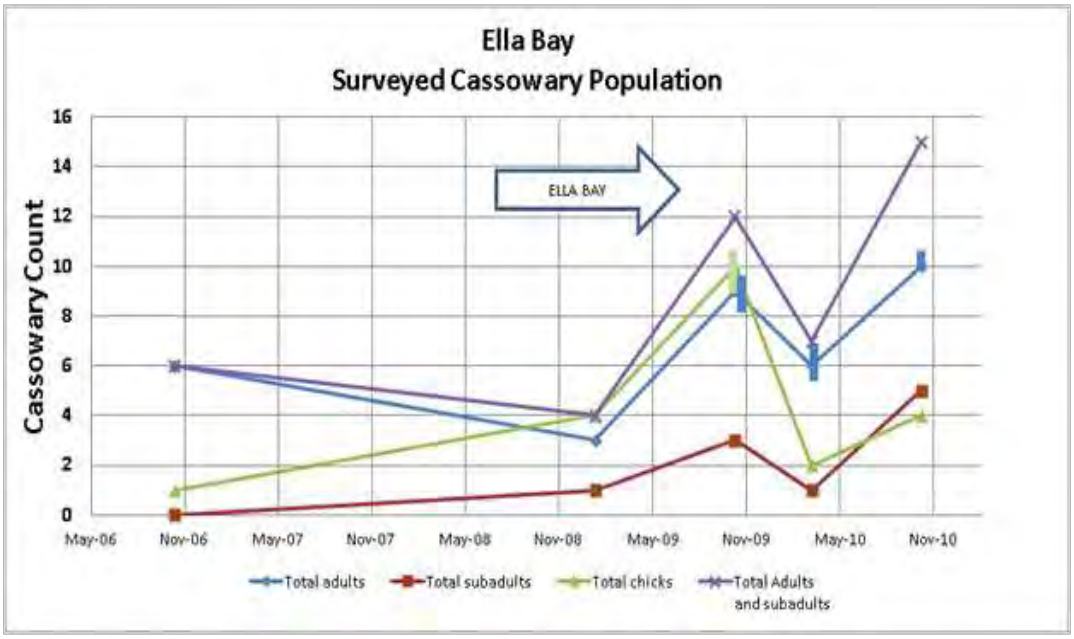

Figure 3:4 Comparison of surveyed Cassowary population

This increase is significant and although some of the increase could be attributable to survey method and time of year the Proponent has:

- Removed all cattle and cattle dogs from the site;
- Stopped cattle trucks along Ella Bay Road;
- Removed barb wire boundary fencing;
- Engaged in a pig culling program and has culled over 100 pigs since 2008;
- Restricted access to the beach and camping hut; and
- Restricted recreational hunters, uncontrolled dogs and hunting using pig dogs.

The details of the surveys are discussed in more detail in section 4.2 Southern Cassowary of this report. This increase in reported numbers indicates that there is a strong case that the previous agricultural use heavily impacted on cassowaries.

3.3.3 Conclusion

It could be expected that with continuation of agriculture there would be an ongoing negative impact on and adjacent to the site. With no active incentive or management with intent to protect or maintain World Heritage values, these values would continue to decline on-site with

the maintenance of clearings and incremental degradation of remnant vegetation with an increase in WONS, and the edge-effects noted on the World Heritage boundaries would likely increase.

From a regional significance perspective, the Ella Bay site is a large cleared 'island' surrounded by World Heritage Areas – Wet Tropics and Great Barrier Reef. Its minor benefit to the Wet Tropics values is that it provides access; although limited by internal fencing, for cassowaries to move through the site or utilize it for food sources. However this access has traditionally come with a high risk of dog attack or sufficient disturbance to disperse the cassowaries.

On this site there is also the significant implication of inappropriate consumption of Pond Apple and potential spread to the WTWHA. Although a WONS weed, identified as the most serious weed threat to the Wet Tropics (Werren 2001) and identified in WTMA mapping since 2004 there has been no active enforcement within the Esplanade area or on the property the past 20 plus years which has allowed the weeds to become established.

With no change in the road form or maintenance, there would be continued negative impact on World Heritage Values through the identified threatening processes associated with the maintenance of essential community infrastructure, with only limited mitigation provided by Cassowary Coast Regional Council's compliance to its Wet Tropics Permit to maintain their road assets in the Wet Tropics.

There is also little perceived community value of protecting WHA as evidenced by recreational use that has negative impacts– feral pig hunting, camping on the beach and leaving rubbish behind, vandalism of gates and beach access prevention mechanisms and illegal access to Ella Bay site. The result is ultimately a decreased 'value' of WHA asset to Commonwealth and State.

This impact duration is permanent, but the geographic extent will be limited. The intensity will increase if cattle grazing is re-established.

On a regional scale there is a high probability that the Graham-Seymour Range cassowary sub-population will be extinct within 60 years with current levels of threat. This impact duration is permanent and the geographic extent will be regional.

3.4 World Heritage Values

The Wet Tropics World Heritage Area (WTWHA) Great Barrier Reef Marine Park World Heritage Area (GBRMPWHA) were inscribed on the World Heritage List in recognition of outstanding natural values under the same four criteria. The proximity and tenure of the WTWHA and GBRWHA to Ella Bay Development are shown in Figure 3.5.

Description	WHA listing	WHA Criterion
Aesthetics/natural beauty	(vii)	Contain unique, rare or superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance.
Significant geomorphic or physiographic features	(viii)	Be an outstanding example representing the major stages of Earth's history, including the record of life, and significant ongoing geological processes in the development of landforms, or significant geomorphic or physiographic features.
Significant ecological and biological processes	(ix)	Be an outstanding example representing significant ongoing ecological and biological processes in the evolution and development of terrestrial, fresh water, coastal and marine ecosystems and communities of plants and animals
Significant biological diversity/threatened species	(x)	Contain the most important significant habitats for in situ conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation.

Table 3:1 Wet Tropics World Heritage Area and Great Barrier Reef World Heritage Area Criteria

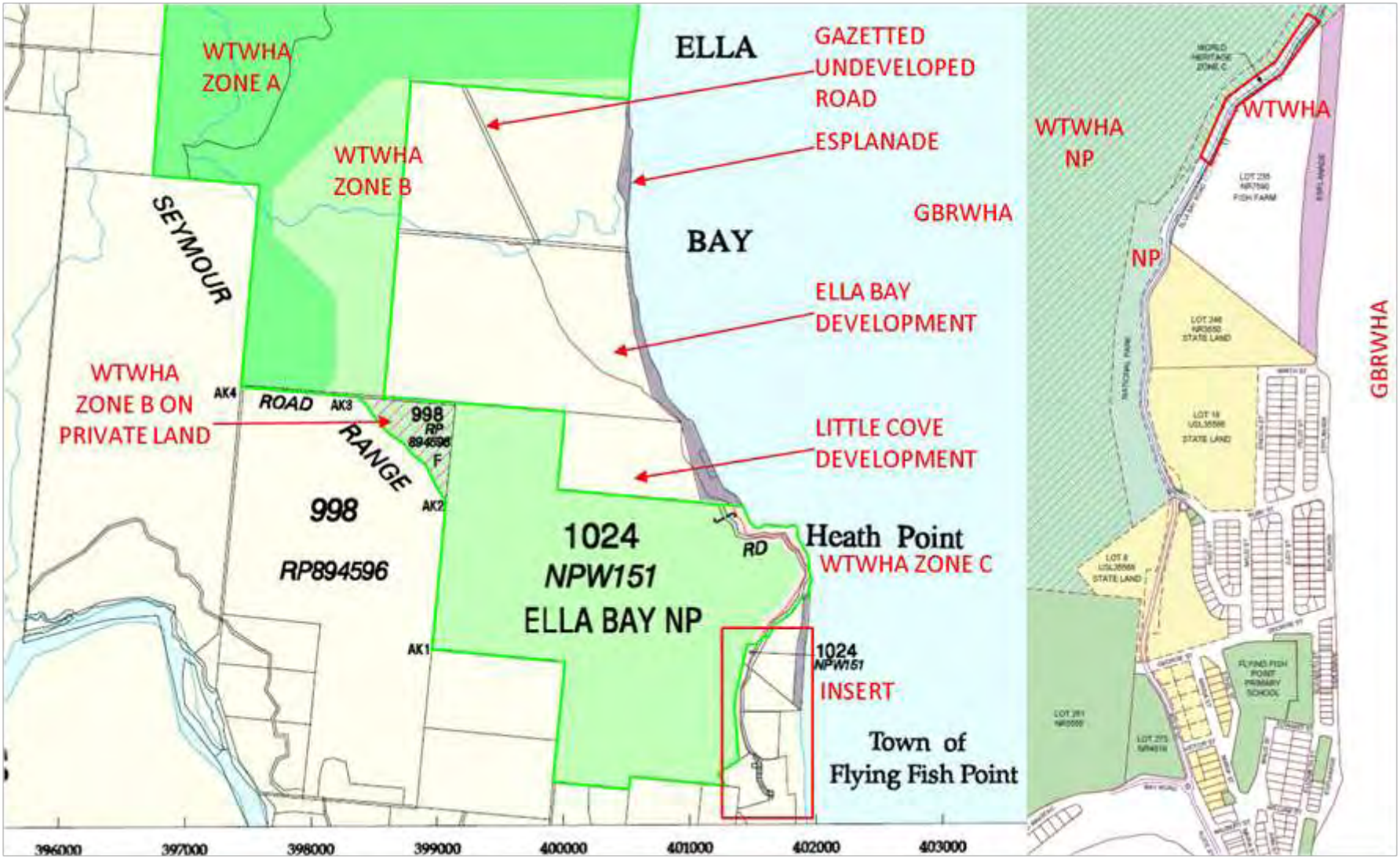

Figure 3:5 Wet Tropics World Heritage Area and Tenures. Note tenure of WHA only, NP only or WHA and NP along Ella Bay Road in insert. Extract from WTMA Map 16 Cooper Point and Insert from EBR1CE-DD70 Volume 7

3.4.1.1 WTWHA

The Wet Tropics World Heritage Area (WTWHA) comprises an area of approximately 894,000 ha between Townsville and Cooktown on the north-east coast of Queensland. The WTWHA was inscribed on the World Heritage List in 1988 in recognition of its outstanding natural heritage values.

The Ella Bay Property borders the WTWHA on its northern, southern and western boundaries. This section of the WTWHA is part of the Ella Bay National Park, which has an area of 3710 ha. (Refer to Figure 3.5))

Ella Bay Road lies adjacent to the Ella Bay National Park border as it passes the township of Flying Fish Point. The WTWHA border and the Ella Bay National Park border do not share the same border along Ella Bay Road. Ella Bay Road crosses through the boundary of WTWHA opposite the Seahaven Prawn Farm and then traverses 1560m through the WTWHA Zone C until the Esplanade past Heath Point. Ella Bay Road crosses through the boundary of Ella Bay National Park near Heath Point and then traverses 1080m through the WTWHA and Ella Bay National Park until the Esplanade past Heath Point.

The WTWHA has been zoned in accordance with the Wet Tropics Management Plan (1998). This zoning scheme allows different types of activities in each zone, in line with the management intent and integrity of the zone. The areas potentially impacted by the proposed road upgrade are Zone C and through secondary affects Zone B.

The zoning of the WTWHA surrounding the Ella Bay property and Ella Bay Road are shown in Figure 3.5. All areas immediately adjacent to the property have been designated Zone B. Ella Bay Road has been designated Zone C from the Seahaven Prawn Farm around Heath Point to the WHA Esplanade boundary. The width of Zone C ranges from 40m to 60m to the west of the existing road alignment and to the coast on the east.

The primary issues of concern are maintenance of World Heritage values and potential impacts of the road and the Action on the Southern Cassowary, Common Mist Frog and to a lesser extent, other threatened faunal species potentially having habitat in the WHA and the critically endangered Littoral Rainforest.

3.4.1.2 GBRWHA

The Great Barrier Reef is the world's largest World Heritage property. It extends over 2,000 kilometres and covers an area of 348,000 km2 on the north-east continental shelf of Australia. The Great Barrier Reef was inscribed on the World Heritage List in 1981 in recognition of its outstanding natural universal values.

The GBRWHA and the reef lagoon adjoins to east coast of the Ella Bay site with an Esplanade. Ella Bay Road along Heath Point and north to Ella Bay adjoins to the GBRWHA. All streams pass within Ella Bay Development and Ella Bay Road discharge into the GBRWHA. The nearest coral reef is approximately 30 km offshore.

In the vicinity of the site, the Great Barrier Reef World Heritage Area is within the Great Barrier Reef Marine Park managed by the Great Barrier Reef Marine Park Authority (GBRMPA) and the Queensland Parks and Wildlife Service (QPWS).

A multiple-use zoning system has been developed for the Great Barrier Reef Marine Park to allow a range of activities and uses. This zoning system provides a high level of protection for specific areas while permitting a variety of other activities to continue in a managed way in certain zones.

The waters along the coastline at Ella Bay are mainly zoned for ‘general use’. This zoning has the least restrictions associated with it, providing opportunities for reasonable use of the Great Barrier Reef, while still allowing for conservation. Activities permitted in the general use zone include, amongst others, fishing, boating and diving.

Under the joint management arrangements between GBRMPA and QPWS, the coastal area in the vicinity of the resort site is covered by the Wet Tropical Coast Regional Coastal Management Plan implemented under the Coastal Protection and Management Act 1995 (Qld). Under this plan, the study area is included in the Ella Bay Key Coastal Site (Locality 5.1 Flying Fish Point).

The issues of concern with respect to the Ella Bay Development and Ella Bay Road are:

- Visual impacts when viewed by ships at sea; and
- Possible impacts on biological processes from water quality (during construction and operation).

3.4.2 Assessment of WHA Listing Criteria (vii) - Visual Amenity

The Wet Tropics World Heritage Area WTWHA was declared as a World Heritage Area partly on the basis of its scenic values - Exceptional natural beauty and aesthetic importance. The coastal scenic value of the Ella Bay area was described as being "High Scenic Significance" (High Priority 2) in Scenic Management Area 20 (WTMA 1992).

The scenic routes are described as of 'Very High' *Public Sensitivity*

- Offshore sea routes of the Coral Sea, and
- Flying Fish Point Road

The Great Barrier Reef World Heritage Area visual amenity includes the reef and its features and the views of the rainforest from the ocean.

3.4.2.1 Great Barrier Reef World Heritage Area and Wet Tropics World Heritage Area

The Great Barrier Reef provides some of the most spectacular scenery on earth and is of exceptional natural beauty. The coastal vista values comprise the rich variety of landscapes and seascapes including rugged mountains with dense and diverse vegetation. At the local level, the Ella Bay National Park and Heath Point are key areas, especially when viewed from ships at sea.

The scenic values for the Great Barrier Reef World Heritage Area with regards to Ella Bay Development are formed by the vista of the Wet Tropics World Heritage Area from the ocean. This area is described as High Scenic Significance. There are no individual natural features of note in the area and the identified values are at the landscape level.

The quality objective for both the WTWHA and the GBRWHA is to preserve this scenic beauty is that future developments should not be visually apparent.

3.4.2.2 Ella Bay Development Scenic Values

The Ella Bay property is predominately cleared with 241ha of the 470ha cleared. The property can only be viewed by the public from the water or by air. There are no roads, or walking tracks that allow for public view.

From the Heath Point road lookout looking north, Ella Bay property is not visible as it is shielded by the smaller headlands (refer Volume Seven *World Heritage Area Visual Amenity From Heath Point*. Dwg 19).

From the sea a foreshore fringe of trees of 10 to 25m high shields the cleared areas from view and the clearing is only visible from the air. The farm homestead is currently visible from the sea (Refer to Volume Six 6.5b *Visual Assessment and Mitigation*). EIS Vol.2 Section 4.1.1.8 Visual Amenity, SEIS Vol. 1 Section 1.7.5).

The existing visual assessment of Ella Bay property from an elevated view (ie from the air) would be described as having a "Maximum Dominance" view (Forest Practice Board, 2006) with the cleared areas that are generally excessive and unacceptable from a visual amenity viewpoint:

- extremely easy to see;
- very large in scale and view encompassing; and
- rectilinear and geometric in shape.

Ella Bay property when viewed externally at eye level retains the “High Scenic Significance” with only the cleared area and white painted homestead standing out with its angular shape and highly reflective galvanised roof.

The current public sensitivity level of Ella Bay property would be Low Sensitivity due to the property;

- Not being visible from Ella Bay Road (usage greater than 50v/d);
- The designated shipping lane for ships greater than 50m is located between 2km to 4.5km offshore. (change since the 1992 assessment);
- A minimum of 10 recreational vessels per day in peak season; and that
- The beach and recreational areas have only very occasional use.

The goal for Ella Bay Development will be to fully retain the visual character of the landscape by ensuring that development is either inevident in the viewed landscape or only temporarily apparent. The goal for the completed development will be to enhance the scenic values through extensive revegetation and sensitive design.

In essence, Ella Bay Development when observed from the ships and boats at sea will be:

- difficult to see;
- muted in contrast; and
- natural in appearance.

Foreground 0.0 – 0.5 km. At this distance the observer will be able to view maximum discernment of details such as shape, colour, texture and contrast.

The development will bring additional external visitors to the area and the number of beach and coastal visitors along the close shoreline will most likely increase to ‘Very High’ *Public Sensitivity.* To beach visitors the development will not be discernible except for signage and entrances to the beach access walkways.

To inshore boating the foreshore screening vegetation is of sufficient height that there will be only limited views of the southern area of the village precinct (near the homestead). Only the resort precincts will be within the foreground distance and the foreground view will be limited to vessels that are restricted to less than 50m in length.

Middleground 0.5 - 6 km At this distance the form and colour of features such as trees and buildings will be recognisable. The colour and shape of the landform will be distinguishable and silhouettes will be visible.

For the distance from 0.5km to the designated shipping lane at 2km (south) to 4.5km (north) only small ships are permitted and the low viewing height will restrict vision to framed views through the tree canopies with the exception of the southern area of the village precinct (near the homestead). In an unmitigated form only the upper parts of buildings and roofs will be visible.

For viewers from larger ships more of the development will be visible however the view will be framed through the tree canopies and will be at a distance that will limit definition of detail. In an unmitigated form only the upper parts of buildings and roofs will be visible.

Background 6 - 16 km Colour is the dominant feature of the landscape. Different coloured areas appear as patterns of the landscape. The observer is unaware of individual details. Due to the curvature of the earth when viewing at sea these distances are at the limit of viewing range.

Planned conservation zone revegetation and rehabilitation will screen the majority of development views leaving only temporary visibility of the upper parts of buildings and roofs

while the landscape screening vegetation grows. In time, the vegetation will weaken colour and textural contrasts, further reducing the visual impact.

The planned revegetation of the eastern side of each precinct will commence and be established prior to works starting to screen with semi-mature trees on completion (Refer to Figure 3:17*).*

To assist the management of visual interaction between the built form and natural environment an indicative colour palette has been developed by extracting natural colours and hues from Ella Bay. External finishes will be non-reflective and of muted tones, selected to match and blend with the existing and proposed vegetation. This palette, combined with additional treatment methodologies applied to built forms proposed for the site will negate potential negative visual outcomes (Refer to Volume Six 6.5b *Visual Assessment and Mitigation*). In the residential precincts the construction height has been restricted to a maximum of 8m to minimise visibility of residences on the western slopes from offshore. In the Village Precinct the maximum height has been restricted to 18m where the ground elevation is less than 20m AHD and 15m above to minimise visibility (Refer to Volume Six 6.5a *Ella Bay Local Area Plan*).

The views from the sea and air will change from open pasture to appropriately coloured buildings and roofs to minimise contrast, reflectivity and visual impact - glimpsed through landscaped plantings. Of a night, the 'Black sky' lighting policy (no up-lighting) will produce no point lighting sources or light loom.

The major threats are identified as:

- Visibility of the development from the GBRWHA;
- Inadequate screening from revegetation and landscape plantings; and
- Visibility of lights and light loom from GBRWHA;

3.4.2.3 Ella Bay Road Scenic Values

Ella Bay Road passes through Ella Bay National Park and World Heritage Area through the Heath Point headland which provides magnificent views of the coast line and to Ella Bay. Sections of the road may be visible when viewed from the Great Barrier Reef World Heritage Area at Heath Point.

A Visual Landscape Assessment (VLA) has been undertaken for Ella Bay Road, to assess the visual impact of the road widening and upgrade. (Refer to Volume 4 *Ella Bay Road Design and Environmental Management Report* Appendix 1 *Visual Landscape Assessment Ella Bay Road*) and to SEIS Vol. I Section 1.4.4 and Appendix A2.6 Section 5.4.8). The proposed upgrade of the existing Ella Bay Road and bypass of Flying Fish Point will provide safe access to visitors and residents of the Ella Bay Development whilst maintaining natural visual integrity. The alignment of Ella Bay road is located adjacent to and passes through the WTWHA within a sensitive visual catchment which exhibits moderate to high levels of visual sensitivity. (Refer to Figure 3:6 and Figure 3:7).

The landscape assessment has identified key values forming the basis of the scenic amenity;

- The rainforest canopy formed by the proximity of mature trees to the roadside;
- The corridor effect of dense roadside vegetation; and
- The extensive vistas of the Great Barrier Reef Marine Park and World Heritage Area from Heath Point Park and headland.

Additionally, there are pre-existing negative impacts of both the visual and environmental aspect of the dirt road. Substantial weed encroachment is evident on the margins; and dust is contributing to both smothering of vegetation and silting of streams.

The proposed road design takes into account the competing requirements of road safety requiring extensive clearing, versus visual sensitivity with limited clearing, by restricting speed limits and where required to save mature trees utilising alternative management of road safety requirements for sight and evasive action distances. The proposed road upgrade alignment utilises all of the existing clearing.

Stage 1 Ella Bay Road Upgrade

The road from Flying Fish Point to the World Heritage Area is an existing, flat road section and there will be minimal visual impact arising as a result of the proposed road improvements. There will be minimal clearing along this section due to the wider existing alignment. This section of the road will not be visible from any of the WTWHA or GBRWHA public accessible areas.

The major visual impact for the user will be from the fauna mitigation measures including the approaches and bridge sections of the fauna underpass and the cassowary directional fencing. The cassowary fence will weave through existing road reserve vegetation, mostly non-visible however in places the fence will be adjacent to the road where there are entrances, escape gates, small culverts and a bridge.

The WTWHA section of the road of approximately 1560m extends from the flat road alongside the Seahaven Prawn Farm to the park area at the base of Heath Point and around the Heath Point Headland. The road upgrade will involve road widening and some elevation change. The visual amenity impact is considered to be low.

The road at the Heath Point Carpark will be increased in elevation and the road will be visible from the GBRWHA. The road will be increased in elevation from 2.4m ADHL to 5.0m ADHL to maintain an all-weather road not subject to cyclone inundation. The road will be elevated with a gabion rock wall and revegetated such that it will provide a similar appearance to the existing Heath Point Headland.

The proposed road design will involve the increase in radius of two strategic corners on the headland by cutting into the headland, with an increase in the embankment height from a nominal 4m to a height of 8m. Gabion retaining walls will be used where required to reduce the extent of road widening and clearing. The gabions will allow trees and other vegetation to grow through a mesh structural system (refer to Volume 4 *Ella Bay Road Design and Environmental Management Report*, *Chapter 9 Flora Sensitive Road Design*) and provide considerable visual improvements to the existing untreated, earth embankments. The design concept is to where possible widen the road on the western side of the roadway to maintain the existing vegetation on the eastern side to screen the road and cuttings.

Consultation with the Wet Tropics Management Authority has established that the scenic values and outward views of World Heritage Areas from the access road are an important consideration. A viewing section - Vista will be included for vehicle amenity and to emphasize the scenic values of the Wet Tropics Queensland and Great Barrier Reef World Heritage Areas. It will offer a significant opportunity to showcase the World Heritage Values of the Ella Bay region.

The sealing of the existing dirt road with bitumen and the removal of weeds from verges will be a significant enhancement to scenic values along the road alignment. The area of clearing required for the road alignment in the World Heritage Area has been minimised to 0.50 hectares and a total of 0.69 hectares will be revegetated including the weed infested verges (Volume Four *Ella Bay Road Design and Environmental Management Report*).

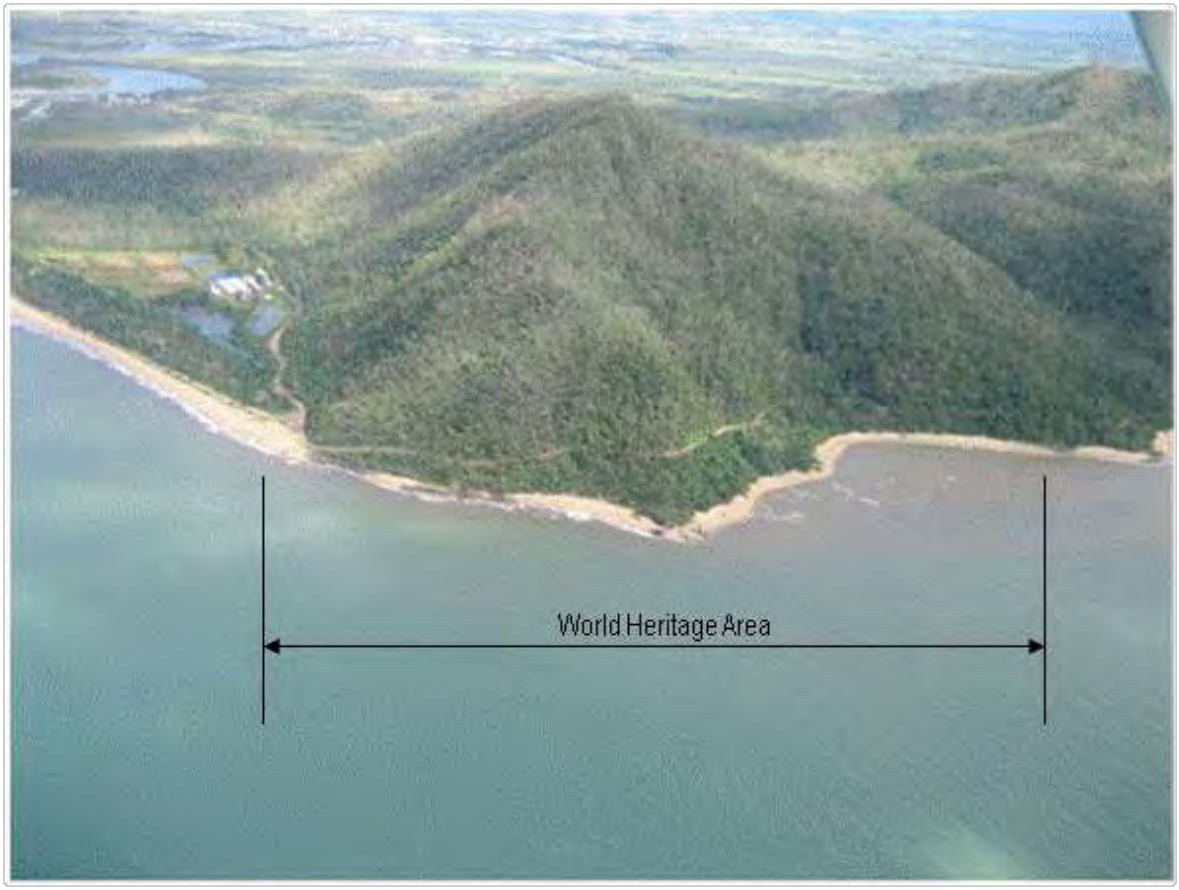

Figure 3:6 View of Heath Point Headland from the air highlighting the extent of the WHA

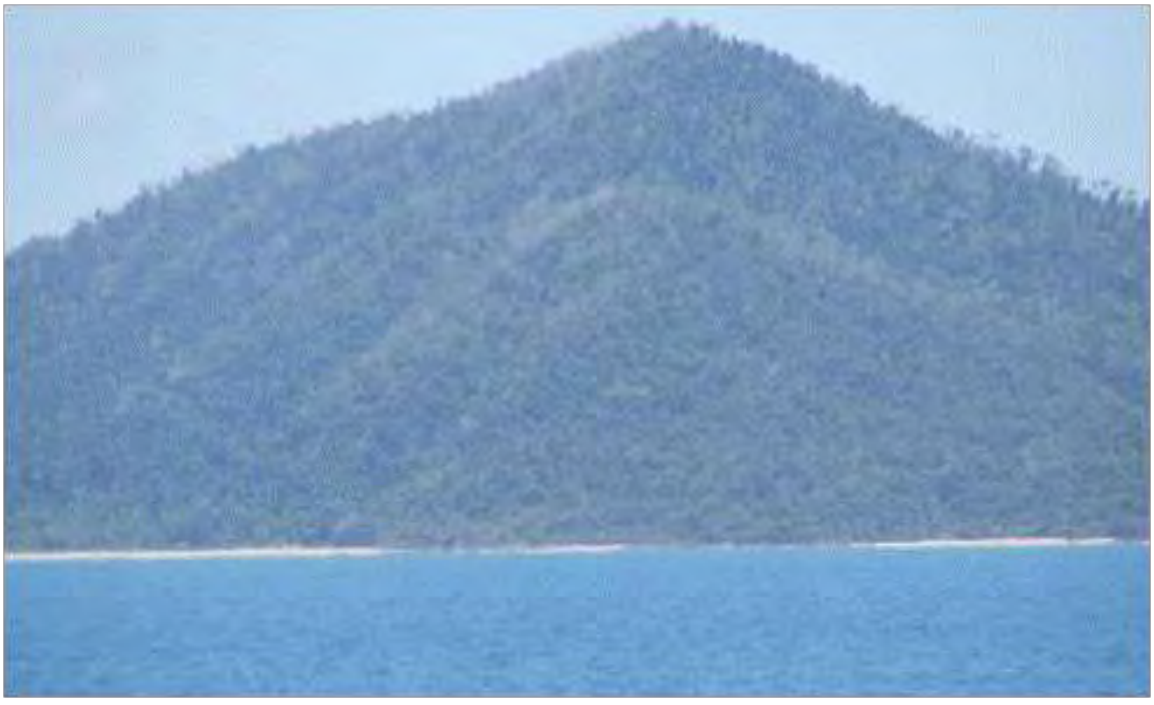

Figure 3:7 View of the existing access road from the sea highlighting its limited visibility. Vegetated retaining walls and other associated mitigation measures will minimise the visual impacts from the reef lagoon.

Stage 2 Flying Fish Point Bypass

The Stage 2 bypass is outside of the WTWHA boundary. The visual impact of this section will be mitigated through revegetation, and a 'cut and cover' tunnel (refer to). The 'cut and cover'

tunnel involves tunnel construction followed by revegetation of the area above the tunnel. Initially there will be some loss of visual amenity until such time as the revegetation has developed. The portal of the tunnel has been realigned in the latest revision so that the tunnel faces north and minimises the visibility from the WTWHA and minimises noise to Flying Fish Point. After plantings are established the impact of this section is considered to be minimal.

The landscape integration strategy (Volume 4 *Ella Bay Road Design and Environmental Management Report* and Volume four Appendix 1 *Visual Landscape Assessment Ella Bay Road*) identified the following outcomes:

- Retain the corridor effect created by dense vegetation;
- Retain existing mature trees, in particular trees with canopy connectivity;
- Relocate where possible EVR (endangered, vulnerable or rare) flora within clearing envelope;
- Remove existing weed infestations of batters, drains and shoulders and revegetate with frangible edge closure vegetation;
- Influence the natural surrounds with a comprehensive revegetation strategy;
- Include water sensitive design coupled with revegetation to improve roadside aesthetics and assist in weed control;
- Discrete shadecloth fencing to reduce the potential mortality of the Southern Cassowary;
- Stabilisation of embankments using vegetated gabions;
- Protect the existing rainforest and woodland from edge effects; and
- Promote this 4km stretch of road as a tourist drive in conjunction with local council and WTMA.

The visual catchment values of Ella Bay Road will be maintained, and improved through sensitive design without compromising safety or ecological design. The report concludes that the proposed road, with incorporated visual impact mitigation measures, is unlikely to adversely affect the scenic values of the World Heritage Areas and in most cases the visual amenity will be improved through dust suppression and endemic revegetation strategies.

The major threats are identified as:

- Clearing of mature trees changing the canopy and corridor effect within the WTWHA;
- Visibility of the cassowary fence within the WTWHA; and
- Visibility of clearing and cuttings from GBRWHA;

3.4.2.4 Summary of Values and Impact WHA Listing Criteria (vii)

The net visual impact of Ella Bay Road Upgrade and of Ella Bay Integrated Resort on World Heritage Values will be temporary; during and immediately after construction and in places until landscape screening vegetation reaches greater than 10m in height.

The area traverses the Heath Point headland which provides magnificent views of the coast line and to Ella Bay. It is proposed that the scenic values be emphasised and showcased by the provision of a vista and vehicle amenity.

To protect the scenic values and visual amenity the Proponent will:

a. Prepare and implement the Ella Bay Road Construction Management Sub-Plan prior to the commencement of construction works. The plan will include measures to screen embankments and cuttings with native vegetation, conserve mature trees where possible and a detailed monitoring and reporting regime for both the construction and operational phase;

b. Ensure that no building will exceed the height as set out in the Ella Bay Development Local Area Plan and will be screened by native vegetation. External finishes will be non-reflective and of dark tones, selected to match and blend with the existing and proposed vegetation; and

c. Implement the revegetation staging plan as presented in Figure 3.17 Revegetation Staging Plan prior to the commencement of each development stage.

3.4.3 Assessment of WHA Listing Criteria (viii) - Significant geomorphic or physiographic features

The WTWHA includes many significant geomorphic features including tropical rainforest ecosystems and wetlands which flow into the GBRWHA. The downstream and consequential impact has the potential to affect the Ella Bay Swamp Wetland which lies to the north of the Ella Bay Development through urbanisation.

The impact of changes in water quality and hydrological flows will potentially impact both World Heritage Areas directly in terms of discharge quality and flow and indirectly for the GBRWHA with regards to impact from degradation of the Ella Bay Swamp Wetland.

3.4.3.1 Nationally Important Wetland

The southern-most tip of the Ella Bay Swamp Wetland enters the property in its north-eastern reaches, as depicted in Figure 3:8. This wetland is classified by DSEWPaC as a Nationally Important Wetland.

Ella Bay Swamp Wetland lies 500m to the north of the development site. Downstream impacts; from sediment, fertilisers or chemicals, changes in surface and groundwater hydrology and the introduction of weeds have the potential to impact on the wetlands.

The wetland mapping is from DSEWPaC's Protected Matters Search Tool (http://www.environment.gov.au/arcgis-framework/apps/pmst/pmst.jsf)

Figure 3:8 Ella Bay Swamp Wetland - DSEWPaC's Protected Matters Search Tool

3.4.3.2 Great Barrier Reef World Heritage Area

The Great Barrier Reef Marine Park and World Heritage Area are adjacent to the coast of Ella Bay. Ella Bay Development is not directly contiguous with the GBRWHA being separated by an Esplanade of approximately 100m width. The GBRWHA in this area has the following properties:

- The GBRWHA from Flying Fish Point to Ella Bay is zoned for general use which is the lowest level of protection;
- The coastal area from Mission Beach to Cairns is shown as a significant coastal wetland; and
- Ella Bay Road and Ella Bay Development are not located within proximity to:
    - Coral reefs;

- Significant sites for birds;
- Seagrass beds;
- Estuarine wetlands; or
- Freshwater wetlands.

The objective to preserve this environment is that future development should not impact on the coastal wetlands.

3.4.3.3 Ella Bay Development

The use of the Ella Bay property for agriculture has created few direct impacts on the World Heritage values of the Great Barrier Reef. The impacts of the agricultural management practices; clearing especially of the riparian margins, use of dips, chemicals and widespread herbicide and fertiliser use has had indirect, relatively localised impacts, primarily relating to water quality.

The potential impacts on Ella Bay Swamp, WTWHA and to the GBRWHA from the Ella Bay Development and increased human activity are:

- Changes in hydrological flow from:
  - Modification of existing drainage patterns;
  - Increased impervious surface;
  - Rainwater harvesting and harder surfaces potentially change the timing and quantity of runoff; and
  - The groundwater abstraction could potentially impact on the upper aquifer and dry the wetlands.
- Increase in pollutants from:
  - Sediments from construction and operation;
  - Increased Nutrients from sewer waste;
  - Golf course and development use of herbicides, pesticides and nutrients; and
  - Acid Sulphate Soils generated during excavation and fill.

Mitigation - Changes in hydrological flow

Extensive mitigation is proposed adjacent to the northern wetlands and Ella Bay Swamp through the use of constructed wetlands to minimise any nutrient and sediment inflow, and "organic" management of the golf course areas that drain northerly (Refer to Figure 3:9). The constructed wetlands will also maintain the current surface water hydrological flow regime to the north. (Refer to Volume Six 6.4G *Stormwater Management Plan*).

Storm and surface waters from all development areas including the golf course open areas will be treated through constructed wetlands and bioretention filters to remove nutrients and sediment and to maintain the hydrological flow regime of the creeks. The nutrient removal and hydrological flows have been modelled for the initial Northern precincts (refer to Volume Six, 6.4c and 6.4d) to preserve the stormwater quality and flow into the northern wetlands and discharge into the creeks.

Ella Bay will be self-sufficient in potable water supply through rainwater harvesting and backup ground water abstraction (refer to Volume Six, 6.4b *Integrated Water Management Plan*). The proposed potable water supply strategy is: (Refer to Figure 3:14)

- Rainwater harvesting (roof catchments) will provide the primary source of potable water supply for the development;
- Rainwater harvesting will provide the water supply for the Resort swimming lagoons which will provide treated water for the pools ;
- Ground water from the lower aquifer will provide on-site backup water supply.

Figure 3:9 Ella Bay Development showing constructed wetlands and organic golf holes with proximity to Ella Bay Swamp Wetland and Offset areas.

Rainwater harvesting will not adversely affect the downstream hydrology, rather it will form an integral part of an overall stormwater management strategy to ensure that post-development site discharges mimic predevelopment flow regimes. Rainwater harvesting will provide 'retention' storage to reduce the overall runoff volume and 'detention' storage to reduce peak runoff rates.

The hydrological objectives to manage the increased impervious surfaces and rainwater harvesting are to preserve:

- Waterway stability to predevelopment discharge to minimise disturbance of benthic habitat; and
- Preserve the dry duration during dry season (avoid drying out):
    - Preserve the pre-development 30-day low flow duration frequency curve for the dry season (July to November) (refer to Figure 3:10).
    - Preserve the low flow spells frequency curve for the dry season (refer to Figure 3:11).
- Preserve the wet duration during year (avoid over wetting)
    - Preserve the pre-development 30-day high flow duration frequency curve for entire year (all months) (Refer to Figure 3:12).

The modelling of flows and durations with management of retention and detention has indicated that there will minimal change to the post-development flows and the creeks, wetland and dunal swale habitat will be preserved (refer to Volume Six, 6.4 c *WSUD Stormwater Objectives*; 6.4 d *Northern Precinct Stormwater Management Plan*). The exception being that in the modelling of the northern precinct flows to the northern wetlands; the catchment area has been marginally reduced from predevelopment flows and the mitigated result will create a slightly drier wet season from that section of the development. The catchment area will be 16ha less compared to the total catchment size of 836ha and given the very wet conditions this slight change is not expected to impact on the Northern Wetland.

Groundwater occurs in two aquifers; a shallow aquifer that flows towards the coast and is (semi)confined showing evidence of tidal forcing and submerged discharge along Ella Bay

Beach; and a lower aquifer that is situated in the colluvium above the bedrock at depths of 20 to 35m.

It is not proposed to use or impact on the upper aquifer, and while the lower aquifer follows the topography and flows slightly northerly it is not considered that this flow will be changed or that it will impact on Ella Bay Swamp.

The upper aquifer is charged by the wetlands and seepage through the covering soil. Water harvested through water tanks will be returned through irrigation of the golf courses by treated recycled water. The irrigation of the treated water will aid in maintaining soil moisture, seepage through the soil and charging the upper aquifer. The inclusion of the contructed wetlands will provide additional detention and holdup of stormwater flows and allow seepage into the upper aquifer. The upper aquifer flows into the Great Barrier Reed lagoon in the form of a submerged groundwater discharge a phenomena researched at Ella Bay (Steiglitz 2005)

Test bores have established that the lower aquifer is a suitable source for drinking water in times of low rainfall in terms of quality and capacity. No direct connection was reported between the aquifers during the tests. Groundwater abstraction modelling was undertaken using a simple model without recharge and assuming that there is a direct hydraulic connection between the colluvium and the sandy sediments in the wetlands. The results indicated that the bore (PB1B) could be pumped continuously for 35 days at a flow rate of 3 L/s before potentially producing 0.1m drawdown at the northern vegetation boundary ephemeral wetland and for 80 days before potentially producing 0.1 m drawdown at the dunal swale. Modelling over an extended period (Figure 3:13) showed that the drawdown at the dunal swale would potentially be 0.32m after 2 years. Given, the high rainfall during the wet season it would be expected that the cone for drawdown would substantially recharge and contract, also the colluvium hydrogeology is highly variable in nature and not free flowing across the site; a number of bores were poor yielding and the colluvium strata does not continue across the site.

It is proposed to monitor the surface aquifers using the existing bores and use a trigger point of 0.1m drawdown, greater than tidal forcing amplitude (Refer to Volume Six 6.4f *Groundwater Evaluation Figure 22*).

Mitigation - Increase in pollutants

The northern golf course holes which flow to the northern wetlands will be managed as per Organic practices (refer to SEIS 2.2.8). This will be practiced with organic versions of pesticides, herbicides and fertilisers except for WONS class weed removal where recognised “frog friendly” herbicides will be used for control. Apart from this practice all golf course stormwater runoff will report to constructed wetlands or bioretention filters.

The primary objective of the constructed wetlands is to remove sediment and nutrients from the development stormwater flows. The quality objective of the constructed wetlands and bioretention filters is to reduce the nutrients and sediment of post development discharge by:

- total suspended solids loads of > 80%
- total phosphorus loads of > 65%
- total nitrogen loads of > 35%
- gross pollutants loads of > 90%

Wastewater from the development; grey water and sewerage, will be treated on site by a membrane bioreactor (MBR) and provide Class A^+ recycled water for non-potable domestic supply toilet flushing, cold water laundry and residential garden watering irrigation and for Open Space irrigation. The Open Space irrigation water may be stored for extended periods, held in open storage or combined with harvested stormwater and will irrigated at a minimum Class B standard. The proposed wastewater system configuration will comprise:

- Wastewater will be collected in a low infiltration sewerage system draining to a number of sewage pumping stations;
- Wastewater will be pumped to two Sewage Treatment Plants;

- Recycled water will be treated to Class A+ standard in accordance with Guidelines under the Water Supply (Safety and Reliability) Act suitable for residential non-potable reuse such as toilet flushing, cold water laundry, garden watering and commercial laundry;
- Class B recycled water will be irrigated through subsurface irrigation and restricted access surface irrigation;
- Treatment residuals will be thickened on-site and then transported off-site for disposal or reuse; and
- Recycled water that cannot be used immediately will be directed to seasonal storages (tanks or sealed covered dams) distributed around the development.

The results of a recycled water balance indicate that 98% beneficial reuse can be achieved with an irrigation area of 91 ha and a dedicated storage volume of 11 ML. Full reuse would be achieved by "over-irrigating" during periods of low demand, ie in wet weather; any additional runoff generated as a result of this will be managed through the site stormwater treatment systems.

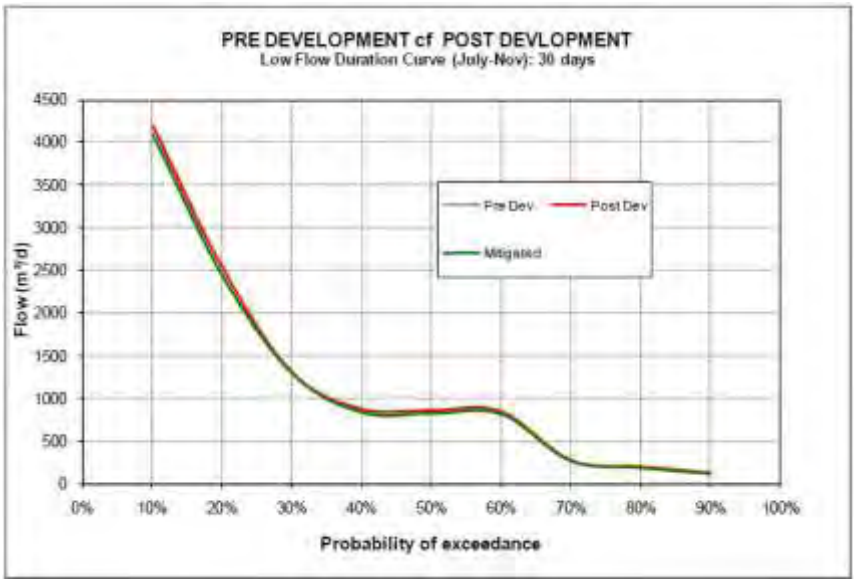

Figure 3:10 Low Flows Duration Curve for whole catchment to Northern Wetland

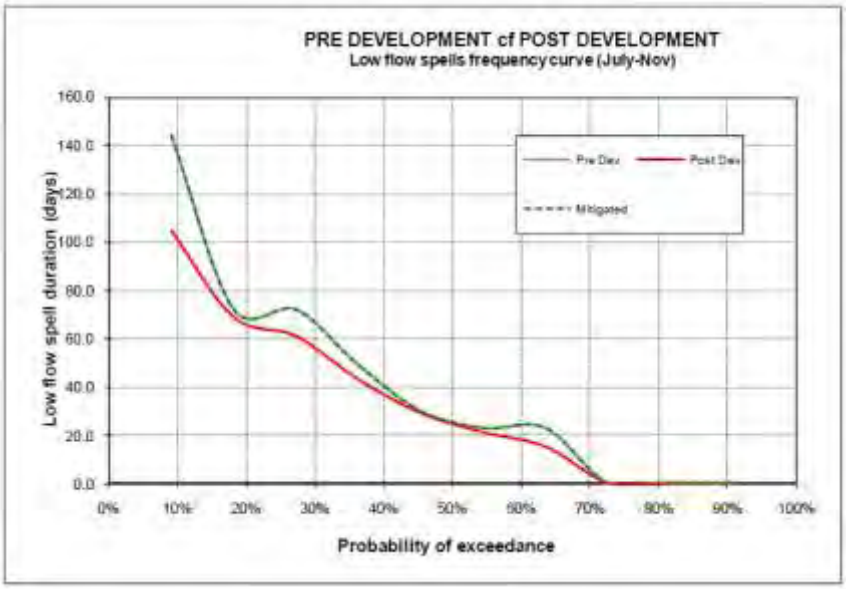

Figure 3:11 Low Flow Duration Curve for whole catchment to Northern Wetland

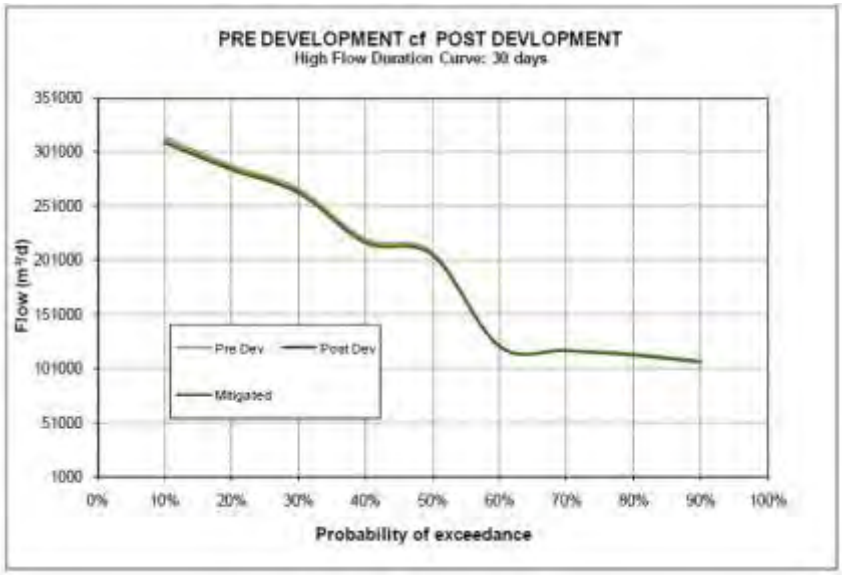

Figure 3:12 High Flow Duration Curve for whole catchment to Northern Wetland

Acid Sulphate Soils

There is a low probability of PASS and ASS based on the preliminary soil sampling (Refer to EIS A6.3). Soil samples were taken along a north-south transect that intersected the centre of the resort precincts of the eastern side of the development and parallel transects to the west. No sample below 7.5mAHD recorded elevated acidic properties. All samples exhibited below detectible limits for Chromium reducible Sulphur confirming no PASS material was identified.

The area east of the North-South creek (below 7.5mAHD) is characterised by quaternary beach sands of the Hull and Tully soil types. None of the soil types are considered to have originated in conditions typically associated with the formation of ASS material.

Some samples above 7.5mAHD reported elevated acidity from boreholes locations logged as residual soils that were formed by in-situ breakdown of weathered rock or alluvial deposition from upstream sources within a terrestrial freshwater environment and the results are considered to be indicative of natural soil acidity sourced from the weathering and erosion of the surrounding basement metamorphic rock types.

To protect water quality and ecosystems, all areas of the proposed development requiring ground disturbances located below 5 metres AHD shall be subject to an acid sulphate soil investigation and management where identified, in accordance with the Queensland State Planning Policy 2/02. If required, site specific Acid Sulphate Soil Management Plans will be developed. Timing for such investigations shall be tied to approval of each stage of development.

Mitigation - Revegetation and Setbacks

Extensive revegetation and rehabilitation is proposed around the site in particular along the boundary to the WTWHA, site streams and riparian zones which carry water to the GBRWHA. The present riparian zones have been degraded by previous use and cyclones Larry and Yasi. The revegetation will provide a significant protective buffer to the stability of the riparian zone, enable stream shading and improve the ecology of the aquatic habitat, prior to discharge to the GBR lagoon.

The thin and often non-existent riparian zone has created heavy erosion along creeks forming unstable creeping banks characterised by bank failure. This erosion will be significantly reduced by the proposed revegetation and stream rehabilitation which will be required in the worst erosion points.

A 100m buffer to the WTWHA will mitigate against urban creep from the development. The 100m buffer will be revegetated and will also significantly reduce the existing agriculture induced edge effects in to the rainforest.

Chemical use (herbicides etc) will be restricted to chemicals recommended in the *Water Quality Guideline for the Great Barrier Reef Marine Park* (2008).

During construction there is also a potential for additional sediment and rubbish. The timing of civil construction including roadworks will be timed to avoid the wet season and emergency regime will be implemented in approaching significant weather events (including cyclones).

The following environmental management sub-plans will specifically address these issues:

- Ella Bay Road Construction Management Sub-Plan;
- Erosion and Sediment Control Sub-Plan;
- Clearing and Earthworks Management Sub-Plan;
- Site Preparation Management Sub-Plan; and
- Cyclone, Fire & Emergency Management Sub-plan.

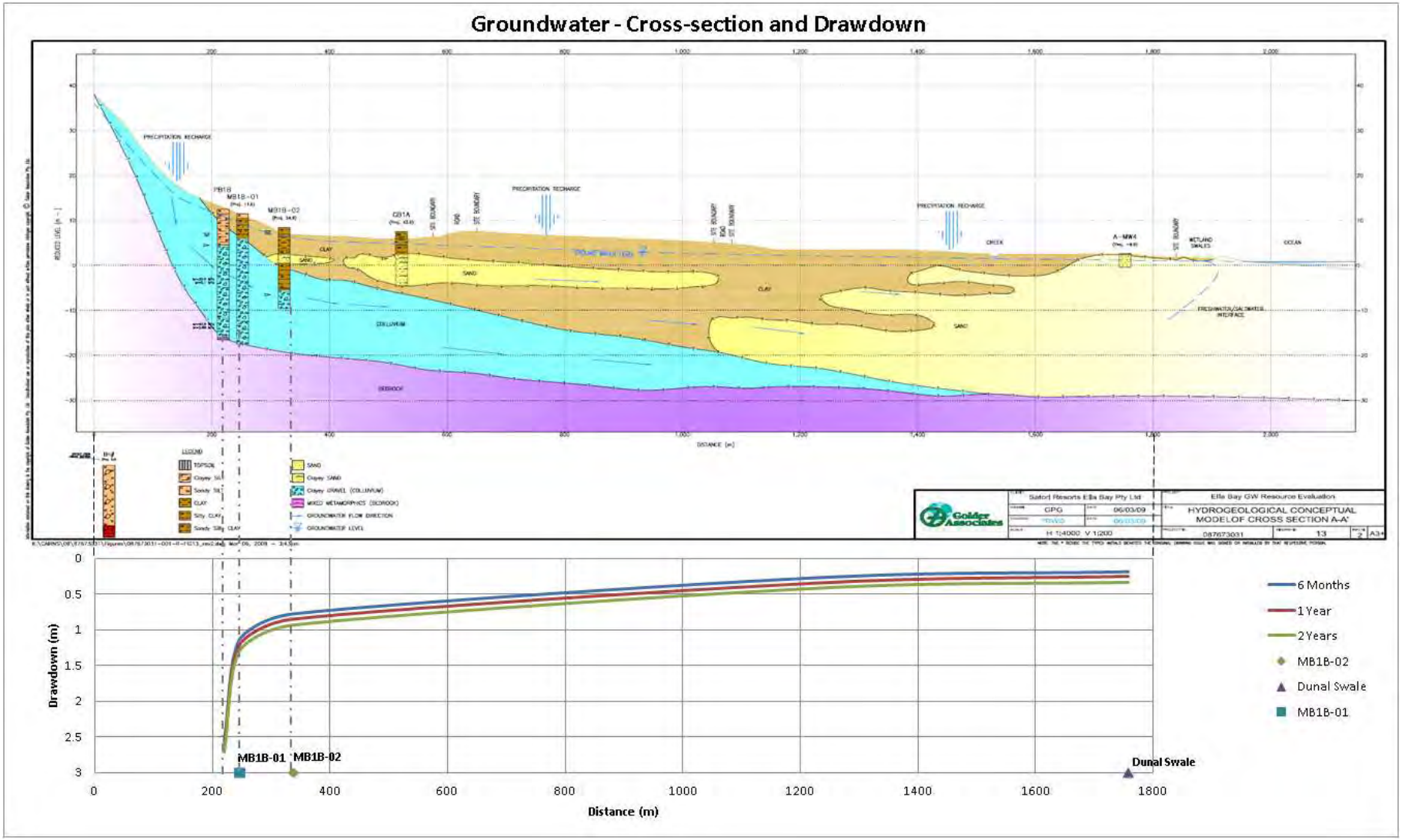

Figure 3:13 Cross-section superimposed over groundwater drawdown showing impact of continuous drawdown assuming upper aquifer is connected and no inflow (worst case scenario)

Figure 3:14 Stormwater and Potable Water Cycle: Rainwater harvesting with groundwater backup. Constructed wetlands and Bioretention Filters filter runoff. Recycled water is stored during rain events

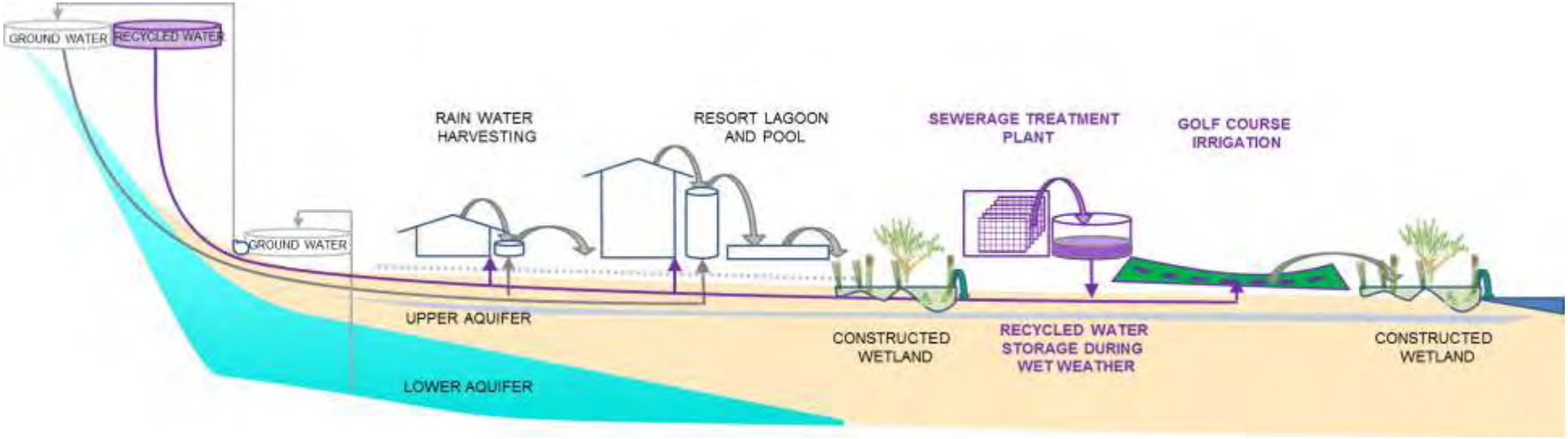

Figure 3:15 Recycled water cycle: supply to buildings, fire fighting, and irrigation of recycled water.

3.4.3.4 Ella Bay Road

The existing Ella Bay Road is a narrow gravel road that varies from an undulating road along the flat to Heath Point Headland and then is winding and steep. The gravel road is subject to extensive erosion and the resulting sediment lines the creeks and drainage paths (refer to Volume four *Ella Bay Road Design and Environmental Management Report* Chapter 6). The road around Heath Point Headland has un-retained cuttings and embankments and there are currently no measures in place to reduce or control erosion and subsequent sedimentation.

The primary sources of sediment and areas of erosion are the table drains and the unsealed road itself. The receiving waters for the various sub-catchments of Ella Bay Road are directly and indirectly the GBRWHA.

The potential impacts on the GBRWHA from the upgrade of Ella Bay Road and increased traffic along Ella Bay Road are:

- The potential for altered water flows and drainage of waterways and wetlands;
- Sedimentation of streams, seasonal wetland habitats, and adjacent marine habitats;
- Direct changes to stream hydrology and flow regime which results in loss of habitat or biodiversity through either erosion of riparian and peripheral areas and/or destruction or modification of aquatic habitat; and
- Pollutants from litter and road runoff.

There are no major watercourses entering the Great Barrier Reef lagoon along the road alignment, and the existing small creeks are intended to remain unaltered by the roadworks. Existing pipe culverts over creeks are proposed to be removed and replaced with bridges (fauna underpasses) which better protect aquatic habitat and water quality. All other pipe culverts will be replaced and use the existing drainage alignments. The potential for sedimentation will be reduced with road sealing and stabilisation of embankments. The potential increase in road runoff nutrients, road pollutants and litter will be mitigated by incorporating bio-filtration and gross pollutant traps along the road where practicable.

Acid sulphate soils could potentially be exposed when excavating or filling below 5mAHD. The road alignment has been designed to be above a minimum elevation of 5mAHD. Areas that are below that level will be filled with compacted road base. The Stage 1 road alignment has two areas that are below 5mAHD and the fill required is less than 500m². The proposed Stage 2 road alignment elevation of Bay Road requires fill in excess of 500m² with an average depth of 0.5m and potentially trigger SPP2/02.

To protect water quality and ecosystems, all areas of the proposed road requiring ground disturbances located below 5 metres AHD shall be subject to an acid sulfate soil investigation and management where identified, in accordance with the Queensland State Planning Policy 2/02. If required, site specific Acid Sulfate Soil Management Plans will be developed. Timing for such investigations shall be tied to each stage of the roadworks approval.

Potential temporary impacting process to the Great Barrier Reef World Heritage Area could occur from the following:

- An extremely low risk emergency release of pollutants from vehicle accidents could temporarily impact on water quality;
- Erosion and sedimentation could occur during construction impacting on water quality. This will be the highest risk period during earthworks and will require high standards of construction management and planning. (Refer to Volume four *Ella Bay Road Design and Environmental Management Report* and Volume three Environmental Management Plan); and
- Acid Sulphate soils exposed during construction of Stage 2 intersection with Bay Road.

3.4.3.5 Summary of Values and Impact - WHA Listing Criteria (viii)

The proposed mitigation measures will reduce the potential impact of groundwater, stormwater and treated effluent on World Heritage Values to the nationally significant Ella Bay Swamp

Wetland, WTWHA rainforest and the Great Barrier Reef Marine Park. The mitigation will adequately cover the impact and will provide a net positive benefit.

The downstream impacts of surface water along Ella Bay Road will be improved with regards to quality, sediment and there will be no change to stream hydrology. A high risk of temporary impact has been recognised during construction of the road.

The residual impact for surface water from Ella Bay Development will be negligible providing the constructed wetlands are maintained and perform to specification.

The residual impact of ground water abstraction will be negligible providing that the groundwater abstraction is monitored to confirm that any net drawdown on the upper aquifer is less than a mean 0.1m greater than tidal forcing amplitude at the northern vegetation boundary or at the dunal swale.

The constructed wetlands will become permanent water sources and likely habitat for site species – particularly cassowaries and frogs; and potentially for migratory birds.

There is a low risk of ASS and PASS however to protect water quality and ecosystems, all areas of the proposed road requiring ground disturbances located below 5 metres AHD shall be subject to an acid sulphate soil investigation and management where identified.

To protect the values of the Wet Tropics of Queensland World Heritage Area and the Great Barrier Reef World Heritage Area, the proponent will:

a. Prepare and implement the *Ella Bay Road Construction Management Sub-Plan* prior to the commencement of construction works. The plan will include measures to manage and minimise nutrient and stormwater runoff, erosion and sedimentation and a detailed monitoring and reporting regime for both the construction and operational phase;
b. Prepare and implement an Integrated Water Management Sub-plan. The plan will include measures to manage groundwater abstraction, manage and minimise nutrient and stormwater runoff, erosion and sedimentation and a detailed monitoring and reporting regime for both the construction and operational phase;
c. Prepare and implement a Golf Course Management Sub-plan prior to the commencement of construction works. The plan will be based on recommendations of the Improving the Eco-efficiency of Golf Courses in Queensland (AGCSA, 2001) and will include measures to manage and minimise nutrient and stormwater runoff, detail the organic principles for the areas that drain to the northern wetland and a detailed monitoring and reporting regime for both the construction and operational phase.

3.4.4 Assessment of WHA Listing Criteria (ix) - Significant Ecological and Biological Processes

This world heritage value is related to the elements of evolutionary processes and in the context of Ella Bay Road and Ella Bay Development the potential impacts are those that could cause greater loss through consequential impact, such as:

- Vegetation clearing and fragmentation of habitat;
- Inhibition or prevention of wildlife movement in important arboreal, terrestrial and aquatic ecosystems;
- Loss of biodiversity through facilitation of weed, pest and disease invasion into adjacent and peripheral vegetation communities.

While the WTWHA is recognised as one of the most significant ecosystems the area of Ella Bay Road and Ella Bay Development has been degraded by previous anthropogenic impact and cyclonic weather events.

No important wildlife movement corridors have been identified for arboreal, terrestrial and aquatic ecosystems. Local movement corridors and essential habitat for the endangered cassowary and Common Mist Frog are present principally along the riparian areas.

3.4.4.1 Ella Bay Site

The Ella Bay site has been extensively cleared for previous agricultural land use and only minimum clearing will be required. The current cleared area is 241ha and only 0.95 ha of additional clearing will be required, with 50ha to be revegetated.

The proposed clearing of 0.95ha for the Ella Bay Development will comprise;

- Clearings for a number of bridges within creek riparian areas for creek crossings. The clearings have been minimised and where possible existing cleared crossings have been used requiring only extension of the clearing width;
- Multiple small clearings to locate the discharge of constructed wetlands and bioretention filters;
- One area of built development – Southern Hill, which continues along from the existing house site.

While the development will subject the area to a significant increase in population and potential anthropogenic impacts, extensive mitigation in terms of revegetation, and rehabilitation of degraded and weed infested vegetation will be undertaken. Cassowary and wildlife corridors will be established, covenanted and provide connectivity between areas of vegetation and improve riparian corridors. Constructed wetlands for storm water mitigation will also provide cassowaries with more abundant permanent water.

A vegetated buffer from the WTWHA on the western and southern boundaries will minimise any edge effects. The buffer distance is a minimum of 100m, and this area will be included in a conservation covenant.

All areas of essential habitat will remain accessible within Ella Bay development site through the cassowary corridors and cassowary underpasses for creek crossings (Refer to Volume Seven *Cassowary Accessibility Through Ella Bay* Dwg 14). The only cassowary habitat area that will have restricted access will be 1.07ha Of Concern vegetation which is classified as "general" cassowary habitat. This section is of very poor quality and invaded by pond apple which will be rehabilitated. The location of this vegetation is adjacent to the central resort area.

Clearing Areas						
	National Park	***WTWHA Of Concern***	***WTWHA Essential Cassowary habitat***	***Essential Cassowary habitat***	***Of Concern RE***	***Total Area***
Ella Bay Road	0.004 ha	0.33 ha	0.33 ha	1.80 ha	0.34 ha	2.80 ha
Ella Bay Development				0.70 ha	0.25 ha	0.95 ha
TOTAL	**0.004 ha**	**0.33 ha**	**0.33 ha**	**2.50 ha**	**0.59 ha**	**3.75 ha***

Table 3:2 Clearing areas for Ella Bay Road Stage 1 & 2, plus clearing of Ella Bay Development site
* Total Area has been rounded to two decimal places

Isolation Areas				
	Essential Cassowary habitat	***General Cassowary habitat***	***WTWHA Of Concern***	***Total Area***
Ella Bay Road	1.05 ha		0.02 ha	1.07 ha
Ella Bay Development		1.07 ha		1.07 ha
TOTAL	**1.05 ha**	**1.07 ha**	**0.02 ha**	**2.14 ha**

Table 3:3 Isolation of habitat caused through fencing

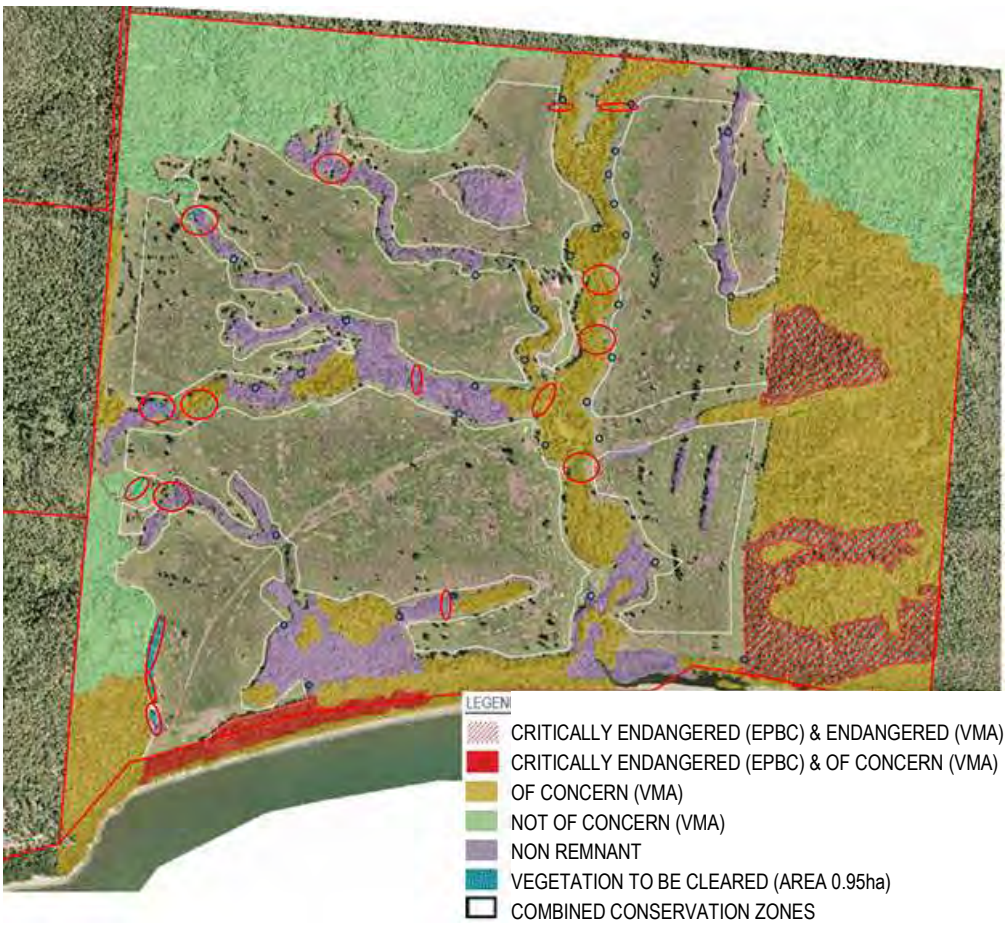

Figure 3:16 Areas of Clearing have been highlighted within red circles. Blue circles indicate clearing for wetland and BRF discharge structures

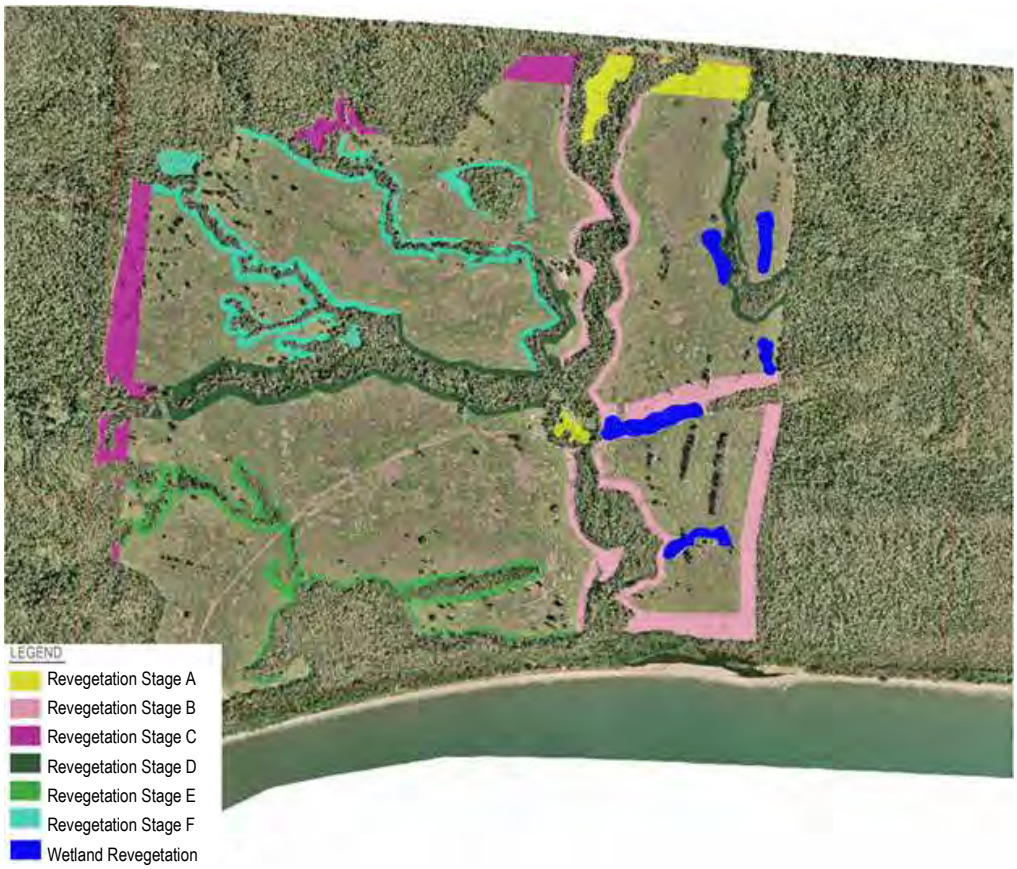

Figure 3:17 Revegetation Staging Plan

3.4.4.2 Conservation Zones

The majority of the vegetated areas will be protected and managed by Conservation Management Zones:

Conservation Zone	Purpose	Area ha
Zone A	Transfer to National Park	62.8 ha
Zone B	Nature Conservation	67.8 ha
Zone C	Fauna Corridor	87.3 ha
Zone D	Setback & Easement	58.9 ha
Total		276.8 ha

The zones have been established according to the integrity, remoteness from disturbance, intended physical, social setting and management purpose of different parts of the area. The zone nomenclature follows the methodology used by the Wet Tropics Management Authority (WTMA) Management Plan (WTMA, 2009).

Zone A

Zone A comprises 62.8ha of high integrity land which will be transferred and incorporated into Ella Bay National Park as part of the proposed Offset Package (Refer to Volume 5).

The primary purpose of Zone A is protection of endangered vegetation, essential cassowary habitat, and Ella Bay Swamp through transfer to National Park.

The 40.18ha (A.1) in the northern area will:

- Include the southernmost extent of the Nationally Significant Wetland; Ella Bay Swamp. (DSEWPaC, Protected Matters Search Tool);
- Support and assist the Southern Cassowary Recovery Plan (Latch 2007) by conserving essential cassowary habitat; and
- Protect EPBC Critically Endangered, VMA Endangered and Of Concern vegetation communities.

The 22.62ha (A.2) in the south western area will:

- Widen the existing narrow World Heritage Area linkage;
- Add a section of land to the Ella Bay National Park to provide a near contiguous linkage to the geographically isolated southern section of Ella Bay National Park; and
- Support and assist the Southern Cassowary Recovery Plan (Latch 2007) by conserving essential cassowary habitat and protecting an important regional cassowary habitat corridor.

Zone B

Zone B comprises 67.8ha adjacent to and borders Zone A. Zone B will be registered as a conservation covenant under the *Land Title Act 1994* (Part 6 Division 4A).

The primary purpose of Zone B is protection of endangered vegetation, essential cassowary habitat and as a buffer to Zone A land transferred to National Park.

The 55.8ha (B.1) in the northern area will:

- Serve as a 300m (minimum) buffer to Zone A (A.1) in the North and to the Nationally Significant Wetland - Ella Bay Swamp;
- Support and assist the Southern Cassowary Recovery Plan (Latch 2007) by conserving essential cassowary habitat; and
- Protect EPBC Critically Endangered, VMA Endangered and Of Concern vegetation communities.

The 12.0 ha (B.2) in the south western area will:

- Serve as a 100m buffer to Zone A (A.2) on the west; and
- Support and assist the Southern Cassowary Recovery Plan (Latch 2007) by conserving essential cassowary habitat and protecting an important regional cassowary habitat corridor.

Zone C

Zone C consists of 87.3 ha comprising 100m wide buffers and fauna corridors. Zone C will be registered as a conservation covenant under the *Land Title Act 1994* (Part 6 Division 4A). Zone C is comprised of land on which, or adjacent to which, there is disturbance associated with community services infrastructure.

The primary purpose of Zone C is for rehabilitation and protection of vegetation, cassowary habitat and as a buffer to the National Park.

The Western boundary and Southern boundaries will:

- Serve as a 100m (minimum) buffer to Ella Bay National Park; and
- Be revegetated to support and assist the Southern Cassowary Recovery Plan (Latch 2007) by conserving essential cassowary habitat;

The East West and North South corridor will:

- Serve as a 100m (minimum) riparian fauna corridor;
- Be revegetated and rehabilitated to support and assist the Southern Cassowary Recovery Plan (Latch 2007) by conserving essential cassowary habitat; and
- Protect Of Concern vegetation communities.

The Coastal corridor will:

- Serve as a coastal fauna corridor;
- Be revegetated and rehabilitated to support and assist the Southern Cassowary Recovery Plan (Latch 2007) by conserving essential cassowary habitat; and
- Protect EPBC Endangered and Of Concern vegetation communities.

Zone D

Zone D consists of 58.9 ha comprises setbacks and easements and will be protected by body corporate bylaws and under the Regional Vegetation Management Code for Coastal Bioregions. The area will be defined by surveyed boundary.

Zone D is comprised of land on which, or adjacent to which community services infrastructure will be located.

This area provides:

- A setback from the riparian border of identified watercourses on the site;
- A 50m setback In the north-east between vegetation (Zone B.1) and the resort; and
- A 20m easement through Zone C to connect the precincts across covenanted areas.

Clearing of native vegetation within the waterway buffer will only occur for required infrastructure, for which no suitable alternative exists e.g. bridges (including co-located pipes and cables), storm water treatment infrastructure in particular discharge outlets. Creek crossings (bridges) have been chosen at existing disturbed areas within the waterway to minimise clearing.

The waterway buffer will be revegetated with site endemic vegetation and grassed swathes to minimise sediment runoff.

Figure 3:18 Ella Bay Conservation Zones

3.4.4.3 Weeds, Pests and Disease

The existing weed problem is extensive with mono-cultural stands of the weeds; Pond Apple, (*Annona glabra)* and Hymenachne comprising approximately 14.9ha of Ella Bay Development (refer to Volume Six, 6.2d *Weed Mapping Survey Jan 2010*). Singapore Daisy lines the beach front along Ella Bay, and is one of the major threats to successful turtle nesting in the upper dunes. Pond Apple, Singapore Daisy and Hymenachne are some of the most threatening environmental weeds to the WTWHA and are listed #1, #4, and #5 according to (Werren, 2001). These weeds will readily colonise and have probably been dispersed into adjacent areas of the Wet Tropics and are in danger of spreading into Ella Bay Swamp Wetland. Successful and continuing weed control of Ella Bay Development will provide a barrier against further weed invasion of the Ella Bay National Park and locally the WTWHA.

Chytrid fungus (Batrachochytrium Dendrobatidis) has been identified as a major threat to the frog population of the WTWHA, causing devastation to the high-altitude frog species. Chytrid fungus has been established as being present on the Ella Bay site (Alford 2009) however is not considered a threat to the frogs due to the warmer temperatures. On the coastal area the fungus appears to be active only in the cooler months and is quickly killed by increase in temperature without appearing to impact on the frog population (Alford 2009).

There are no recognised disease threats to the Southern Cassowary and the Recovery Plan for the Southern Cassowary (2007) has no guidelines on preventative measures.

The Proponent has committed to a no dog or cat policy, instigated control of feral pigs and dogs, and started control of WONS listed weeds.

3.4.4.4 Summary of Values and Impact WHA Listing Criteria (ix)

The proposed Masterplan has incorporated extensive conservation zones. A covenanted buffer will protect the adjacent WTWHA with a minimum 100m wide revegetated corridor from the development. The proposed North/South and East/West fauna corridors will be extended by revegetation to a minimum of 100m wide revegetated corridor.

These buffers and corridors will be maintained for conservation purposes creating a ‘continuous’ conservation area to facilitate fauna movement through the landscape, particularly allowing access to coastal habitat and increasing the carrying capacity for cassowaries

The total clearing including Ella Bay Development and Ella Bay Road will be 3.75ha and the total isolation of habitat will be 2.14ha. To minimise the impact of clearing revegetation totalling 50ha will be undertaken.

The implementation of the *Weed Management Sub-plan* and continuation of current feral animal control on site are designed to protect the adjacent WTWHA from these influences which are recognised threats to World Heritage values.

To protect the values of the WTWHA the Proponent will:

- **a.** Prepare and implement the Ella Bay Road Construction Management Sub-Plan prior to the commencement of construction works. The plan will include measures to manage and minimise the clearing of mature trees and revegetate along the road corridor as referred to in the Ella Bay Road Design and Environmental Management Report Chapter 9 Flora Sensitive Road Design;
- **b.** Implement a conservation covenant over areas denoted as Conservation Zone B of 67.8 ha and Conservation Zone C of 87.3 ha on Lot NR320 N157629 for protection and in perpetuity as described in Figure 3.18 Ella Bay Conservation Zones
- **c.** Prepare and implement the Revegetation and Rehabilitation Management Sub-plan. The plan will include the priority as presented in Figure 3.17 Revegetation Staging Plan and identify the areas, management actions, and performance criteria;
- **d.** Implement the Weed Management Sub-plan, to control exotic species including Pond apple (Annona glabra) and revegetate with endemic species;

e. Prepare and implement a Feral Pest & Wallaby Management Sub-plan to control feral animals and manage wallaby impact on revegetation. The plan will include cassowary safe trapping and baiting of feral pigs, control of feral and domestic dogs and cats, including non-target safe monitoring and active management actions;
f. Implement the Hygiene Protocol referred to in Stream Dwelling Rainforest Frog Species Management Sub-plan for chytrid fungus control.
g. Prepare and implement a Community Management Statement over Lot NR320 N157629 which details the prohibition of cats and dogs, excluding guide and assistance dogs.

3.4.5 Assessment of WHA Listing Criteria (x) Significant Biological Diversity/Threatened Species

Impacts on EPBC threatened species are covered in Chapter 4 of this Volume.

3.4.5.1 Great Barrier Reef World Heritage Area.

The inshore marine area of Ella Bay is frequented by rare and threatened fauna such as the Irrawaddy and Indo-Pacific humpback dolphins, dugong and turtles.

Impacts to marine animals will be primarily from changes to water quality and hydrology and increased use of the coastal area by boats and swimmers.

Possible impacts and mitigation measures due to Stormwater and Groundwater have been detailed in section 3.4.2 of this report. Other potential impacts are detailed in the *Marine Turtles Section 4.5* of this report. These measures are also appropriate for all marine species.

No increase in boating traffic is forecast with no boat landing access or marina proposed. The development will not be visible from the coastal area and there is no incentive for additional boat cruising.

3.4.5.2 Summary of Values and Impact WHA Listing Criteria (x)

The significance of potential impacts on the GBRWHA from the development are likely to be "minor and inconsequential" due to mitigation measures applied to minimise changes in hydrology and minimise pollutants of Stormwater and Groundwater.

3.4.6 Assessment of Cultural and Historical Values

Although the controlling provisions of the project do not include National Heritage values the Proponent has prepared a Heads of Agreement to establish the Ella Bay Bagirbarra Development Trust to establish a cultural economy and assist with sustainability of the Bagirbarra cultural heritage.

The Bagirbarra people are recognised as the Traditional Owners of the Ella Bay area and have received recognition as the Traditional Owner from the Northern Queensland Land Council during 2011. The Bagirbarra are of slight build characteristic of the rainforest aborigines of the Wet Tropics reported by Tindale (1974) and are physically (and culturally) distinct from the MAMU. The first recorded history of the Traditional Owners is from survivors of the wreck of the brig Maria who landed at the Ella Bay site on a raft in 1873.

The Ella Bay site was cleared in the early 1900's and most of the cultural and ethno-history have been removed or lost. The only known significant cultural artefacts are at the entrance to the Ella Bay property; a significant rock (women's business) and grinding grooves on beach rocks.

The Welcome centre will feature Traditional Owner Cultural Heritage values and history and application of indigenous natural heritage management principles.

The Proponent will:

- Implement the *Cultural Heritage Management Sub-plan,* to control, manage and protect cultural artefacts during excavation ; and

- Inform of the Traditional Owner Cultural Heritage values and history and application of indigenous natural heritage management principles through the Welcome Centre.

3.4.7 Upgrade of Ella Bay Road through WTWHA Environmental significance

The WHA is managed by Wet Tropics Management Authority (WTMA) who administers road development within the WHA through a Permit system. WTMA together with Queensland DMR have produced a manual to road construction within the WHA titled Roads in the Wet Tropics,

The goal of the manual is to:

> *"Improve the performance and management of road corridors within the wet tropics region by using current information and the latest technology in such a way that takes into account the costs and benefits to the environment, community and economy."*
>
> (DMR, 1998), pO-1)

The design of Ella Bay Road has primarily been based on this manual with a number of modifications which have evolved through the design process literature study, stakeholder interaction, and design and environmental consultants.

The area of Zone C which incorporates the existing road is immediately adjacent to a 'buffer area' of Zone B, in which the management intent is to restore land to it's natural state wherever practical by relocating disturbances to land where they will have less impact or to rehabilitate the land over time where opportunities arise.

The traffic noise of Ella Bay Road was modelled and compared to the existing Kuranda range traffic noise which has been ecologically researched as to the impact of noise to avifauna. The difference in sound power is substantial with the traffic noise of Ella Bay Road at 31m equivalent to current Kuranda traffic noise at 100m at which point the impact on avifauna was marginal. Traffic noise will create minimal impact into Zone B.

3.4.7.1 Ella Bay Road

The clearing along Ella Bay Road has been restricted to the minimum necessary for safety of motorists. The clearing design of Ella Bay Road upgrade (Stage 1) has fully utilised the existing cleared road alignment wherever possible. The road corridor has been widened for the increased traffic safety and to improve the road-side drainage to meet current standards. Mature trees have been protected where possible to provide canopy shading with over 20 trees requiring guard rail protection because of their proximity to the road. To achieve this level of tree retention the road alignment has been modified to specifically avoid the trees and road safety mitigation added where the alignment has remained too close to the tree. However in some cases the saving of mature trees has increased the area required for clearing as the road alignment has been moved to avoid these trees. Additionally the canopy connectivity of Ella Bay Road was significantly damaged by Cyclone Larry (2006) and more recently by Cyclone Yasi (2011) with the high shear winds breaking many of the canopy crowns and the large branches that formed the canopy cover, particularly on the edge of the road. (Refer to Volume Four *Ella Bay Road Design and Environmental Management Report* Chapter 9 *Flora Sensitive Road Design)*

The clearing required for Ella Bay Road is summarised below and in Table 3.2. The clearing table excludes clearing for Little Cove Road Easement which is under an existing DA and current clearing permit. The clearing areas have been categorised by Regional Ecosystem mapping and correlation to Essential cassowary habitat mapping from the Southern Cassowary Recovery Plan (Latch 2007).

The cassowary fencing along the road and funnelling of the cassowaries to the underpasses and the overpass will isolate some essential and general cassowary habitat along the roadside and other non-cassowary habitat within the World Heritage Area. Additionally any revegetation works within the fenced road alignment will exclude cassowary fruiting species to reduce the

possibility of enticement on to the roadway. The total of this isolation area is included in Table 3:3

The revocation of a small area 0.014ha (140m²) of Ella Bay National Park with clearing of less than 40m² will enable an improved alignment at the intersection of Stage 1 and Stage 2 resulting in a reduction in clearing of 1400m². The National Park and WTWHA do not share the same boundary at this point.

The cassowary fence will be located between 5 to 10m within the rainforest and isolate some habitat between the roadside and the fence and have a small impact around the fence alignment. The impact of the fence installation and maintenance will be from localised hand clearing and the potential for weed incursion. The fence trials at Ella Bay were able to demonstrate that the impact was minimal and despite a number of cyclone events there was no increase in weeds or clearing requirement. (Refer to Volume 6.1j *Report on Cassowary Exclusion Fence Trials*).

During construction of Ella Bay Road upgrade, areas of habitat will be temporarily isolated. A temporary construction fence will be used along the road and in particular during the construction of the three underpasses and the overpass to prevent possible cassowary vehicle/construction workforce interaction. Temporary fencing of the underpass near Flying Fish Point will isolate access of up to three cassowaries from approximately 10% of their habitat during one dry season. The two underpasses at Little Cove will isolate one cassowary from approximately 3% of its habitat during one dry season. It is neither feasible nor desirable to allow the cassowaries to pass and possibly be trapped on the coastal side of the road during the construction.

Critical habitat for the Common Mistfrog is not listed in the Species Profile and Threats Database (SPRAT, DSEWPAC) and for this purpose riparian habitat along creek lines has been evaluated. In all cases riparian habitat is also listed as essential cassowary habitat and has not been collated separately.

3.5 Conclusion

The proposed development and operations of Ella Bay Development will not cause any significant loss of any World Heritage values, will not cause any World Heritage values to be degraded or damaged on a long-term basis, and will not cause any of the World Heritage values to be notably altered, modified, obscured or diminished for any significant period of time. There is an opportunity to increase the integrity of World Heritage values of the area by mitigation of the threatening process of significant weeds and road death of cassowaries; to enhance knowledge of appropriate cassowary protection measures and increase the awareness of residents, tourists and the general community of the importance of protecting World Heritage values through the measures proposed for this site.

4. Listed Threatened Species and Ecological Communities

4.1 Fauna and Flora Surveys and Assessment

Fauna and flora surveys and assessments were reported in the EIS and SEIS. Additional surveys have been requested by SEWPAC, or were generated from review or required for preparation of the Environmental Management Sub-plans.

The result of these further surveys and reports has been to add detail to the EIS and SEIS. No additional EPBC species have been recorded. Further analysis of the threats and impacts to the cassowary have been included in section 5.2, Volume Six 6.1m (*Update of Habitat Assessment of Ella Bay for the Southern Cassowary*) and in Volume Five *Offset Package Proposal*.

4.1.1 Cassowary studies - Additional Information post SEIS

A cassowary survey, assessment and PVA was undertaken in 2006 and 2007 and included in the EIS and SEIS. These reports have also been included in Volume 6 (6.1L EIS and SEIS Cassowary reports Vol I, II, & III & WP 3) on the request of SEWPAC to collate all studies together. In reference the EIS or SEIS and "collated in 6.1L" will be given to indicate source.

Further surveys were undertaken in 2009 and 2010 and are included in Volume 6 of this report (number reference is to Volume 6):

- 6.1 a Review of EIS and SEIS Cassowary Reports
- 6.1 b Cassowary Survey Feb. 2009
- 6.1 c Cassowary Survey Nov. 2009
- 6.1 d Cassowary Survey Apr. 2010
- 6.1 e Cassowary Survey Nov. 2010
- 6.1 f Cassowary Identification Drawings
- 6.1 g Cassowary Water Survey
- 6.1 h Cassowary Underpass Survey
- 6.1 i Cassowary Gate Trial
- 6.1 j Cassowary Fence Trial
- 6.1 k Cassowary Fencing Strategy
- 6.1L EIS and SEIS Cassowary reports Vol I, II, & III & WP 3
- 6.1m Update of Habitat Assessment of Ella Bay for the Southern Cassowary

A review of the EIS and SEIS survey, assessment and PVA including the February 2009 wet season survey (6.1b) was undertaken by P. Buosi to evaluate the survey and assessment technique. (6.1a).

The wet season cassowary survey was requested by SEWPAC and the proponent commissioned further surveys to monitor the cassowaries over what would be key periods in their seasonal cycle. The cassowary surveys (6.1b to 6.1e) show a large variation in cassowary numbers and an increase in cassowary usage of the area. These reports are discussed in more detail in section 4.2.

The cassowary water survey (6.1g) was undertaken to establish the habitat quality with regards to permanent water supply. Assessment of habitat quality was reported in the EIS (6.1L) and commented further by Buosi (6.1a) however the question of permanent water availability was left unanswered. This report shows that water availability was scarce during the 2009 dry season with the only permanent water reported in the creeks and to the northern wetlands. The dunal swale at Ella Bay site and the Unallocated State Land (USL) along Ella Bay Road were both dry. A revised habitat assessment has been prepared in Volume Six 6.1m.

The cassowary underpass survey (6.1g) was undertaken post the Cairns Stakeholders Workshop on Ella Bay Road (2008). This workshop concluded that cassowaries do use bridges as fauna underpasses however no evidence or research into design had been undertaken. The consensus was that any underpass on Ella Bay Road must be based on bridges that had demonstrated evidence of cassowary use.

The cassowary gate and cassowary fence trials (6.1i and 6.1j) were undertaken to prove the feasibility of the fence and funnel strategy. Both fence and one-way escape gate were trialled and proven effective. These reports are discussed further in Section 4.2 and Volume 4 (Ella Bay Road Design and Environmental Management Report).

The Cassowary Fencing Strategy (6.1k) details the methodology of construction and operations fencing for Ella Bay Road and for Ella Bay Development.

An Update of Habitat Assessment of Ella Bay for the Southern Cassowary (6.1m) has been completed based on the post SEIS cassowary surveys, vegetation survey report and the Southern Cassowary Management Sub-Plan. This update includes reference to post SEIS mitigation.

4.1.2 Fauna Studies - Additional Information post SEIS

Fauna surveys were undertaken in 2006, 2008, and 2009. The 2006 studies were reported in the EIS whereas the subsequent surveys and reports are contained in Volume 6 of this report

The following additional Fauna studies were undertaken (number reference is to Volume 6):

- 6.3 a Fauna Survey Report;
- 6.3 b Chytrid Fungus Survey;
- 6.3 c Marine Turtle Review; and
- 6.3 d Feral Pig trapping and Baiting Report.

The Fauna surveys for EBIR Site were surveyed October 2006 and November 2008 while the access road was surveyed in November 2008. The 2006 survey was undertaken some 7 months after Cyclone Larry.

In the 2008 survey no additional EPBC listed species were reported, however several additional NCA listed species were noted. None of these species will require a specific management plan, and their habitat will be potentially increased by revegetation and establishment of fauna corridors.

Common Name	Zoological Name	Status	Threats
Yellow-blotched Forest-Skink	*Eulamprus tigrinus*	NC Act Rare	Little information exists, clearing of its preferred habitat
Rufous Owl (southern subspecies)	*Ninox rufa queenslandica*	NC Act Vulnerable	Clearing of lowland habitat for agriculture
Australian Swiftlet	*Aerodramus terrareginae*	NC Act Rare	Activities which destroy or disturb nesting sites.

Effects of Cyclone Larry and Yasi on Fauna

In March of 2006 Ella Bay was damaged by severe tropical cyclone Larry (category 5). The cyclone extensively damaged the vegetation; large trees and in particular along the exposed riparian creek banks. Large areas of trees had crowns broken or were uprooted. The damage to vegetation altered understorey microclimates with the understoreys becoming brighter, warmer, drier and windier. Such changes have encouraged the growth of pioneer and weed species within the rainforest understorey.

From the 2006 to the 2008 survey there was:

- Only a minor increase in bird species richness;
- A slight increase in the species richness of frogs;
- A substantial increase in the number of reptile species. Two of the additional species, *Saproscincus basiliscus* (no common name) and Rainforest Sunskink *Lampropholis coggeri*, are rainforest species and may have suffered declines in abundance when the

forest canopy was opened. The other additional species are more generalist and may simply reflect the patchy nature of reptile activity;

- An additional two ground-dwelling mammals, Long-nosed Bandicoot *Perameles nasuta* and Northern Brown Bandicoot *Isoodon macrourus*, were recorded in 2008;
- One arboreal mammal, Striped Possum *Dactylopsila trivirgata*, was added to the species list in 2008; and
- An increase in Spectacled Flying-fox activity, however this was for only several individuals.

None of the changes or increases in species or sightings is significant enough to require modifications to the assessment in the EIS or change to the Masterplan.

In February 2011 Ella Bay was damaged by severe tropical Cyclone Yasi (category 5). The event of having two Category 5 cyclones pass over Ella Bay was extremely rare and the previous suspected category 5 cyclone was in 1916. While Ella Bay was still regarded within the eye of the cyclone there was relatively little damage. The centre of the cyclone passed to the south and the direction of the wind was from the south and while there was some tree damage and denuding of trees along the riparian areas there was not the extensive uprooting of trees experienced with Larry.

Post cyclone feeding of cassowaries was required from Cardwell north to Coquette Point (southern bank opposite Flying Fish Point). Ella Bay staff monitored cassowaries and cassowary scats and reported to QPWS that feeding stations were not required at Ella Bay. Ella Bay staff also provided cassowary fruit to the QPWS Garners Beach facility.

No followup Fauna studies have been undertaken following the favourable survey of the fast recovery of the Cyclone Larry fauna.

Other Fauna Studies

A Marine Turtle Review was undertaken after a report of turtle nesting along Ella Bay and Bramston Beach was submitted to SEWPAC by the Environmental Defenders Office in 2009 requesting that the original referral conditions be modified to include Marine and Migratory species.

No marine turtles were reported during the Fauna surveys by BAAM in 2006 and 2008.

Surveys of turtle nesting activity were undertaken by Constable (2009) who reported that a recently dug nest adjacent to the proposed resort site, and 8 recently dug nests within approximately 300m to the north of the proposed resort site and a further 39 recently dug nests along the 20km of beach extending to the north.

The Marine Turtle review concluded that the beach area near the Ella Bay site is limited in suitability for turtle nesting; it is steeply sloping with dense foreshore vegetation and limited low dunes suitable for nesting which are subject to overtopping. The proposed resort would pose a negligible threat to turtle nesting along the Ella Bay coast

A Chytrid Fungus Survey was undertaken to establish whether chytrid fungus had infected the local frog population and if quarantine and disinfection of vehicles was required.

The survey concluded that chytrid fungus is present at the Ella Bay site, and at surrounding sites in the lowland Wet Tropics and has invaded the entire Wet Tropics region, thus there is no need for special quarantine procedures.

A Feral Pig Trapping and Baiting Report has been prepared to highlight the numbers of feral pigs present on the southern end of the Ella Bay National Park. Over 100 pigs have been culled since 2008 which has locally decreased the population and is thought to benefit the cassowary population and decrease the incidence of pig dog hunter trespass.

4.1.2.1 Flora studies - Additional Information post SEIS

Flora surveys were undertaken in 2006 and 2007, 2008, and 2009. The 2006 studies were reported in the EIS whereas the subsequent surveys and reports are contained in Volume 6 of this report

The following additional Flora studies were undertaken:

- 6.2 a Vegetation Survey Report;
- 6.2 b Baseline Vegetation Monitoring of Edge Effect;
- 6.2 c Revegetation and Weed Management Issues Discussion Paper;
- 6.2 d Weed Mapping Survey;
- 6.2 e Vegetation management plan for the littoral rainforest and coastal vine thicket;
- 6.2 f Cassowary Specific Revegetation -A Cyclone Tolerant Orchard; and
- 6.2 g Pond Apple Assessment.

Vegetation surveys were undertaken in August 2006, March, 2007 and October 2008. The 2006 survey was reported in the EIS whereas the 2007 and 2008 surveys are contained in Volume 6 of this report with a comparison to the EIS. A Baseline survey October 2008 was also undertaken to establish a pre-development monitoring. The 2007 vegetation survey also included a detailed survey of the road alignment.

The 2006 survey was undertaken while there was considerable damage to the vegetation canopies. Projections of the canopy cover (2006) were made but did not provide repeatable measurement of the health of either canopy, sub-canopy or lower structural layers when compared to the later 2008 study. In some cases this lead to the reassignment of some non-remnant areas to remnant status. In regards to EVR species Stanton reported:

> *"In relation to habitat for EVR species, intensive survey in four permanent monitoring locations failed to identify significant species additional to those identified during the original survey effort with the exception of Rourea brachyandra identified at EBM22a. This gives confidence that the EVR species list compiled as a result of the original survey is a representative indication of the population densities and nature of significant flora on the site"*

While Rourea is classified as near-threatened under NCA it is a common species in the undergrowth within the roadside easement. The total of NCA listed species increased from three to four, there were no reported EPBC listed species.

None of the changes to vegetation community identified nor the additional NCA species is significant enough to require modifications to the assessment in the EIS or change to the Masterplan.

Other Flora Studies

A number of other studies were undertaken to establish the impact of weed management, weed mapping, management of rehabilitation of critically endangered Littoral Rainforest.

The species and extent of the weeds on site (6.2c Revegetation and Weed Management Issues Discussion Paper) and mapping (6.2d Weed Mapping Survey) has established a benchmark, prioritisation and methodology of management. These reports have been used in preparation of the Weed management Sub-Plan (Volume Three).

The rehabilitation, management (6.2e Vegetation management plan for the littoral rainforest and coastal vine thicket) and assessment of weed infestation (6.2g Pond Apple Assessment) was undertaken for the critically endangered Littoral Rainforest.

This vegetation community has been impacted by a number of threatening processes which has degraded the quality of the community:

- Weed invasion and subsequent native plant species displacement, habitat loss and impedance to movement;

- Understorey damage caused by unnaturally high densities of wallabies trampling and grazing;
- Wind damage caused during high wind events such as cyclone Larry and Yasi;
- Wallaby and storm surge pond apple seed dispersal; and
- Previous agricultural and camping clearing and rubbish.

These reports have been used in the preparation of the Significant Flora Management Sub-Plan (Volume Three).

4.1.3 Environmental Management Plans

The preparation of a detailed site specific Environmental Management Plan for MNES issues was requested by SEWPAC. The Environmental Management Plan and sub-plans are located in Volume Three.

Ella Bay Development's Environmental Management Plans (EMP) are designed to be a user friendly document, which ensure that the environmental commitments, management and mitigation measures identified in the EIS approvals process are implemented, monitored, audited and improved and that no breaches of environmental legislative or regulatory requirements, permits or licences occur.

The EMP consists of an overarching document titled Environmental Management Plan (EMP) which outlines the overall environmental management system and a series of separate Environmental Management Sub-Plans. The Sub-Plans are not designed as stand-alone documents but rather as specific documents addressing a specific environmental management issue and are to be read along with the overall EMP document.

The EMP details the methods and procedures which will be used to meet the environmental objectives and targets of the Ella Bay Development project which are:

- to employ best environmental management practices and controls to protect and enhance the environmental values of the area;
- minimise, mitigate and manage potential impacts of the development on the environment throughout construction and operation;
- provide a platform for consistent approach which assures that the required standards of environmental protection are achieved;

The sub-plans that have been written are for issues that relate to matters of National Environmental Significance as defined by the EPBC act. Specifically the Sub-plans completed and contained in Volume Three are:

- Southern Cassowary Management Sub-Plan
- Stream Dwelling Rainforest Frog Species Management Sub-Plan
- Spectacled Flying Fox Management Sub-Plan
- Marine Turtle Species Management Sub-Plan
- Flora Management Sub-Plan
- Weed Management Sub-Plan
- Cultural Heritage Management Sub-Plan

The Ella Bay Development will be a staged development over a period of 15 years and planning, construction and operations will overlap for that period. The sub-plans have been written to cover all of planning, construction and operations stages where appropriate, to ensure that a consistent environmental management is followed.

The plans have been completed to a preapproval status and will require updating after approval commitments have been defined. Some of the sub-plans rely on information from other sub-plans which have not been completed for example the Cassowary Road Management Strategy and the Ella Bay Road Management Sub-Plan.

The full list of sub-plans follows (completed documents are in bold):

Matters of National Environmental Significance

- **Southern Cassowary Management Sub-Plan;**
- **Stream Dwelling Rainforest Frog Environmental Management Sub-Plan;**
- **Spectacled Flying-fox Environmental Management Sub-Plan;**
- **Marine Turtle Species Sub-Plan;**
- **Significant Flora Management Sub-plan;**
- **Cultural Heritage Management Sub-plan;** and
- GBRMP & Ella Bay WHA Values Sub-plan.

Biological Environment

- Revegetation and Rehabilitation Management Sub-plan;
- **Weed Management Sub-plan;**
- Beach Stone Curlew Management Sub-plan;
- Feral Pest & Wallaby Management Sub-plan;
- Conservation Area and Wetlands Management Sub-plan; and
- Mosquito Management Sub-plan.

Physical Environment

- Integrated Water Management Sub-Plan;
- Acid Sulphate Soils Management Sub-plan;
- Erosion and Sediment Control Sub-Plan;
- Air Quality, Dust, Noise, Light and Vibration Management Sub-plan;
- Contamination & Remediation Management Sub-plan; and
- Cyclone, Fire & Emergency Management Sub-plan.

Construction

- Ella Bay Road Construction Management Sub-Plan;
- Site Preparation Management Sub-Plan;
- Clearing and Earthworks Management Sub-Plan;
- Drainage Management Sub-Plan;
- Machinery Plant and Equipment Management Sub-Plan; and
- Materials Storage Management Sub-Plan.

Built Environment

- Sustainability and Carbon Neutral;
- Environmental Procurement;
- Road Network & Transport Management Sub-plan;
- Infrastructure & Buildings Management Sub-plan;
- Power, Lighting and Communication Management Sub-plan;
- Golf Course Management Sub-plan;
- Waste Management & Minimisation Sub-plan; and
- Sewerage & Recycle Management Sub-plan.

4.2 Southern Cassowary

4.2.1 Existing Status of Species and Habitat

The Southern Cassowary, *Casuarius casuarius johnsonii*, is the largest native vertebrate in Australian rainforests. The cassowary is a frugivore and an essential element in the sustainability of the Wet Tropics rainforests. The species is classified as endangered under the *Environment Protection and Biodiversity Conservation Act 1999.* It is estimated that only between 1200 and 1500 Cassowaries exist in the wild in the Wet Tropics.

The primary habitat of the Southern Cassowary is rainforest and associated vegetation mosaics, although they also use mangroves, melaleuca and various eucalypt woodlands, swamps and swamp forests. Their habitat is required to have a high diversity of fruiting trees and a ready supply of water.

The Graham-Seymour Range Population

The coastal cassowary habitat south of Cairns predominantly occurs as a narrow strip on the coastal ranges, which parallels the coast. This discontinuous band of vegetation varies from one to four kilometres in width over most of its 200km length. These forested coastal ranges are separated from the main rainforest of the Wet Tropics region by extensive agricultural and urban clearing, and the Bruce Highway, forming a substantial obstacle to east-west cassowary movement. Clearing and road corridors have also led to impediments to north-south movement by cassowaries, creating a series of small sub-populations, faced with declining numbers due to declining habitat and growing threats.

Cassowaries have been identified along the Ella Bay access road and around the Ella Bay property as part of one of these sub-populations known as the Graham-Seymour Range population, which extends from Russell River in the north to the Johnstone River in the south (approximately 32 km). The cassowary population within the Graham-Seymour Range has not been surveyed and is tentatively estimated to be 51-73 independent birds (SEIS A2.4 Collated in 6.1L). Population viability analysis indicates that the Graham-Seymour Range cassowary population, along with other coastal cassowary subpopulations south of Cairns, is undergoing a population decline. Moore (SEIS A2.4 Collated in 6.1L) suggests that this decline is caused by inadequate patch size, isolation from the main habitat blocks to the west, cyclone-induced mortality, and high levels of historical and contemporary anthropogenic impact including urban and agricultural encroachment into their habitat and the edge effects associated with these.

Ella Bay property and Ella Bay Road form the south-eastern boundary of the Graham-Seymour Range cassowary population and the home ranges of the birds sighted during the field survey predominantly lie to the west and north of the survey areas.

4.2.1.1 Cassowary Abundance, Age Class Structure and Sex Ratio

Moore (SEIS PVA Collated in Volume 6.1L) estimated the cassowary density of the Ella Bay Property and Little Cove was one adult per 3.2 km2 (/320ha). Based on the vegetated area (229ha) of Ella Bay property less than one cassowary could be supported. Since Moore's original survey, further surveys have been undertaken in both Wet and Dry seasons and additionally surveillance camera monitoring has been in place since January 2009.

In all five surveys were undertaken and show an increase in reported (photographically identified) numbers in the past four years with an increase from 6 (2006) to 15 (2010) adult and subadult cassowaries indicating that the population is healthy and that the number of females to males is sustainable.

The following trends can be observed from the surveys:

- The number of adults has increased over the survey period;
- The number of subadults has increased;
- The number of chicks has fluctuated greatly and is not in relation to the number of subadults; and

- the number of adults monitored during the wet season surveys is lower than from the previous dry season survey.

Category	Nov 2006 (Moore EIS)		Feb. 2009 (Moore Vol 6.1b)		Nov. 2009 (Buosi Vol 6.1c)		April 2010 (Buosi Vol 6.1d)		Nov. 2010 (Buosi Vol 6.1e)	
	EBIRD Site	EB Road	EBIRD Site	EB Road	EBIRD Site	EB Road	EBIRD Site	EB Road	EBIRD Site	EB Road
Adult male	2	2	1	1	5 (p 4)	1	4	0	4 (p 5)	2 (p 3)
Adult female	1	1	0	0	1(p* 2)	1	0 (p 1)	0	1	1
Adult sex uncertain	0	0	0	1	0 (p 1)	0	0	1 (p 2)	0	1
Subadults	0	0	1	0	2	1	1	0	4	1 (p 2)
Family groups	0	1	1	1	5 (p 4)	0	3	0	2	2
Chicks	0	1	2	2	11(p 9)	0	5	0	2	2
Total adults	**6**		**3**		**8 to 10**		**5 to 7**		**9 to 11**	
Total subadults	**0**		**1**		**3**		**1**		**5 or 6**	
Total chicks	**1**		**4**		**9 to 11**		**2**		**4**	

Table 4:1 Comparison of population estimates between all Ella Bay Cassowary surveys.
P - Possibly P* - Probably EBIRD -Ella Bay Integrated Resort Development

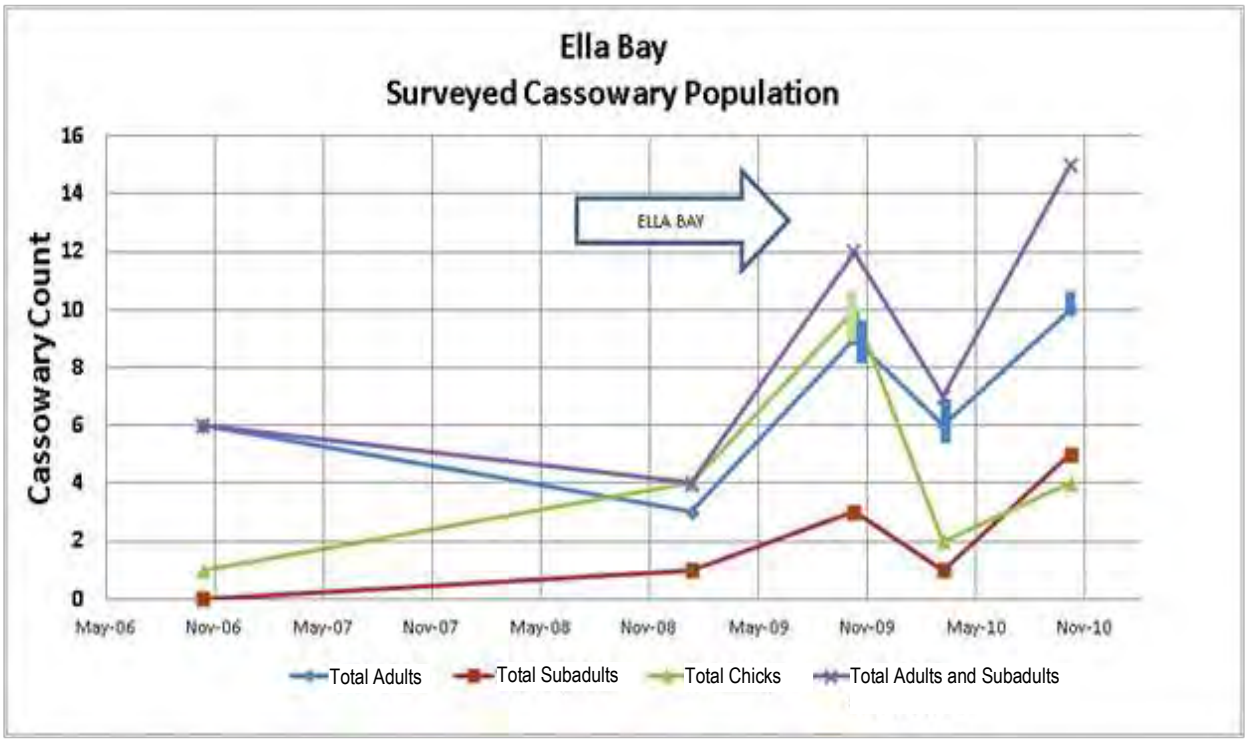

Figure 4:1 Comparison of Cassowary population estimates and arrow showing change from agriculture.

The surveyed cassowary population has varied significantly for each of the surveys. This variation could potentially have been caused by a number of factors:

- Different methodology between the surveys:
  - Moore tracked the cassowaries and defined a “home range”; where as
  - Buosi surveyed the perimeter and riparian corridors of Ella Bay and the proposed Ella Bay Road and made the identification based on camera images.
- Adverse weather conditions:
  - Moore 2006 - 6 months after cyclone Larry;
  - Moore Feb 2009 – surveyed during the wet season with heavy rain; and
  - Buosi April 2010 – surveyed 3 days after heavy rain.

However a number of anthropogenic changes have also occurred during that timeframe. The property ceased being a cattle property mid-2008. While cassowaries and cattle are not competitive for food sources the impact of the farm workings: cattle dogs, chemicals and human activity could have contributed. Additionally the proponent:

- Has restricted access to pig dogs and hunters;
- Engaged in a pig culling program and has culled over 100 pigs since 2008; and
- Removed barbed wire fences.

Moore November 2006: dry season after Cyclone Larry. Moore suggests that the observed abundance of adult Cassowaries approximated the pre-cyclone situation. However the data was characterised by lack of subadults and chicks which would have indicated that there was insufficient food availability for the males to hatch chicks after the cyclone. Two female cassowaries were identified.

Moore February 2009: wet season during heavy rain. Moore has hypothesised that there could potentially be a seasonal migration to the foothills during the wet season. Moore recorded no females and noted that a female recorded in the Nov 2006 was killed by dogs at Flying Fish Point.

Buosi November 2009: dry season. A significant increase in numbers was recorded in adults, subadults and chicks. Buosi reports

> • *Subadult Cassowaries. The location of three subadults has been identified. The territories of these subadult birds overlap with adult birds. Subadults are the most likely age class to move into areas of suboptimal habitat which may include some of those areas where Cassowary activity was not recorded during the current study.*
>
> • *Adult Cassowaries. The number and distribution of adult Cassowaries observed during the current study differs markedly from that observed by Moore (2006) and reflects the situation during more 'ambient' conditions. Further surveys at other times of the year (February to March) are required to confirm use patterns around the coastal fringe.*
>
> • *Female Cassowaries. Moore (2009) concluded that the study area (EBIRD* site + proposed access road) contained a single adult female Cassowary. The current study estimates that the same area now contains two (probably three) adult female Cassowaries. A camera on the western slopes of Seymour Range approximately 2.2 km west of the EBIRD* site also captured images of a separate adult female Cassowary.*
>
> *EBIRD - Ella Bay Integrated Resort Development

Buosi April 2010 wet season after heavy rain. Fewer cassowaries were reported during this survey indicating that there could be seasonal movement driven by wet weather or food resources. Of note cassowaries used more sections of the study area including beach and foredune habitats. The large numbers of chicks reported in the previous survey appear not to have resulted in more subadults or chicks fathered into a second season.

Buosi November 2010 dry season. This survey reported a further increase in the population of adults, and subadults but chick numbers are low. The survey conditions were ideal and there was an apparent abundance of food resources. Of note is that fewer chicks were reported – possibly indicating that the shortage of food resources reported in April 2010, could have resulted in less nesting.

4.2.1.2 Home Range and Sex Ratio

Each survey point has been located on Figure 4:2, note that these are individual photos, scats, prints, feathers or sightings. The figure shows a movement pattern not abundance. For example in some surveys many prints were made in soft mud over an extended period prior to the survey.

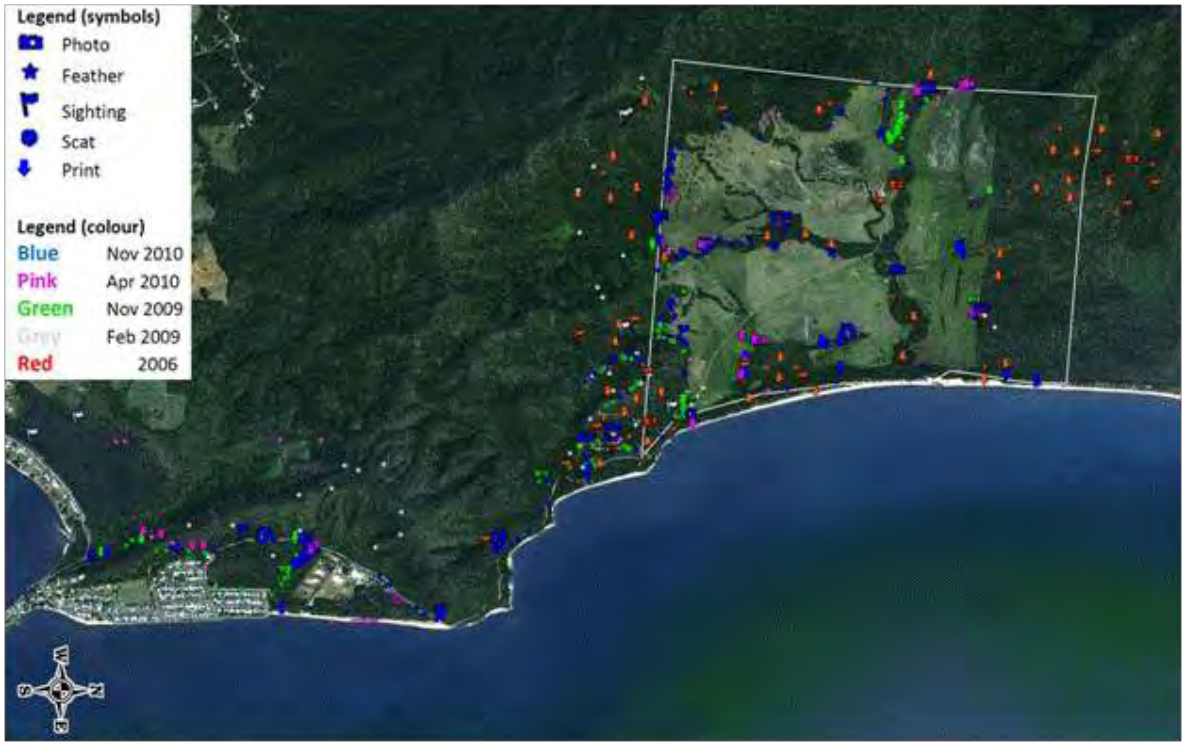

Figure 4:2 Analysis Cassowary findings all surveys (Moore 2006, 2009, Buosi 2009b, 2010a,b) Note that in this figure each scat and footprint are recorded.

The surveys identified that the cassowaries within the Ella Bay Development almost exclusively use the riparian or adjacent to the riparian corridors. The areas that are frequented vary throughout the season possibly based on food and water availability although this is not consistently seen. The highest population count did not mean that that more areas were frequented.

Buosi in his review of Moore's work (EIS & SEIS) (Volume Six 6.1a) was concerned regarding the sex ratio and sub-adult population as to the vulnerability of the population given that Moore had surveyed two females in the November 2006 survey and none in the Feb 2007 survey and reported that one female had been killed in Flying Fish Point by dogs. During the surveys two females were reported in November 2006 (Moore), November 2009 (Buosi) and November 2010 (Buosi) and none in February 2009 (Moore), and April 2010 (Buosi).

The fact that two females were reported in this small sample area would infer that the population dynamics of breeding females are sustainable. The sex ratio from averaging of all the surveys was 3.6 to 1 male to female. This is much higher than that reported by Moore (Moore, 2007a) who reported a sex ratio of 1.47 to 1 male to female in the Mission Beach survey of 47 adult cassowaries. This could be due to misidentification through difficulty in capturing photographic profiles or through the limited area surveyed compared to home range size. (refer to detail 6.1m)

While each of the surveys has defined an assumed home range for the birds surveyed there is no correlation between the Moore and Buosi surveys. It appears that some of the Moore identified birds have moved out of the area, and there has been an increase in the number of cassowaries and overlapping of many home ranges. None of the cassowaries identified in the Moore surveys could be matched with cassowaries in the November 2009 survey.

4.2.1.3 Summary of Cassowary Surveys

The number of adult cassowaries recorded in 2006 to 2010 in the immediate vicinity of Ella Bay Development and the access road has increased from 6 adults to 10 adults. The population appears to have a higher density than that reported by Moore in his Mission Beach Survey (Moore 2007a).

The number of females reported total of 2 (possibly 3) is lower than expected from the sex bias ratio of 1.5:1 however, there is ambiguity in sex determination through monitoring photographs and the extent of the surveyed area.

The number of sub-adults recorded has increased since 2006 from zero to between 3 and 5 probably representing movement of the sub-adults around Ella Bay. The age class structure and recruitment appears to be sustainable.

The total number of cassowaries, of females and of subadults for recruitment has shown an increase in reported numbers and indicates a local healthy population.

4.2.2 Cassowary Habitat Use Within Ella Bay Property and Access Road

4.2.2.1 Habitat within the Ella Bay property

The majority of the Ella Bay property has been cleared since at least 1902. Narrow strips of riparian vegetation have regrown along the creek banks since the Army mapping of 1943 (Army, 1943). These areas provide some feeding resources for cassowaries and movement corridors traversing east-west and north-south. However, the viability of the property for the cassowary is reduced due to the impact of:

- High levels of historical and contemporary anthropogenic impact;
- Grazing by herbivores (cattle, and wallabies) continuing to degrade remnant vegetation within the property;
- Infestation with WONS, including Pond Apple, an inappropriate food source for the cassowary which creates a mono-culture;
- The property and surrounding areas supporting feral pigs in large numbers destroying vegetation, destabilising creek banks and disturbing habitat; and
- Barbed wire fencing (being progressively removed).

The cassowaries have been monitored predominantly using the riparian and surrounding vegetation cover or staying within close proximity to the vegetation. The existing open areas of the proposed precinct location and of the golf course are rarely used by cassowaries; however the open spaces will be available for movement facilitation for cassowaries – as they are known to cross open and relatively flat spaces.

A further requirement for cassowaries is access to permanent water sources. Moore in his assessment (Vol II EIS collated in 6.1L) did not include the requirement for permanent water in his assessment. Buosi (6.1a) recommended that the Proponent survey and determine the extent of water availability (known or potential) for the cassowary, in particular during the dry season.

> *"This approach does not consider the location and importance (known or potential) of permanent water for drinking and bathing. Even if water is not a limiting factor, the location of permanent water sources, especially during very dry years, is an important consideration for the impact assessment process." Buosi 2009 (6.1a)*

Within Ella Bay property only the North/South and East/West creeks and the northern swamp area provided permanent water during the dry season (refer to Volume 6.1g). The water survey was undertaken in October and November 2009 under NRA's guidance, two to four weeks prior to the Buosi November 2009 survey which reported a large increase in the number of reported cassowaries.

Moore in *Ella Bay Cassowary Assessment: Volume I* (EIS collated in Volume 6.1L section 4.1 4.1 *Status Of Cassowary Habitat At Ella Bay Property*) analysed the habitat based on his mapping of habitat types. Buosi in a review of the EIS and SEIS (6.1a) has further commented that:

> *"Revised habitat assessment using a consistent and transparent methodology for all areas. Ideally habitats should be reassessed based on more recent vegetation mapping*

(3D Environmental 2009), the location of permanent water, existing (Moore 2006, 2009) and further field data collection."

The updated habitat assessment has been detailed in (6.1m *Update of Habitat Assessment of Ella Bay for the Southern Cassowary)*. The habitat was assessed based on usage determined from the cassowary surveys, water availability and the vegetation survey 2008.

The updating of cassowary habitat by reference to the latest flora survey and to water availability produced only one change within the mapping from Moore in Volume I of the SEIS Cassowary Assessment. The classification of the Dunal swale (area 4) was changed from Other by Moore to General.

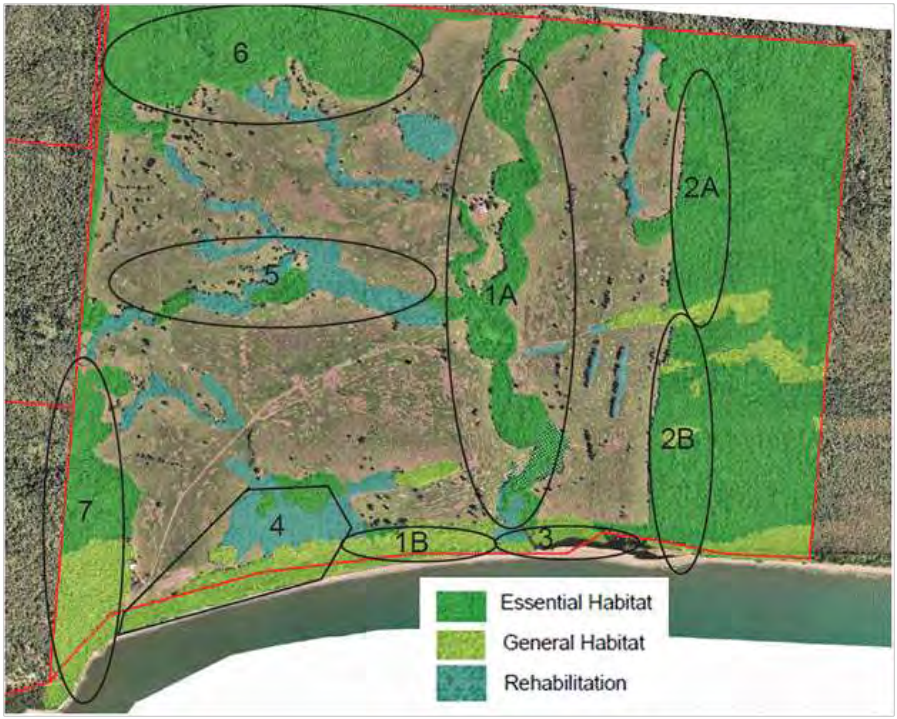

Figure 4:3 Update of Cassowary habitat description (refer to 6.1m) with Moore area descriptors (EIS collated in 6.1L)

The Ella Bay conservation strategy will be to place the majority of existing vegetation under conservation covenant, plus create a covenanted vegetated fauna corridor bisecting north/south and east/west. The fauna corridor will be a minimum of 100m in width. The majority of the existing riparian vegetation is less than 100m in width and has recovered from previous agricultural clearing to either remnant status or with revegetation and closing of edge effects will become remnant.

4.2.2.2 Habitat Use along Ella Bay Road

Moore (SEIS collated in 6.1L) developed a risk assessment approach to the "risk of accessing the habitat". Moore used field survey data from his previous survey (Nov 2006), together with vegetation mapping (EIS Vol 8 A6.1) and professional opinion to map areas as high, moderate or low quality Cassowary habitat.

According to this method of evaluating cassowary habitat, as the level of anthropogenic threat increases, the usefulness of otherwise suitable cassowary habitat decreases. The level of existing risk is thereby factored in to the assessment of cassowary habitat. In doing so, this method attempts to establish the habitat value, or the true contribution made by habitat to conserving the cassowary populations in an area.

An area's habitat quality level is combined with a risk level to arrive at 'Habitat Values' for the vegetation. Four categories are recognised as follows:

- Category A – high value (high quality and low risk).
- Category B – moderate (moderate quality and moderate risk).
- Category C – alternative habitat (low quality, steep terrain).
- Category D – negative value (varying quality and high risk).

The updating of cassowary habitat by reference to the latest flora survey, cassowary surveys and to water availability (6.1m) produced only one difference to the mapping from Moore in Volume I of the SEIS Cassowary Assessment. That was with location 4 which is the Flying Fish Point Reserve. In this area habitat was changed to Essential to be consistent with the Recovery Plan description.

Moore's assessment was based on his professional experience of the impact of dogs and traffic. Areas 3, 4, 5, 6 and 8 were mapped as negative value habitat. According to this risk assessment, there is currently a high probability of death or injury to cassowaries accessing these areas from dog attack and car strike due to the unfenced road.

In Table 4.2 the history of known cassowary mortality in this area has been added to Moore's assessment. Two of these deaths postdate Moore's analysis, confirming his original experience based assessment.

The known cassowary deaths are:

- Ella Bay Road 28/10/2002 Chick - 100mtrs South of Ella Bay NP sign – hit by car (QPWS unpublished)
- Flying Fish Point Road 23/03/2006 Adult – likely hit by car (QPWS unpublished)
- Little Cove Development - 24/12/2011 Male Adult – dogs (pers. obs)
- Flying Fish Point 2007 - Female Adult – dogs (Moore Feb 2009 survey)

Area code	Location	Moore Risk Factor	Known Cassowary death	Vegetation category/habitat value
1	Ella Bay National Park	1.0		A
2	Heath Point	0.5		C
3	Beach front	0.1		D
4	Flying Fish Point Reserve	0.1	Car	D (B)*
5	Southern EB Road verge	0.1		D
6	South Seymour Range	0.1	Dog	D
7	Flying Fish Point west swamp	0.5	Car	C
8	Northern EB Road verge	0.1	Dog	D

Table 4:2 Habitat values as a function habitat quality and risk from Moore Working paper 3 (collated in 6.1L)

***Note High risk habitat in area code 4 will be mitigated to Category B**

Moore's risk assessment has been taken as appropriate and confirmed in this update. When applied to the updated habitat quality parameter only changed the habitat value of Flying Fish Point Reserve from 0.2 to 0.3 which correlates with category D – negative habitat.

Although categorised as negative value habitat, the Flying Fish Point Reserve remains important to the continued presence of cassowaries in this south-east section of Seymour Range. Although the streams between Flying Fish Point and Heath Point flowing to the Reserve are ephemeral, the Reserve provides both food and water resources for cassowaries for most of the year.

As such, measures to reduce the level of risk to cassowaries using the reserve, such as the fence and funnel strategy, will effectively increase the habitat value of Flying Fish Point Reserve and the adjoining sections of the Ella Bay Road from the current negative value habitat to moderate value habitat.

4.2.3 Summary of Ella Bay Development Cassowary Mitigation Measures

The primary objective of cassowary mitigation strategies of Ella Bay Development is to facilitate the continuation of normal cassowary behaviour while minimising the possibility of adverse contact between cassowaries and humans.

The mitigation strategies are an integral component of the Ella Bay Development and have been developed to protect both the cassowaries known to use the area, as well as to achieve a net benefit for the population as a whole. The goal is for cassowary numbers, carrying capacity and resistance to cyclonic disturbance to improve, locally and regionally.

The Masterplan has incorporated ecological sensitive design and focussed on retaining the existing vegetation and fauna access and corridors. Mitigation of potential direct and indirect impacts of pre-construction, construction and operational phases of the development have also been considered.

Potential impacts on the cassowary from the proposed resort development will be managed through the implementation of the Southern Cassowary Management Sub-Plan. This plan details a comprehensive program of management actions to be implemented over the life of the development.

4.2.3.1 Fauna Corridors and Cassowary Access

The proposed conservation zones, fauna corridors and fauna underpasses will maintain unimpeded cassowary movement access around the Ella Bay development. The area of access will consist of the fauna corridors and the extensive open space formed by the golf course fairways. The golf fairways will be landscaped with endemic trees and provide the equivalent of general habitat for the cassowaries with some food source. The conservation zones and open space cover all of the cassowary evidence from the five surveys with the exception of 2ha of clearing and isolation of Essential and General habitat. (Refer to details 3.4.4.1)

Cassowary movement corridors around the site will be unimpeded pre-development to post-development. The total area of the conservation covenant and open space is 336 ha of the 470ha. (Refer to Figure 3:18).

The vegetation within the property has been mapped as either essential habitat, general habitat or rehabilitating habitat for the Southern Cassowary. The distribution of each of the habitat types within the Ella Bay Development site is mapped in Figure 4:3.

- Essential 176ha
- General/Other 20ha
- Rehabilitating (non-remnant) 33ha

This cassowary habitat will be maintained, protected and increased.

Revegetation of an additional area totalling 50ha will provide a substantial increase in habitat; of this revegetation 45ha will be high quality cassowary fruiting habitat which will significantly increase Essential habitat and 5ha will be non-fruiting habitat which will become General habitat. Non-fruiting revegetation will be used to the east of the main north/south creek so that cassowaries will not be enticed to the resort areas.

Rehabilitation totalling 64ha will change weed infested non-remnant habitat of which approximately half is mapped currently as rehabilitating habitat into essential or general habitat.

Figure 4:4 Cassowary accessible areas (green shading) totalling 336ha out of a 470ha with movement corridors. The white outline is the edge of the conservation zoned areas. The markers are from all surveys.

The future habitat designation after completion of the development and maturity of the vegetation will be:

- Essential 238ha
- General 39ha
- Cleared/isolated 2ha

All of the Essential and General habitat above will be protected under conservation zoning which accounts for nearly all of the surveyed cassowary signs. The area accessible to cassowaries will also include the landscaped golf course open areas which will increase the accessible area by a further 61ha to a total of 336ha of the 470ha available.

The existing riparian zone ranges in width from 30 to 50m wide for the majority with some areas up to 100m wide. The planned north/south and east/west cassowary corridors will increase all the riparian vegetation in the main corridors to at least 100m wide. A number of additional corridors radiate between the main corridors and the perimeter vegetation and will maintain the current movement patterns.

Both the main north/south and east/west corridors have been cleared previously and are regrowth vegetation. The vegetation has been damaged by two category five cyclones in the past 5 years and while there has been some crown destruction, defoliation and subsequent weed infestation the vegetation has survived and is thickening. The high unnatural number of wallabies has however stopped natural recruitment in most riparian zones, with only non-palatable species or species that are growing on steep banks or protected areas able to recruit.

Revegetation along the border of the riparian zone and the exclusion of wallabies will strengthen the zone and also provide edge closure; an important factor in decreasing wind related damage and improving the ecological habitat within the riparian zone.

The Proponent's revegetation trials:

- Have focussed on selection of endemic species that are cassowary fruiting, cyclone tolerant, and with selected species to provide edge closure.
- Have shown that natural recruitment has extensively increased the number of species even within the short period of 18 months.
- That cassowaries are feeding from early fruit producing trees within 18 months of planting.

The selection of vegetation species chosen to resist wind damage – "Learning from Larry" will provide the future revegetation to be more cyclone resistant.

The argument that 100m width is satisfactory for a cassowary corridor is;

- That there are many movement pathways which intersect the creeks not just the main corridors and cassowaries currently use these corridors;
- That the regrowth vegetation has survived a number of cyclones in the past 5 years; and
- That the revegetation will focus on cyclone resistant tree species and edge closure to grow a more cyclone tolerant corridor.

A Revegetation and Rehabilitation Management Sub-plan will be prepared based on the species and learnings of the revegetation trial. This plan will include locations, species, numbers, site preparations, and timing of activities. This plan will identify management actions (such as revegetation, appropriate species, weeding and fencing), performance criteria, responsibilities and costs needed to effectively restore and manage cassowary habitat on site.

Permanent Cassowary Water Sources

Cassowaries require access to water several times daily for drinking and bathing and permanent water is an important consideration. There will be extensive increase in the area of permanent water from the constructed wetlands. The majority of the constructed wetlands will be proximal or within the fauna corridor and discharge into the creeks.

Ella Bay Development Precinct Fencing

The Ella Bay Development will lead to a significant increase in internal traffic flows within the property compared to the near non-existent current traffic flow. The threat is to traffic interaction and mortality of cassowaries, common Mistfrog and other fauna.

The transport strategy at Ella Bay is to:

- Minimise the risk of interaction by separating the cassowaries from the roads and vehicles;
- Reduce the use of internal private motorcar trips by encouraging electric buggies, bicycles, shuttle busses and walking;
- Enforced 40km/h speed limits for all vehicles within the precincts; and
- 20km/h for any unfenced gated crossings.

To mitigate against the traffic interaction with fauna all the roads within the precincts will be perimeter fenced and the precincts will be linked by bridges or low speed gated crossings linking. The roadways will be included within the precinct fencing to eliminate cassowary road trauma. The creeks will be crossed by elevated bridges (cassowary underpasses) to provide fauna habitat connectivity throughout the site to all Open Space/Recreation and Conservation areas. All the main internal roads servicing the resorts will have elevated bridges/underpasses. (Refer to Figure 4:5) Only four secondary internal roads with low volume, controlled low speed 20km/h traffic will have unfenced gated crossings of the open space or fauna corridor. The longest of these gated crossing will be 100m across the northern section of the north/south fauna corridor in the northern residential precinct. The speed will be controlled by traffic calming; signage and raised speed platforms.

The fence will be 1.2m dark-coloured powder-coated aluminium pool fencing, which will provide a physical barrier but not an impassable barrier to a cassowary. The fence will only be screened or vegetated in strategic locations and the outside of the fence will have enough clearance for inspection and maintenance of the fence.

The fence will not have cassowary escape gates installed. The fence will have an open visual appearance and it will be difficult to discriminate a visual window to identify the gate for the cassowary and success of the escape gate will be less likely. The road entrances and fence perimeter will be monitored to determine if cassowaries are breaching the fence or entrances. The areas that will be closely monitored will be the higher risk areas where frequent interactions between cassowaries and people would otherwise occur have been identified as the Ella Bay Village Precinct and the Ella Bay Welcome Centre area, and the road crossings. Manual gates will be located close to the entrances and the road crossings such that if a cassowary should breach the entrance, the gates can be opened and funnel the cassowary out.

Refer to Section 4.2.5.3 Operational Phase – Traffic for further details.

Figure 4:5 Cassowary access will be maintained through fauna underpasses shown in yellow and gated level crossings shown in red.

Internal Traffic, Pathways and Tracks

There will be extensive areas of open space and conservation covenant to allow free fauna movement (illustrated by the red arrows in Figure 4:4 and Figure 4:5) to all areas of the site external to the fenced precincts.

There will be an extensive network of pedestrian and bicycle pathways throughout the precincts and open space.

- The pedestrian/bicycle pathways will be along the edge of 100m wide main fauna corridors (conservation Zone C).
- Pedestrian walkways through or crossing the main cassowary corridors will be elevated above the forest floor to separate cassowaries and people, and to provide unhindered cassowary use of the creek and associated vegetation;
- The pedestrian walkways will be strategically located to minimise any disturbance to the normal behaviour of the cassowary(s);
- The pedestrian 'walkovers' may serve as a focal point for ecological interpretation, particularly that of the endangered cassowary;

- Bicycle and buggy pathways crossing the creeks and the main cassowary corridors will have at least 30m of elevated section for cassowary movement under the structure, the pathways leading to the bridge will not be fenced or prevent cassowary access across them;
- Nature walkways, predominately boardwalks will provide access for ecological interpretation through Zone C,

The precinct fence will be gated for access to the open space pathway system for walking, bicycle and buggies. Walking and bicycle only gates will be manually opened and closed. These gates will have pool childproof locks to prevent underage children from accessing the open space. Some of these may be fitted with pass operated locks for security. Buggy gates will be managed similarly to the road crossing gates with automatic opening/closing for high use areas and manually controlled for low use. At all gates cassowary warning and behaviour signage will be displayed.

4.2.4 Summary of Ella Bay Road Fauna Mitigation Measures

The design, specification, mitigation measures, and environmental management are detailed in Volume Four *Ella Bay Road Design and Environmental Management Report* of this submission. Ella Bay Road will be constructed in two stages with Stage 1 utilising the existing road alignment from Flying Fish Point to Ella Bay and Stage 2 bypassing Flying Fish Point.

To minimise the environmental impact of Ella Bay Road; the goal is to restrict the traffic speed to a level which:

- Minimises the risk of fauna mortality;
- Minimises the clearing envelope; and
- Allows the visitor to appreciate the road and views

The cassowary mitigation measures at Ella Bay have been prepared from an integrated approach and have looked at the whole road, known cassowary crossing points and behaviour. (Refer to Volume Four Chapters 5 & 8) The integrated approach has focussed on:

- Excluding cassowaries from the road;
- Excluding cassowary visibility of the roadside;
- Providing a safe crossing with attractant vegetation;
- Providing an escape mechanism if the cassowary accesses the road; and
- Slowing the traffic in case of a cassowary on the road.

The road will use a fence and funnel mitigation to exclude cassowaries from accessing the road for the majority of its length and underpasses to allow access to the habitat on the east of the road. The proposed bypass and fauna overpass through the narrow southern extension of the Seymour Range will ensure connectivity to the lower end of range.

The fence will be 1.8m high shadecloth directing the cassowaries to fauna underpasses and the overpass located at known crossing points. In other locations the steep natural terrain or embankment heights will provide additional exclusion. The fence will include a one-way escape gate to minimise the risk of cassowaries being trapped in the road reserve.

Ella Bay Road will be a low speed environment (60km/h) and to ensure effective speed control; fixed and psychological calming will be used to increase driver awareness. The 1.5m wide road shoulder is designed for use as a bikeway and will be delineated to provide a bicycle lane on both sides. Extensive traffic calming comprising delineated roadside shoulders, cassowary signage, transverse line markings, chicanes and raised speed platforms will be used to reduce the operational speed. Additionally pull off lanes will be included in the design to enable parking while servicing and monitoring mitigation features. The bike lane and traffic calming will be used to support the “change of focus” as people enter the Ella Bay area.

The dimensions of the underpass design were confirmed from a survey of cassowary usage of bridges as underpasses at North Hull and Wongaling River bridges (minimum dimensions 15m wide by 3.5m high).

The following mitigation measures will be included in the road design: Refer to Volume Seven drawing EBR1CE-PD10, road detail drawings EBR1CE-DD(01-22), EBR2CE-DD(01-08) and Volume Four *Ella Bay Road Design and Environmental Management Report.*

- Fauna Underpasses – 3: Bridge 1 CH 0440; Bridge 2 CH 3000; Bridge 3 CH 3250.
- Fauna Overpass (Stage 2) – 1: Tunnel CH 0500.
- Small Fauna Underpasses with furniture – 4: Culvert 3 CH 0635, Culvert 15 CH 2170, Culvert 16 CH 2400, Culvert 20 CH 3123
- Cassowary Fencing will be installed at the following locations:

Stage 1	Western side of road Length m	Eastern Side of Road Length m
Unfenced Flying Fish Point roads NB. chainage starts at Ruby St.	120m	150m
Cassowary Fence	2290m	955m
Seahaven Prawn Farm Fence		690m
Bridge fencing	205m	205m
Too Steep/Retaining Wall	1385m	1960m
Total	40000m	4000m

Stage 2	Western side of road Length m	Eastern Side of Road Length m
Unfenced Bay Rd roundabout	35m	35m
Cassowary Fence	525m	190m
Noise Attenuation Fence		100m
Tunnel	125m	120m
Too Steep/Retaining Wall	195m	435m
Total	880m	880m

- Cassowary Escape Gates (Stage 1) - 19 gates; (Stage 2) – 6 gates
- Frog Fence - 25m either side of the following; Bridges 1, 2, 3. Culvert 3, 15, 16, and 20
- Pipe culverts replaced by box culverts – 19 places.

To protect essential habitat; mature trees have been protected where possible to provide canopy shading with over 20 trees requiring guard rail protection because of their proximity to the road. To achieve this level of tree retention the road alignment has been modified to specifically avoid the trees and road safety mitigation added where the alignment has remained too close to the tree.

Revegetation will take place as each stage or partial stage of works is completed. A detailed plant species selection for revegetation has been undertaken. This was based on selecting endemic non-cassowary food plant species that suit the criteria for the roadside vegetation; blend with the surrounding vegetation and complement the natural surroundings; and seal the edge of the forest to reduce the potential of edge effects. Plant selection will also be required to meet road safety criteria where the species do not inhibit sight distances and are frangible.

4.2.4.1 Ella Bay Road Fencing

Ella Bay Development will increase the traffic volumes along Ella Bay Road and increase the potential road mortality threat to the cassowary. The cassowary population along Ella Bay Road to Little Cove property has been surveyed over different seasonal conditions and has remained stable at 2 or 3 adult cassowaries with one sub-adult or chick (Vol 6.1e). As a result extensive mitigation has been incorporated to minimise the impact.

The mitigation will comprise three cassowary underpasses and one overpass. The roadside will be fenced to funnel the cassowaries to the underpass and the overpass (Flying Fish Point Bypass). (Refer to Volume Four: *Road Design and Environmental Management Report*).

The fence will be a 1.8m high neutral coloured (dark grey/black/green) shadecloth to provide a visual and a softer resilient barrier that will not damage the birds.

The fence alignment will run 3m to 12m within the vegetation parallel to the road alignment, to minimise visibility from the road. The fence will be installed to follow the natural contours to reduce the risk of erosion and visual impact and will be constructed predominately with only hand pruning of native flora. No significant or EVR species will be cleared. The impact of the fence installation and maintenance will be from localised hand clearing and the potential for weed incursion. Weeds will be cleared around the path and surrounding area. The fence alignment will be made to fit and go around mature vegetation with the fence weaving between trees. The disturbance width will be minimised and where possible kept less than 1m wide. (Refer to Volume 6.1j *Report on Cassowary Exclusion Fence Trials;* Volume 6.1i *Report on Cassowary Escape Gate Trials;* Volume 6.1k *Cassowary Fencing Strategy* and Volume Seven drawing EBR1CE-PD10).

The fence has been developed by the Proponent specifically for this application within the rainforest and has been field trialled in three cyclones. The escape gate was developed by the Proponent and trialled with captive cassowaries.

The fence will not be installed where:

- The road edge and surrounding slopes are steeper than 1:1 or where the embankment is vertically greater than 1.5m e.g. gabions walls.
- Other barriers such as guard rails and noise fences provide an exclusion function where the above conditions are met.

In the event of significant cyclone risk, the fence will be pulled to the ground and tied with cable ties to keep it rolled up and safe from damage. The fence will only be pulled down immediately prior, and during cyclonic weather events.

Additional traffic management procedures will be required to minimise the risk of cassowary vehicle strike while the fence is down; temporary warning signs will be used identifying that the fence has been dropped and the vehicle speed limit reduced to 40km/hr.

The Proponent and there after the body corporate will retain responsibility for maintenance and monitoring of Ella Bay Road fauna and flora mitigation measures as outlined in the Corridor Management Plan (Refer Volume Four Chapter 12).

Figure 4:6 Cassowary one way Escape Gate during trials with captive cassowaries Refer to Volume 6.1i *Report on Cassowary Escape Gate Trials*

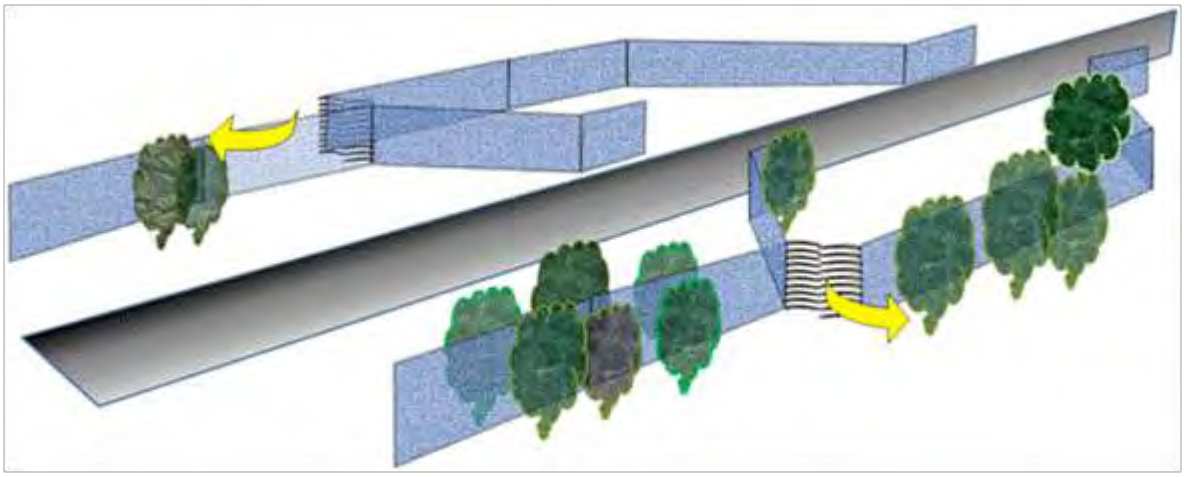

Figure 4:7 Installation of cassowary escape gate at road entrances with strategically placed vegetation. Refer to Volume 6.1k *Cassowary Fencing Strategy*

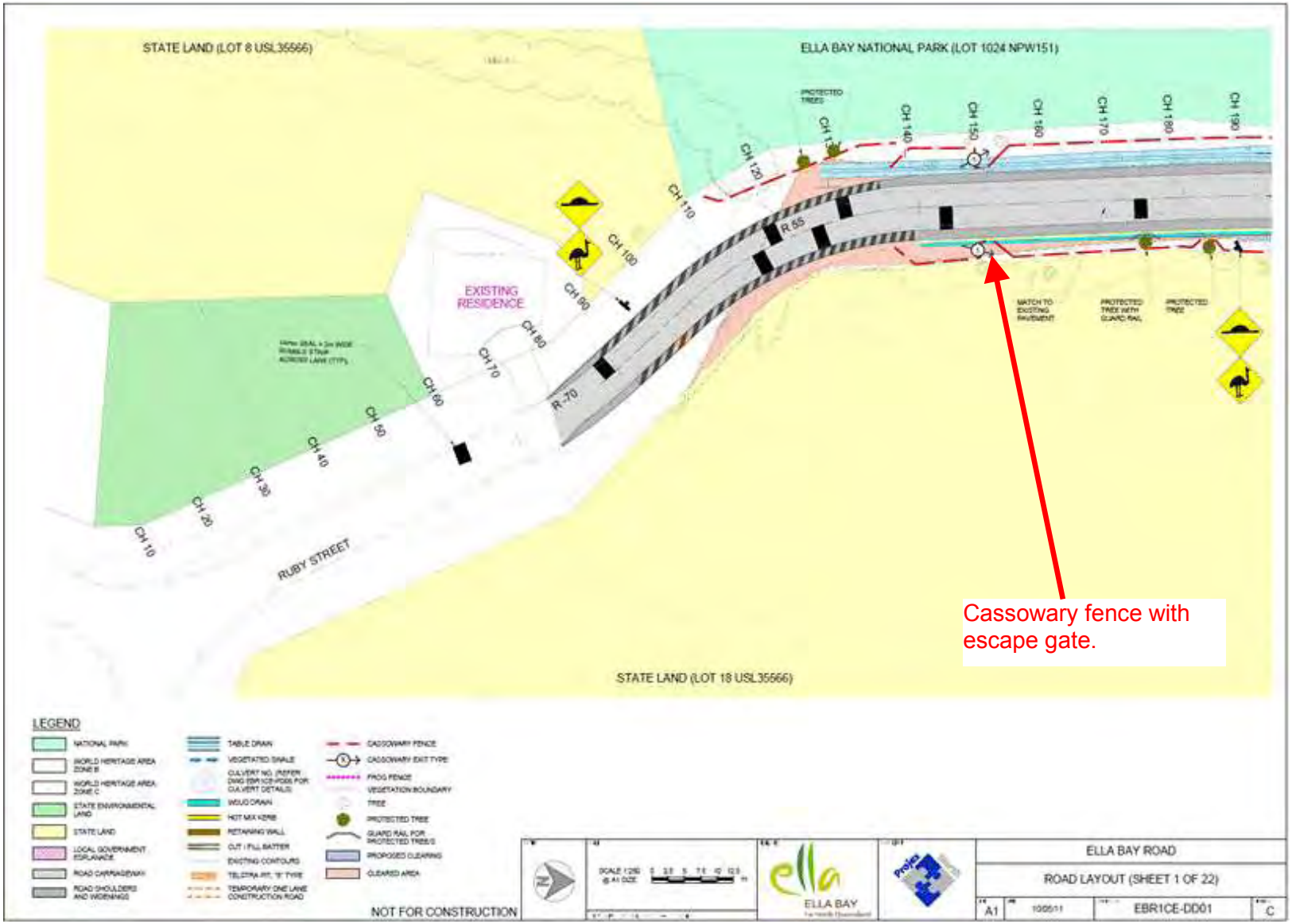

Figure 4:8 **Typical escape gate location Stage 1 entrance. From Dwg. EBR1CE-DD01. For details of fence and escape gate locations Refer to Dwg. EBR1CE-DD(01-22) also Refer to Volume Seven drawing EBR1CE-PD10**

4.2.5 Mitigation during Preconstruction, Construction and Operations

Potential impacts on the cassowary from the construction and operation of the Ella Bay Development and access road are outlined in detail in the Southern Cassowary Environmental Management Sub-Plan (Volume Three). In particular, the Sub-Plan details the necessary management actions, performance criteria, timeframes, reporting requirements and costs associated with effective cassowary management on site.

The objective of the mitigation is:

- To avoid injury to cassowaries or damage to cassowary habitat as a result of Ella Bay Development activities; and
- To maintain the normal foraging and breeding behaviour of the cassowary during the construction of the Ella Bay Development and Ella Bay road.

The proposed mitigation will reduce the impact of increased human population from Ella Bay Development on the World Heritage values, making these threats relatively small and the development will not have a significant impact on the Southern Cassowary.

In all stages of the development, a strong emphasis will be on education of the workforce, contractors, residents and guests through inductions and the Welcome Centre of the significance of the cassowary, and measures to prevent or discourage inappropriate interactions.

4.2.5.1 Pre-construction/design phase

The pre-construction phase of Ella Bay Development includes the planning and staging of construction plus site based activities including inspections, surveying, revegetation, and ongoing of weed and feral animal control. The potential impacts on the Southern Cassowary include habitat degradation and loss of connectivity.

The mitigation strategy will be to ensure that the planning and staging of construction related activities will recognise all the surveyed cassowary movement areas, water sources and ensure that there is minimal impact to cassowary connectivity, habitat, foraging and behaviour through:

- Identify in the planning information, survey, protect and prohibit access for humans and machinery to cassowary movement corridors, habitat and water sources;
- Ensure the staging of road construction will maximise connectivity for cassowaries;
- That any disturbance is located:
    - away from cassowary movement corridors and water sources
    - within cleared areas or areas of previously disturbed vegetation;
    - proximal to construction areas; and
    - to avoid vehicles moving across vegetated corridors.
- Cassowary habitat revegetation staging will utilise the learnings from the revegetation trials (Volume Six 6.2f);
- Weed control will adhere to the Weed Management Sub-Plan (Volume Three);
- That site based revegetation, weed and feral animal control which may impact on habitat connectivity, and behaviour
- No dog policy on site and removal of any feral dogs; and
- Feral pig control will continue using the Feral Pig Control Report (Volume Six 6.3d) in the interim and the Pest & Wallaby Management Sub-plan will be prepared.

4.2.5.2 Construction phase

The construction phase has the potential to create a range of impacts on the cassowary including additional habitat loss, habitat degradation, loss of connectivity, increased risk of road deaths and an increased risk of negative human interactions. The nature of each of these potential impacts is outlined below.

Habitat loss

Construction of the proposed development will lead to a total loss of 5.20 ha of cassowary habitat. This includes clearing and isolation of habitat of 2.02 ha of vegetation loss within the Ella Bay property and 3.18 ha of vegetation loss along the access road. (Refer to Table 4.3)

During the construction phase of Ella Bay Development the net essential cassowary habitat will increase prior to clearing or isolation. The revegetation trial (Volume Six 6.2f) has shown that natural recruitment and cassowary use is initiated within the first two years and it is expected that a meaningful contribution to habitat will occur within the first four years with habitat maturing and fruiting of most species within seven years. The construction and revegetation staging have been sequenced such that there will be approximately 20ha of revegetation of essential habitat greater than four years old prior to clearing greater than 0.5ha. (refer to Figure 3:17)

The strip of coastal vegetation along the eastern boundary (locations 3, 1b and 4 shown in Figure 4:3) will be rehabilitated and the pond apple removed and replaced with non-cassowary fruiting species. The pond apple removal will be undertaken early in the construction staging prior to fruit production of the revegetation. This will lead to a reduction in the available food supply during January to April of the pond apple fruiting period. This area was only utilised by one cassowary during the surveys with similar use during pond apple fruiting period (April 2010) as to the November surveys, indicating that the pond apple was not such a key contributor to diet. The impact to the cassowaries will be minor, less than that of an intense wet season where the cassowary would move to the higher extent of its home range and not feed in the area.

This habitat loss will create a temporary net loss of cassowary habitat and the revegetation staging has been based on minimising the net impact. The Revegetation and Rehabilitation Management Sub-plan will identify the areas, management actions (such as revegetation, appropriate species, weeding and fencing), timeframes, performance criteria, and responsibilities needed to effectively restore and manage cassowary habitat on site.

Construction of Ella Bay Road (stage 1) will be on the critical path for construction and will be initiated near the start of the project prior to maturity of any compensating revegetation. The clearing will comprise vegetation that is listed as essential cassowary habitat and additionally there will be essential habitat that will be isolated by the cassowary fence. The cassowary fence along the road and the underpasses will isolate some essential cassowary habitat. Additionally any revegetation works within the fenced road alignment will exclude cassowary fruiting species to reduce the possibility of enticement on to the roadway.

	Clearing			**Isolation**		
	WTWHA Essential Cassowary habitat	***Essential Cassowary habitat***	***General Cassowary habitat***	***Essential Cassowary habitat***	***General Cassowary habitat***	***Total Area***
Ella Bay Road	0.33 ha	1.80 ha		1.05 ha		3.18 ha
Ella Bay Development		0.70 ha	0.25 ha		1.07 ha	2.02 ha
TOTAL	**0.33 ha**	**2.50 ha**	**2.50 ha**	**1.05 ha**	**1.07 ha**	**5.20 ha***

Table 4:3 Cassowary Habitat Clearing and Isolation areas for Ella Bay Road Stage 1 & 2, plus clearing of Ella Bay Development site

* Areas have been rounded to two decimal places

Construction of Flying Fish Point bypass (Stage 2) will occur several years after stage 1 when revegetation at Ella Bay Development will contribute to a net benefit of habitat however the distance of the bypass from the revegetation will negate any benefit to the home range of cassowaries in the area. There will be approximately 0.5ha of revegetation of cassowary fruiting species after construction of the cut and cover tunnel.

The total Essential cassowary habitat loss, inclusive of clearing and isolation from construction of the road will be 3.18ha.

Habitat degradation

Cassowary habitat can be degraded without damage to vegetation through disturbance that prevents the cassowary from using its full home range. The size of a home range is far greater than the magnitude of construction disturbance and disturbance to an edge can be accommodated by restriction of movement, however long term disturbance is likely to lead to increased stress and competition to defended home ranges. Disturbance can be accommodated for a short period and noise is reported as being habituated with cassowaries around Mission Beach (Moore pers. comm.). The objective is to minimise habitat degradation that affects cassowary habitat, movements, foraging, behaviour and maximise the cassowary carrying capacity. Refer also Volume Four *Ella Bay Road and Environmental Design Report* Chapters 10 and 11 which specifically address road construction management.

Construction activities that have the potential to degrade cassowary habitat include:

- Trespass creating edge effect of construction workers and equipment;
- Noise and dust disturbance may cause the birds to withdraw from adjacent forest;
- Weeds and pathogens may be introduced into adjoining cassowary habitat; and
- Nutrient runoff and water quality contamination may degrade adjoining cassowary habitat.

Mitigation measures that will be implemented to manage these potential impacts include:

- Clear designation of work areas, vehicle tracks and foot-access areas together with the use of barrier mesh and prohibition signage to prevent staff and contractors from trespass, and/or introduction of clothing borne weeds and soil pathogens;
- The use of dust suppression measures and road speed restrictions to minimise dust;
- The minimisation of vibration and noise, in particular that the machinery complies with construction noise limits specified under the Environment Protection Act;
- Minimising construction impact through the use of designated bunded Construction Management Compounds (refer to Volume Four Chapter 11) for vehicle parking, fuel and materials stores, stockpile areas and workers facilities, and the use of offsite shuttle parking for Ella Bay Road construction;
- Adhere to best practice procedures for the importation of materials (refer to Volume Four Chapter 10);
- Weed control will adhere to the Weed Management Sub-Plan (Volume Three) including washdown of all off-road vehicles; and
- An approved Erosion and Sediment Control Sub-plan will be implemented at all construction sites and relevant staff/subcontractors will be trained in erosion and sediment control techniques and infrastructure maintenance.

Loss of connectivity

Construction activities at the Ella Bay property and along Ella Bay Road have the potential to impact cassowary habitat connectivity or create barriers to traditional movement corridors. To minimise this, construction infrastructure and access tracks will be located to avoid creating barriers to cassowary movement along or between habitat corridors.

During construction of the internal roads of Ella Bay Development, bridges will be built to cross the cassowary corridors. The bridges will be located over existing creek crossings that have been previously cleared and used for farm access. The bridges will have sufficient clearance for use as cassowary underpasses. The construction process while being ecologically sensitive will require the closing of the cassowary corridors for periods for cassowary safety during construction.

During construction of Ella Bay Road upgrade, areas of habitat will be temporarily isolated. A temporary construction fence will be installed along the road prior to construction and in particular during the construction of the three underpasses and the overpass to prevent possible

cassowary vehicle/construction workforce interaction. Temporary fencing of the underpass near Flying Fish Point will isolate access of up to three cassowaries from approximately 10% of their habitat during one dry season. The two underpasses at Little Cove will isolate one cassowary from approximately 3% of its habitat during one dry season. It is neither feasible nor desirable to allow the cassowaries to pass and possibly be trapped on the coastal side of the road during the construction.

It was initially considered that cassowary corridors would be able to remain open using slow speed crossing, however the risk of mortality from vehicle/cassowary collision has resulted in recommending that the cassowary corridors

Increased traffic

There will increased traffic flows within Ella Bay Development and along the Ella Bay access road during the construction phase of the project. Consequently, there is a greater risk of road trauma to cassowaries occupying adjacent or nearby habitat.

To manage this risk, a road traffic management strategy for the Ella Bay property and access road will be in place during the construction phase. Key requirements will include:

- Temporary cassowary exclusion fencing will be erected prior to start of each construction phase to exclude cassowaries from accessing construction sites (refer to Volume four Chapter 10 & 11, and to Volume Six 6.1k *Cassowary Fencing Strategy*) ;
- All vehicles to remain within the designated road alignment;
- For any cassowary habitat areas or road crossings that are unfenced;
    - a 20km speed limited will be signposted for all construction and non-construction vehicles in including at road crossing points,
    - a traffic control program will be in place with specific road-based mitigation at known cassowary crossing points,
    - daily inspections of the status of cassowary crossing points will be carried out, looking at aspects such as fencing integrity and evidence of crossings, and
- A reporting system will be established for vehicle and workforce incidents with cassowaries.

Increased human activity

The increased level of human activity at the Ella Bay property and along the access road during the construction phase of the development increases the risk of negative human interactions with the Southern Cassowary. Inadequate litter disposal can attract the cassowaries to the site and there is the risk of habituation due to feeding.

To manage these risks, the following conditions will be in place:

- An induction course will be prepared on appropriate behaviour around cassowaries which all staff and subcontractors will have to attend;
- There will be no access by the workforce to the adjoining forest;
- A waste management strategy will be established to ensure the correct disposal of construction material such as wires, plastics or other ‘attractive’ items that may be ingested by cassowaries;
- Food consumption will only be permitted in designated areas and covered bins for the disposal of food scraps will be provided in these areas;
- Extended activities in or adjacent to known cassowary road crossing points and highly frequented habitat will be avoided;
- Temporary cassowary exclusion fencing (barrier mesh) will be erected prior to the start of each construction phase to dissuade birds from accessing construction sites,
- Protocol on appropriate methods for removing cassowaries from construction areas will be developed, and
- A nominated ‘vet-on-call’ will be contacted immediately to facilitate response.

4.2.5.3 Operational phase

The operational phase of Ella Bay will be the day to day living of established residents, resort guests and day visitors. The ongoing physical threats will be from transport through the development and along Ella Bay Road, grounds and golf course maintenance, tourist activities such as nature trails and recreational activities. The daily operations will provide different potential threats to the cassowaries and fauna with an increased risk of negative human interactions and habituation of the birds.

There will be an additional risk of the success of the cassowary mitigation measures including underpass use, fence integrity and habitat reinstatement.

Education

One of the highest priorities will be of continual education on the significance of the cassowary within the Wet Tropics environment, and measures to prevent or discourage inappropriate interactions.

The Welcome Centre will be the first point of contact of all arrivals and every opportunity will be used to educate on the awareness of the significant surrounding ecosystems and the responsibilities of individuals within these sensitive environments. A key objective of the education process will be to provide comprehensive information on how to live safely with the cassowary. This is applicable whether people are just visiting for the day, staying on holiday, or living as a permanent resident within Ella Bay.

The education will comprise the Welcome Centre and associated community education program, signage, resort literature, regular newsletters and information sessions. The following measures will be adopted:

- Inductions will be compulsory for all workers, and residents, while resort guests and day guests will be provided with target specific education literature on appropriate behaviour around cassowaries and will include:
    - strictly enforced 'no feeding' policy and why this is so important;
    - education of the dangers of interaction;
    - appropriate behaviour within the precinct with regards to food, rubbish and 'attractive' items that may be ingested by cassowaries;
    - appropriate behaviour in cassowary habitat, specific responses and behaviour for golfers, walkers and cyclists in open spaces;
- Advisory signage on cassowary behaviour at open space entrance locations;
- Monitoring and location awareness through cassowary sighting reports;
- Adaptive management through reporting of cassowary incidents within the precincts and open space; and
- The development of guidelines on appropriate methods for removing cassowaries from construction, residential or resort areas.

The education will also focus on minimising edge effects causing habitat loss from inappropriate access to revegetation, beach dunal and forested areas.

Cassowary/human Interaction and Habituation

Management of the negative cassowary/human interactions and ensuring that cassowaries do not become habituated to humans will focus on education to discourage inappropriate human behaviour and minimising the opportunities for contact between humans and cassowaries.

The total revegetation and rehabilitation area will be greater than 110ha and will be an opportunity to subtly change the foraging habits of the cassowaries with the focus of encouraging cassowaries away from the ducal swale and resort areas. The tree species used in the coastal revegetation after the removal of pond apple will be non-fruiting species while the species used in revegetation of the areas to the west of the north south fauna corridor will be predominantly cassowary fruiting species. The western revegetation especially along the

riparian strips of cassowary fruiting species will provide a significantly more abundant food source than the current degraded vegetation.

There will also be a significant increase in the availability of permanent water from the constructed wetlands to manage stormwater. The constructed wetlands will contain both ephemeral water and permanent water to sustain the vegetation mix necessary for nutrient removal. By nature of purpose the constructed wetlands will be located adjacent to the creeks and often within the fauna corridor. The provision of additional extensive permanent water will reduce the requirement for cassowaries to access the dunal swale.

The precincts will be fenced to exclude cassowaries from the developed areas. The Ella Bay body corporate will be responsible for regular on-going monitoring of the integrity of both the precinct fencing and the cassowary road fence together with education and community participation.

In the event that a cassowary becomes habituated and a nuisance; the bird will require removal and relocation from the area. The large home range of a cassowary and the ability to move between neighbouring populated areas to Ella Bay may mean that habituation occurred remote from the development. Some of the Ella Bay cassowaries were reported to have been handfed after cyclone Larry (Moore EIS collated in 6.1L) and habituated from cyclone feeding stations.

Habitat Degradation and Edge Effect

During the operations phase the cassowary habitat will improve in quality, fruit abundance and area following the maturation of the revegetation, rehabilitation of weed infested areas and removal of the agricultural edge effects. New threats will arise through resort and residential population and intensity.

The major threats to potential habitat degradation are from;

- The introduction of exotic plant species or disease to adjoining habitat;
- Encroachment, dumping and littering by residents and guests; and
- Disturbance from increased human activity, noise levels and night lighting along streets and in residences.

The landscaping of public areas and open space will be planned and will be controlled by planting guides to not prevent the spread of exotic species. The public areas will be kept well maintained and free of invasive plants in particular focus will be on those species listed in Weeds of the Wet Tropics (WTMA).

The control of residential plant species will be through education and community engagement with the site nursery able to provide preferred species. The objective will be to educate the residents on how to address environmentally acceptable gardening in sensitive natural areas. A list of prohibited and potentially invasive plants will be provided to all residents for yard and gardens as part of the ownership covenant.

The purpose of the perimeter precinct fencing will be two-fold: cassowary exclusion and to reduce the incidence of resident encroachment on the native vegetation. Experience in other developments bordering national estate (McWilliam, et al., 2010) has shown that encroachment, weed and rubbish dumping and the intensity of ecological impacts was significantly reduced with education and fencing. McWilliam concluded that the greatest reduction in encroachment could be achieved by installing fences around development housing, pathways within the vegetation, design boundaries so staff and the community can monitor boundaries, and monitor infrequently.

To minimise the impact of light, noise and human activity within Ella Bay Development:

- Motor vehicle noise within the precincts will be reduced through the use of electric buggies;
- Cassowaries will be discouraged from access near the more intense resort areas of the development on the east of the property by change in vegetation through removal of the pond apple;

- The conservation areas are surrounded by the open space areas and combined the open space and conservation areas will be 2½ times greater than the precinct area, reducing the impact of disturbance; and
- The control of light spread by using downlights will also be necessary for species such as turtle breeding and nocturnal fauna.

The major threats to potential habitat degradation along Ella Bay Road are:

- Disturbance from increased traffic noise and light;
- Pollutants from road runoff; and
- The introduction of weeds along the road from the disturbance caused by the cassowary fence.

The increased traffic volumes along Ella Bay Road will increase the noise, and light into the rainforest over the current road traffic. The only comparison of this impact that has been studied with regards to the Wet Tropics is for Kuranda Range Road and projected noise levels for Ella Bay Road (Refer to Volume Four) will be significantly lower -7db(A) than the current Kuranda Range traffic. The predicted noise level for Ella Bay Road is less than one quarter that of Kuranda Range and distance that the noise penetrates is about one third. Recent studies (Dawe, G. and Goosem, M, 2008) have reported that there is an impact of compensatory pitch adjustments to the dominant frequency of song in avian rainforest fauna and the reduced densities of avifauna in habitat adjacent to roads.

Studies at Mission Beach (Moore pers comm.) however indicate that cassowaries appear to have habituated to the sound of cars and trucks on the roads. This is illustrated by many observations of cassowaries standing by the roadside waiting for an adequate break in the traffic flow to allow them to cross. They take little notice of cars even when birds are foraging close to the road corridor, but loud trucks, noisy trailers, or sudden noise do startle them. In these situations they move away from the road initially but generally come back if the source of the unexpected noise ceases.

The nature of the headland topography and the shadecloth cassowary fence will mute light at ground level from the habitat. Noise studies and observation from similar roads indicates that noise and light will not be a significant threat to the cassowary.

The road runoff will be treated for gross and fine particulate removal in sensitive areas by incorporating bioretention swales for treating soluble toxins from first flush road runoff. The volume of water from the road surface is relatively low compared to the bypassed flows from the western range and there is little cassowary habitat towards the coast.

The cassowary fence along Ella Bay Road will require regular inspection and on-going maintenance which will be accomplished on foot from the forest edge. Walking along the fence alignment will be avoided as much as possible to minimise weed invasion. Weeds will be treated in accordance with the Weed Management Sub-Plan. The Body Corporate will be responsible for maintenance of the fence.

Traffic

The operation of Ella Bay Development will significantly increase traffic flows along the access road and within the property once it is operational. This will increase the risk of road death to cassowaries occupying adjacent or nearby habitat. The mitigation measures are summarised in Section 4.2.4.1 and are fully described in Volume four. The key to success of the mitigation will be a monitoring program to determine cassowary use of the underpasses and bridges. The monitoring program will comprise

- Logging of opportunistic sightings and incidents by the public, staff and cassowary fence surveys;
- Monitoring of the fauna underpasses usage with remote cameras;
- Monitoring of cassowary escape gates with remote cameras, counters or sand print beds;

- Transect surveys of road envelope area combined with strategic placement of monitoring cameras; and if possible
- Monitoring of dynamic movement by GPS telemetry to model cassowary land use patterns within the reserve and east side of the range to fauna underpass usage.

The results of the monitoring will be used to assess the risk of cassowary mortality and the success of the mitigation:

- Adherence to the signposted speed limits and psychological calming;
- Integrity of the exclusion fencing along the road corridor to prevent cassowaries accessing the road;
- Willing usage of the underpasses by cassowaries; and
- Monitoring and logging of all cassowary road incidents.

Failure of any of these key areas will require adaptive management. For example:

- For speed limits - installation of further physical calming such as increased number of speed bumps or chicane;
- Failure of the fence integrity - change in maintenance, fence type or relocation of the cassowary ;
- Failure of the underpasses – enticement through alternative vegetation species selection, construction of screening, artificial feeding or as a last resort fall back to road crossings and a low speed environment with physical calming, warning signs, and warning lights.

With fence and funnel exclusion based mitigation the greatest risk is fence failure and cassowaries trapped within the road corridor. There will be two methods of cassowary removal from the road corridor:

- Escape through cassowary one-way escape gates located at regular intervals to allow cassowaries to exit the road corridor; and
- Manual removal of the bird by the Queensland Parks and Wildlife Service or trained Ella Bay Development Environment staff through dropping of the fence by manual release of the shadecloth shear clips (as per the cyclone procedure)

There will also be a risk of cassowaries accessing the precinct and the precinct roads within development. One way gates will not be included in the precinct fence as there is little visible discrimination between the fence and the escape gate. Manual removal of the bird by the Queensland Parks and Wildlife Service or trained Ella Bay Development Environment staff through herding the cassowary to a gate or removal of fence panels (through undoing four bolts).

Interactions with domestic animals

Despite a cat and dog ban the daily operation will experience the presence of domestic animals whether from inadvertent accompaniment, stray or dumped animals and feral predators. To manage potential interaction;

- No cats or dogs apart from guide and assistance dogs will be permitted within the development;
- Any domestic cats and dogs found within Ella Bay Developments will be removed by Council dog control officers; and
- Wild or feral dogs and cats will be actively controlled with the feral pig control program.

Poultry and aviary birds will be permitted to be kept by residents with body corporate permission under appropriate care guidelines to avoid any possible spread of disease to cassowaries.

Pest Management

Feral pigs are classed as a pest in the WTWHA and are primarily responsible for habitat degradation. Pigs are also thought to contribute to egg predation on the cassowaries and

turtles. The proponent has instigated a feral pig trapping and baiting program and over 100 pigs have been culled to date. (Volume Six 6.3d)

The major threat to cassowaries however is not from the pigs but from the indiscriminate killing by hunting pig dogs. The Wet Tropics are considered a mecca for pig dog hunting and the locals have developed a culture of pigging and organise special events to capture pigs.

The pig dogs are released in pack of 2 or 3 and run wild chasing scent and then "capture" any species often including cassowaries. The cassowaries have no defence for these specially bred killers. The culture ignores World Heritage boundaries and many pig dogs have found their way to Ella Bay site from over the range and through the property gates.

Unfortunately cassowaries have been found after being mauled and two deaths are known in the past 5 years, however most deaths go unreported as these deaths are in remote areas often not sighted and definitely not reported by the pig hunters.

Cyclone Response

Cyclone events are one of the major impacts on the survival of the endangered Southern Cassowary. Cassowaries have proven to be extremely vulnerable to disruption to the fruit cycle following the destruction of a significant cyclone. In the aftermath of Cyclone Larry the immediate loss of food from fruit drop and the structural damage to Cassowary habitat had a significant impact on cassowary mortality. Many birds starved to death, while others were aided by widespread feeding stations while handfeeding resulted in some birds becoming nuisances to the local residents especially around Mission Beach. Cassowaries entering into built-up areas increased in search of hand-outs increased their risk of mortality from interaction with vehicles and dogs.

Queensland Parks and Wildlife Service (QPWS) confirmed that 23 cassowaries had been killed since Cyclone Larry, most of them hit by cars. A number of the problem birds were anaesthetised and relocated to the western less-cyclone ravaged areas. The relocation was a last resort action as the territorial nature and home range instinct of the cassowary would have meant a difficult if not impossible existence.

The mitigation of cyclone impact on cassowaries will be planned:

- Identify post-cyclone cassowary feeding stations prior to the cyclone season which are based on home range surveys, and where food can be placed without human habituation;
- Enhance the resilience of existing vegetation through additional plantings, edge closure and species selection; and
- Plant 'cyclone tolerant' species to protect less tolerant species intermingled with cassowary "fruit sources". that fruited in the late wet season or early dry season.

A revegetation trial of 12,000 trees has been undertaken in the north-west of Ella Bay, specifically planned develop a post cyclone refuge for cassowaries. The location provides some topographic protection for the trees and will also be away from major population centres within the resort and development area.

Large, tall 'cyclone tolerant' and 'cassowary fruiting' tree species were intermingled with cassowary fruiting species and planted in rows. Smaller trees and shrubs, also species of high fruiting yield that fruited in the late wet season or early dry season were planted in areas between rows. The intention is that during high wind events the larger trees offer some protection to the smaller trees/shrubs reducing the degree of fruitfall, and the late wet season fruiting trees would not have interruption of fruit cycle allowing for continued fruiting after the event. The cyclone tolerant species were selected from reports of "Learning from Larry".

Ella Bay Road Cassowary Fence - Cyclone Operating Procedure

The cassowary fence along Ella Bay Road will be subject to damage from intense cyclonic winds. The fence has been trialled in low intensity cyclones without damage. With Cyclone Yasi (category 5) under trial conditions sections of the fence that were prepared for the cyclone

survived without damage where lengths of the fence that were left upright were destroyed (Refer to 6.1j).

In the event of significant cyclone risk, the fence will be pulled to the ground; the top carrier wire will be manually removed from the shear clip and relocated to the lower wire clip where both wires will be held together. The shadecloth fence will be effectively folded down to the ground and the shade cloth material tied every 2-3m in between posts by use of cable ties or similar to keep it rolled up and safe from damage. The fence will only be pulled down immediately prior, and during cyclonic weather events.

Additional traffic management procedures will be required to minimise the risk of cassowary vehicle strike while the fence is down; temporary warning signs will be used identifying that the fence has been dropped and the vehicle speed limit reduced to 40km/hr.

The reinstatement of the fence will be a high priority post cyclone events. Initially, the debris will be removed from fence area to facilitate the erection where the fence top carrier wire will be placed in clips and inspected for damage. Any fence damage will be repaired locally by either replacing entire sections of the fence from strainer assemblies or only repairing small sections by cutting the wires, threading a new shadecloth section and rejoining the wire using a mechanical wire joiner and sowing the replaced shadecloth. Damage to the tensioning assemblies will be a low risk unless by direct tree strike.

Cassowary Monitoring

Ella Bay Developments has monitored cassowary populations surrounding the area from Flying Fish Point to Ella Bay, both on a formal and informal level since 2007, including five (5) field transect surveys (Moore 2007, 2009 and Buosi 2009a, 2010a & b) and continuous camera monitoring for 2 years. The camera monitoring involved between 6 to 12 cameras with some permanently monitoring riparian corridors, with other cameras set up at specific fruiting trees.

The objective is to develop a database of the individually identified cassowary population in this habitat.

During the survey period a variation in cassowary population from 6 adults to 15 adults and subadults (all photographically identified) was reported. The conclusion from the observations and surveys were that:

- Numbers varied between 6-22 (adults and chicks) depending on season, weather conditions and fruit availability;
- Identification of individuals and sexes through monitoring cameras was difficult and would require clearer better quality photos;
- Identification of home ranges was difficult from the static photos and transect surveys;
- Initial GPS tracking appeared to provide a far superior method of determining home ranges; and
- DNA analysis of scat samples would enable the positively identify the population and their relationships.

The future monitoring of cassowaries will be focussed on

- Population monitoring to allow the identification of negative and positive cassowary population trends and likely causal factors of variation. The large variability in population will mean that individual transect surveys will not be sufficient to monitor a dynamic population and either GPS tracking or a number of individual surveys will be required.
- Monitoring of the effectiveness and use of cassowary corridors within Ella Bay Development; and
- Monitoring of the effectiveness and use of cassowary mitigation underpasses along Ella Bay Road;

The proponent has also provided ongoing research project support for cassowary tagging and tracking project with the purchase of 5 GPS trackers and recovery of data for future implementation at Ella Bay.

4.2.6 Summary of Actions

To protect the Southern Cassowary;

a. Implement the Southern Cassowary Management Sub-Plan;

To protect the habitat of the Southern Cassowary

b. Implement a conservation covenant over areas denoted as Conservation Zone B of 67.8ha and Conservation Zone C of 87.3ha on Lot NR320 N157629 for protection and in perpetuity as described in Figure 3.18 *Ella Bay Conservation Zones;*

c. To revegetate and rehabilitate Conservation Zones B and C described above with cassowary plant foods in the western section and non-cassowary plant foods in the Eastern resort area;

d. Implement the *Weed Management Sub-plan*, to control exotic species including Pond apple (*Annona glabra)* and revegetate with endemic species;

e. Prepare and implement the Revegetation and Rehabilitation Management Sub-plan. The plan will include the priority as presented in Figure 3.17 *Revegetation Staging Plan* and identify the areas, management actions, and performance criteria;

f. Prepare and implement schedules of prohibited noxious weeds and potentially invasive plants (as declared or defined by the Local Authority or State Government) or undesirable plants (as defined in Schedule 3 to the Wet Tropics Management Plan) in the landscaping on the site;

g. To provide fauna corridor connectivity by constructing and maintaining cassowary underpasses at locations described in (Figure 4:5).

To protect the Southern Cassowary from feral pests and domestic animals

h. Prepare and implement a *Feral Pest & Wallaby Management Sub-plan* to control feral animals and manage wallaby impact on revegetation. The plan will include cassowary safe trapping and baiting of feral pigs, control of feral and domestic dogs and cats, including non-target safe monitoring and active management actions;

i. Prepare and implement a Community Management Statement over Lot NR320 N157629 which details the prohibition of cats and dogs, (excluding guide and assistance dogs).

To minimise the impact of increased vehicular traffic on the Southern Cassowary.

j. Prepare and implement a *Road Network & Transport Management Sub-plan* for Ella Bay Development. The plan will include onsite speed limits, (40km/hr), traffic calming and management for the fauna corridor road crossings;

k. Prepare and implement the *Ella Bay Road Construction Management Sub-Plan* prior to the commencement of construction works. The plan will include details of speed limits, (40km/hr), traffic calming, temporary and permanent fences with one-way emergency gates,

- The road entrance to the fenced section of the road will have warning signs, speed bumps/platforms and transverse line markings and rumble strips to alert drivers to the likely presence of cassowaries;
- A fauna underpass located at chainage 440 will be installed to provide cassowary habitat continuity between State Land (Lot 18 USL35566) and Ella Bay National Park (Lot 1024 NPW151);
- Two fauna underpasses located at chainages 3000 and 3250 on EBR1CE-PD010 will be installed to provide cassowary habitat continuity over two unnamed creeks within Lot 337 NR53;
- A fauna overpass (Flying Fish Point Bypass) will be installed to provide cassowary habitat continuity over state land Lot 8 USL35566 located at chainage 500 on EBR1CE-PD010

To protect the Southern Cassowary in the event of cyclone,

l. Prepare and implement Cyclone, Fire & Emergency Management Sub-plan. The plan will identify post-cyclone cassowary feeding stations based on home range surveys,

procedures for cassowary fence stowing and temporary traffic management procedures to minimise the risk of cassowary vehicle strike.

To minimise impacts on the Southern Cassowary from human disturbance and interaction:

m. Prepare, provide and monitor a compulsory educational induction for all workers and contractors throughout construction on appropriate behaviour around cassowaries including food and waste hygiene, and "no feeding";
n. Prepare and provide educational information consistent with the Recovery Plan to residents, guests, visitors and staff to discourage handfeeding and/or approaching cassowaries;
o. Prepare and implement guidelines on appropriate methods for removing cassowaries from construction, residential or resort areas.

4.2.7 Cassowary Population Viability Analysis

A Population Viability Analysis of the Southern Cassowary subpopulation of the Graham-Seymour Range was presented in the SEIS (collated 6.1L) by Les Moore. Moore reported that the Graham-Seymour Range cassowary population

> *"is a linear subpopulation which has lost all connectivity with the larger cassowary populations to the west, the Graham Seymour Range population is currently experiencing high levels of anthropogenic impact, and declining rapidly as a result."*

The time frame predicted by Moore's modelling for extinction was 60 years for these isolated populations with the current levels of threat. Moore also concluded that

> *"Natural catastrophes in the form of severe cyclones and the environmental uncertainties of climate change, are hastening this decline."*

According to the Population Viability Analysis (PVA) the Graham-Seymour Range cassowary sub-population is currently in a declining vortex whereby extinction of that sub-population appears to be inevitable. Many of the present indirect impacts of the local environment are cumulative and are contributing to this decline. That is; a "do nothing" scenario will lead to extinction of the Graham-Seymour Range cassowary sub-population.

The PVA indicates that along with the other coastal cassowary subpopulations south of Cairns, the Graham-Seymour Range cassowary population is undergoing a population decline. It is postulated that this decline is caused by inadequate patch size, isolation from the main habitat blocks to the west, cyclone-induced mortality, and high levels of historical and contemporary anthropogenic impact exacerbating the naturally low reproductive rate of cassowaries.

Moore (pers. Comm.) added

> *"The results of PVA are just one factor in any social and decision-making context and should always be considered only as a precursor to good judgment (Brook et al. 2002). It is important to recognise that the quantitative analyses in predictive population modelling are based on probabilities rather than certainties. Thus the results of the PVA study at Ella Bay can only provide information on the 'probability' of extinction or decline given certain assumptions about the biology and status of the cassowary population. Thus, extinction of the Graham-Seymour Range cassowary population is not certain but it does have a high probability of occurring. This is particularly so given the imminent fragmentation of the Graham-Seymour Range cassowary population at three separate locations."*

Moore identified specific threats and impacts to cassowaries around Ella Bay and applied a risk analysis methodology to determine an overall effect. Moore assessed the risks against Direct, Indirect and Cumulative impacts similar to those identified by the Significant Impact Guidelines for the endangered southern cassowary.

The assessment compared the agricultural grazing use continuation to the proposed development with the result that Ella Bay Development would not increase the impact over the exiting land use. It must also be noted that substantive additional mitigation, and the result of

the subsequent cassowary surveys which potentially show the real impact of the previous land use were not included in the assessment. Bousi (6.1a) concluded that

> *"Moore (2006) has identified most of the project-related threats for the impact assessment process. However a discussion of potential impacts on important water sources and threats associated with extreme climatic events is needed. We anticipate that the greatest project-related threats include the potential for vehicle strike (especially on the access road to the Ella Bay site), negative human-Cassowary interaction and maintenance of connectivity."*

Ella Bay Development has applied appropriate mitigation and management strategies that will minimise impact to the Southern Cassowary and contribute to conservation.

4.2.8 Conclusion

The proposed development and operations of Ella Bay Development with the proposed mitigation will not cause any significant loss to the long term survival of the Southern Cassowary and given the cassowary's iconic focus for the development will most likely sustain and halt the decline of the regional Graham-Seymour Range subpopulation. The proposed offsets will provide additional linkage in perpetuity which will contribute to recovering movement corridors to the isolated Eubenangee population and to the west potentially increasing the population.

Under the EPBC Act guidelines for determining significance, a significant impact is 'an impact which is important, notable, or of consequence, having regard to its context or intensity. Whether or not an action is likely to have a significant impact depends upon the sensitivity, value, and quality of the environment which is impacted, and upon the intensity, duration, magnitude and geographic extent of the impacts' (DEH 2006).

In evaluating the significant impact criterion for a critically endangered or endangered species establishes whether there is a real chance or possibility that an impact will:

- **Lead to a long-term decrease in the size of a population.**

  The mitigation included within the Ella Bay Development will improve the available carrying capacity, minimise the risk of dog attack and mitigate against the increase in traffic.

  The five surveys have shown an increase in reported (photographically identified) numbers in the past four years - from 6 (2006) to 15 (2010) adult and sub-adult birds following the change in management practices and the end of agricultural use of the site in 2008.

  The Population Viability Analysis of the Graham-Seymour Range subpopulation has shown that the present anthropogenic impacts are causing a declining vortex whereby extinction of that sub-population appears to be inevitable. That is; a "do nothing" scenario will probably lead to extinction of the Graham-Seymour Range cassowary sub-population.

- **Reduce the area of occupancy of the species;**

  The Ella Bay conservation strategy has designated cassowary-significant habitat into Conservation Zones, ensuring both protection and habitat connectivity. The total area of conservation zoning will comprise 277ha of which essential cassowary habitat currently comprising 176ha will be increased through revegetation and rehabilitation to 238ha and the total accessible habitat available including landscaped open space will be 336ha out of 470ha. The area of access will consist of the fauna corridors and the extensive open space formed by the golf course fairways. The golf fairways will be landscaped with endemic trees and provide the equivalent of general habitat for the cassowaries with some food source.

  Within Ella Bay site 2ha of essential/general habitat will be lost to clearing or isolation including clearing of 0.95ha of essential/general habitat.

Along Ella Bay Road 3.9ha of essential/general habitat will be lost to clearing or isolation including clearing of 2.80ha of essential/general habitat.

- **Fragment an existing population into two or more populations;**

  Cassowary movement within the existing habitat of Ella Bay site will be maintained through extensive network of conservation corridors, crisscrossing the development with cassowary underpasses and safe fauna crossing points to maintain movement corridors.

  The cassowary mitigation measures for Ella Bay Road have been developed to maintain movement corridors through fence and funnel mitigation comprising three cassowary underpasses and one overpass (Flying Fish Point Bypass). The roadside will be fenced to funnel the cassowaries to the underpass and the overpass to allow access to the habitat on the east of the road.

  The proposed bypass including the fauna overpass through the narrow southern extension of the Seymour Range will ensure connectivity to the lower end of range

- **Adversely affect habitat critical to the survival of a species;**

  The existing habitat will be protected, and rehabilitated. The existing weeds and feral pests will be controlled. The cyclone tolerance of the existing vegetation and cassowary habitat will be improved through widening of the riparian corridors using a selection of cassowary fruiting cyclone tolerant species and edge closure

  The value of the cassowary habitat will be improved with an extensive increase in the area, volume and availability of permanent water through constructed wetlands. The majority of the constructed wetlands will be proximal or within the fauna corridor and discharge into the creeks.

- **Disrupt the breeding cycle of a population;**

  The five surveys of the Ella Bay environs has shown a more than doubling in cassowary numbers since 2006, and indicated the population is healthy and the age class structure and recruitment sustainable. At least two females were reported in three out of the five surveys inferring the population dynamics of breeding females is also sustainable.

- **Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;**

  The existing habitat will be protected, improved through rehabilitation, and extended through revegetation. Quality habitat will be increased 176ha to 238ha and total habitat including landscaped open space will be 336ha.

  Access to all habitat will be maintained with the exception of clearing/isolation of 2.02ha within Ella Bay Development and 3.87ha along Ella Bay road.

- **Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat;**

  The existing vegetation has major infestations of weeds that will impact the WTWHA and cassowary habitat. Ella Bay Development has implemented a weed control program and a Weed Management Sub-plan.

  The existing environment has an extensive feral pig population. Ella Bay Development has instigated a feral pig trapping and baiting program with over 100 pigs culled to date and will prepare a Pest & Wallaby Management Sub-plan.

  The major threat to cassowaries however is not from the pigs but from the indiscriminate killing by hunting pig dogs. The proponent has committed to a 'no dog or cat policy' and hunting being forbidden on the property with perpetrators reported to the authorities

- **Introduce disease that may cause the species to decline; or**

There is no recognised impact of disease on the Southern Cassowary and the Recovery Plan for the Southern Cassowary (2007) has no guidelines on preventative measures.

As a precautionary measure, any poultry or aviary birds kept by residents will be required to conform to appropriate care guidelines to avoid any possible spread of disease to cassowaries.

- **Interfere with the recovery of the species.**

  Ella Bay Development has prepared a site specific *Southern Cassowary Management Sub-Plan* and *Ella Bay Cassowary Recovery Plan Implementation* which supports Specific Objectives of the "Recovery Plan for the Southern Cassowary *Casuarius casuarius johnsonii*". (2007): DEWHA 2009, and recommendations from the Significant Impact Guidelines for the endangered southern cassowary (Casuarius casuarius johnsonii) Wet Tropics Population - EPBC Act policy statement 3.15 (2007).

An Offset Package has been proposed and is contained in Chapter 5. The proposal includes offset land comprising 126.42 ha of important cassowary habitat and corridors.

Each of the specific objectives are addressed in Table 4.9 *Cassowary Recovery Plan Matrix.*

Ella Bay Cassowary Recovery Plan Implementation referenced against objectives of the **Recovery plan for the Southern Cassowary *Casuarius casuarius johnsonii*** Peter Latch for the Cassowary Recovery Team

Cassowary Recovery Plan (2007) Latch.	Ella Bay Cassowary Conservation Commitments
Specific objective 1: Protect essential cassowary habitat and landscape corridors	Regional Ecosystems classified as Essential Cassowary Habitat in the Recovery Plan for the Southern Cassowary Casuarius casuarius johnsonii, (Latch 2007) have been identified and mapped both on site and along the road. On Ella Bay site the vast majority of this Habitat will be protected by gifting to National Parks or under Conservation Covenant. An offset comprising 62.8ha of essential habitat within Ella Bay property and a 63.62ha offset property have been proposed in the Offset Package. The offset property has been purchased and will be revegetated. The offset property is positioned within a strategically important East-West regional corridor as identified in the Recovery Plan for the Southern Cassowary Casuarius casuarius johnsonii, (Latch 2007) as an area of key ecological function, broad movement corridors and appropriate rehabilitating habitat. Additionally the corridor 'would significantly improve the mobility of cassowaries between Eubenangee Swamp and the Graham Ranges' (Biotropica, 2005). This cane farm property will be revegetated with a Cassowary Habitat Corridor increasing the accessibility for birds from the Eubenangee Swamp National Park to World Heritage Area. The clearing of Essential habitat along Ella Bay Road has been avoided unless road safety or the saving of mature trees dictated.
Specific objective 2: Institute a more coordinated and stronger planning response to development issues in cassowary habitat	Ella Bay is committed to conserving the cassowary sub-population. A number of protection measures will be implemented addressing issues arising from the development; such as planning and design for habitat connectivity; fencing the road to reduce vehicle strike; no dogs allowed; gifting 62.8ha of the property to National Parks; providing a 63.62ha offset property positioned within a strategically important East-West regional corridor; and Conservation Covenanting 154ha of revegetated riparian fauna corridors traversing the site.
Specific objective 3: Implement strategies to protect cassowary populations by minimising the adverse impacts of roads, dogs, pigs and cyclone events	Implementation of the above Development of a suitable fencing strategy including purpose designed escape gate. To be installed along a Cassowary Coast Regional Council owned road. Cassowary specific underpass and 3 bridges to retain connectivity along Ella Bay Road. Ella Bay Road upgrade will retain the existing level of corridor width in order to reduce edge effect impacts on the terrestrial environment. The only clearing to occur would be in

Cassowary Recovery Plan (2007) Latch.	Ella Bay Cassowary Conservation Commitments
	specifically areas in order to: • Provide safety in terms of evasive action and correct sight distances; • Provide the alignment with a proper, adequate, environmentally sensitive drainage design, • Prevent the potential for landslides at Heath Point Successfully implemented feral pig trapping programme across Ella Bay since 2008 with greater than 100 pigs culled. No dogs and cats permitted Cassowary specific revegetation has been undertaken on 5ha at the base of the range in the north-west corner of Ella Bay. This location provides topographic protection to the trees, while being away from major population centres within the resort and development area. 'Dry' season fruiting cassowary-diet species were chosen to fruit after the cyclone season where many cassowary food trees may be badly damaged/drop fruit load due to high wind. Additionally, high wind tolerant species were chosen within this species selection then planted as 'wind breaks' to protect the smaller, more vulnerable trees.
Specific objective 4: Develop an effective cassowary rescue, rehabilitation and release programme	Ella Bay is collaborating with the University of Queensland to reintroduce rehabilitated orphaned cassowaries back into the wild. To monitor the results of the subadult's translocation Ella Bay purchased 5 GPS units to tag the birds, also financing their recovery for analysis.
Specific objective 5: Cassowary populations are monitored to assess population size, trends and status	Substantial survey information of the Cassowary population in the surrounds of Ella Bay has been collected, collated and assessed by staff and Cassowary advisors over the past 3 years. From this information Ella Bay has established a Cassowary database. The revegetation strategy for the offset property is aimed at restoring and widening a priority East-West regional movement corridor. Ella Bay proposes to assist and be involved in the population survey methodology based on faecal DNA research.

Cassowary Recovery Plan (2007) Latch.	Ella Bay Cassowary Conservation Commitments
Specific objective 6: Improve understanding of cassowary ecology and threats to its survival.	Implementation of the above A cassowary research station is to be located within the 5ha cyclone tolerant fruiting trees revegetation trail, with a number of ongoing projects being monitored, such as the monitoring of cassowary use of the revegetation plot, determining cassowary diet and energetics through remote sensing. The UQ tagging of subadults will provide dispersal pattern and other population information
Specific objective 7: Engage the community in cassowary conservation and education	The cassowary is significant within a marketing perspective of the area, and its conservation profile will be raised as a result. The Welcome Centre will both inform and educate residents and visitors alike. A section of the Welcome Centre will be dedicated to the cultural significance of the area, and the fauna and flora within it. Staff and contractors will be inducted before entering site, raising awareness and importance of the cassowary to the area.
Specific objective 8: Manage the recovery programme	A site specific (including Ella Bay Road) Cassowary Environmental Management Sub-Plan has been developed, which will involve regular, ongoing monitoring, reporting and evaluation of activities. The Environmental Management Plan will comprise other sub-plans which will ensure the mitigation measures; such as weed control, and feral pig cull and revegetation are successful.

Figure 4:9 Cassowary Recovery Plan Matrix

4.3 Stream Dwelling Frogs

Habitat suitable for two EPBC Act listed stream-dwelling frogs, *Litoria rheocola* (Common Mistfrog) and *Nyctimystes dayi* (Australian Lacelid) is present within the Ella Bay Development site and along the access road.

4.3.1.1 Ella Bay Site

Suitable habitat is confined to the southern section of the major north-south creekline on the southern boundary and the south-western corner of the property where riffle zones are present. *L. rheocola* was recorded in both the 2006 and 2008 surveys on the southern boundary as shown in Figure 4:10 and by Alford 2009 further to the north along the north-south creekline. The *L. rheocola* reported by Alford was confirmed as infected by *Batrachochytrium dendrobatidis* (Chytrid fungus).

The habitat is primarily located upstream and away from the proposed development area, and with appropriate controls, as set out in the *Stream Dwelling Rainforest Frog Species Management Sub-plan*, will not be affected by construction or operation activities.

BAAM reports "*It is likely that a substantial population is present on the site along creeklines draining the range along the western and southern boundaries. The species is also expected to occur in creeklines in Ella Bay National Park*"

These frogs are not expected to be present within the less steep portions of the creeks that traverse the predominantly cleared portions of the property. It was thought that the frogs would be confined to where there has been no disturbance by adjacent clearing and cattle grazing. However the later find by Alford may be an extension of distribution since cattle grazing has ceased.

Figure 4:10 Recordings of Litoria rheocola. From Figure 5.1 (BAAM, 2008) Volume 6.3a and (Alford 2009) Volume 6.3b

As the site has historically been operating as a cattle property, invasive flora and fauna species are present in significant numbers. Weed control programs to remove existing infestations of

weeds and introduced grasses within and surrounding the existing creekline habitats within the property are being undertaken and will continue throughout the construction and operational phases of the development. All riparian habitat on the site will be protected and enhanced through rehabilitation. All riparian areas and setbacks will be covered by conservation covenants. While *Litoria rheocola* and *Nyctimystes dayi* are not known to inhabit the proposed development areas, removal of cattle and pigs, and rehabilitation works within creeklines traversing the site may encourage their presence within the development area in the future.

4.3.1.2 Ella Bay Road

A fauna survey of the access road corridor, particularly targeting EPBC Act-listed frog species, was undertaken in November 2008 (BAAM 2009). Of the EPBC Act listed frog species which were targeted during the survey, only *L. rheocola* was located (Refer Figure 4:10), although habitat for *N. dayi* is present.

Creeklines supporting habitat suitable for the frogs are crossed by the existing Ella Bay Road around Heath Point. At these locations, the creeks currently pass beneath the existing road within pipe culverts, then immediately discharge down the headland to the ocean. The recordings for *L. rheocola* were upsteam and to the west (inland) of the current road. The road widening proposed in these creek locations will feature fauna sensitive culvert underpasses specifically designed with riffle zones for amphibian mobility and frog fencing 25m either side of the road. (Refer to Volume Seven drawing EBR1CE-PD10, EBR1- DD31 & DD32). This mitigation will improve on the existing habitat.

No suitable habitat was recorded within the proposed new road section (stage 2 Flying Fish Point Bypass)

4.3.1.3 Assessment of Potential Impacts on Stream Dwelling Frogs

A number of the identified threats and possible actions are relevant to the construction and operation of the Ella Bay Integrated Resort and access road upgrade have been addressed in *Stream Dwelling Rainforest Frog Species Management Sub-plan* (Volume Three). The major threats are:

- Increased risk of road kill near Ella Bay Road creek crossings due to increased traffic;
- Degradation of water quality though sediment, erosion or contamination;
- Inappropriate weed control measures in riparian areas; and
- Increased chance of further spread of pathogens (Chytrid Fungus).

4.3.1.4 Chytrid Fungus

Batrachochytrium dendrobatidis is listed as a key threat in Australia under the EPBC Act. Alford, 2009 states:

"B. dendrobatidis is present at the Ella Bay site, and at surrounding sites in the lowland Wet Tropics. …….. All available evidence indicates strongly that *B.* dendrobatidis has recently invaded the entire Wet Tropics region, and therefore the fungus found at the Ella Bay site will not be genetically differentiated from *B. dendrobatidis* occurring at other sites in the Wet Tropics. There is thus no need for quarantine procedures. The only precautions that should be needed with respect to *B. dendrobatidis* are with respect to handling frogs. Individuals should be handled and housed separately using sterile bags, gloves and containers if handling them is necessary, as could happen should individuals need to be relocated."

The *Stream Dwelling Rainforest Frog Species Management Sub-plan* includes procedures on handling and hygiene protocol of frogs.

4.3.1.5 Conclusion

Potential impacts on the stream-dwelling frogs from the construction and operation of the Ella Bay Integrated Resort and access road have been addressed in the *Stream Dwelling Rainforest Frog Species Management Sub-plan.* Recommendations from specialists and the Recovery

Plan for Stream-dwelling Rainforest Frogs have been incorporated into the plan's management and monitoring processes for the development. A frog monitoring program, as set out in the *Stream Dwelling Rainforest Frog Species Management Sub-plan*, will determine the ongoing status of the species on-site.

There will be no increase in threats to the long-term persistence of *Litoria rheocola* and *Nyctimystes dayi* populations resulting from the proposed development. Onsite the conservation covenants will encompass the riparian areas which will be revegetated and rehabilitated while the establishment of constructed wetlands and swales for stormwater management will have the potential to increase the available habitat and resilience of these species. It is concluded that the proposed activities at the Ella Bay Development site or the access road upgrade construction and operation will not interfere with the recovery process, with mitigation measures contributing to a net positive impact.

To minmise impacts on Stream Dwelling Rainforest Frog Species, the proponent will:

a. Implement the *Stream Dwelling Rainforest Frog Species Management Sub-plan* for chytrid fungus control;
b. Implement the *Weed Management Sub-plan* which will ensure chemicals are frog and aquatic friendly; and
c. Implement the *Fauna Sensitive Road Design* in the *Ella Bay Road Design and Environmental Management Report (Volume 4)*. Specifically:
    i. To provide habitat connectivity by constructing and maintaining fauna friendly culvert underpasses specifically designed with riffle zones for amphibian mobility at locations identified as fauna underpasses Volume Seven drawing EBR1CE-PD10;
    ii. To minimise road mortality directional frog fencing will be installed and maintained for 25 m either side of creek crossings at locations identified as Culverts 15 & 16 and Bridges 2 and 3 Volume Seven drawing EBR1CE-PD06.
d. Induct all staff, construction workers, residents, and provide information to visitors with significance of Common Mistfrog and risks to species viability.

4.4 Spectacled Flying-fox

The Spectacled Flying-fox is the only Australian mainland Flying-fox species that is specialised to rainforest (Richards *et al.* 2008). They feed on more than 35 species of rainforest trees and are rarely observed far from this habitat. Large groups of hundreds to tens of thousands may roost at a single location, called a camp. Camps are usually located in rainforest and gallery forest trees, but they have also been recorded roosting in mangroves, paperbark, eucalypt forest and tall acacia trees (Churchill 1998).

During field surveys several individual Spectacled Flying-foxes were observed feeding in a large fruiting *Szygium* near the entrance to Little Cove and one individual was seen on Ella Bay, Individuals were also observed feeding in trees at Flying Fish Point. A large permanent camp of Spectacled Flying-foxes was observed in a melaleuca wetland in Innisfail, approximately seven km from the study site. No camps were recorded from the study area.

The animals can move a great distance from camps in search of fruit and they disperse seeds up to 20 km from the source tree (Churchill 1998). Consequently, they are considered to be a major dispersal agent of rainforest seeds across the landscape and between rainforest patches (Richards et al. 2008).

Species Recovery: There is no specific recovery plan for the Spectacled Flying-fox, although the species is included in the Environment Australia (1999) publication 'The Action Plan for Australian Bats'. The recommended actions for the species are aimed at regulators. The proposed development will not interfere with the aims or outcomes of the Action Plan.

4.4.1.1 Assessment of Potential Impacts on Spectacled Flying-fox

The Ella Bay site is not frequented and the habitat is not currently critical to the Spectacled Flying-fox. Potential impacts and possible actions relevant to the construction and operation of the Ella Bay Development and access road have been addressed in the *Spectacled Flying-fox Management Sub-plan* (refer Volume Three). Both direct and indirect impacts are considered in relation to the pre-construction, construction and operational phases of the development.

The major threats are:

- Disturbance to camps through noise and light; and
- Injury and/or death through overhead power lines and barbed wire fencing.

4.4.1.2 Conclusion

There is little existing presence of the Flying Fox, and minimal habitat use. The nearest colony is in Innisfail. The project will enhance Flying Fox habitat and the *Spectacled Flying-fox Management Sub-plan* (refer Volume Three) will manage any interactions if they arise.

To avoid impacts on Spectacled Flying-fox, the proponent will:

a. Implement the Spectacled Flying-fox Management Sub-plan;
b. Induct all staff, construction workers, residents, and provide information to visitors with significance of The Spectacled Flying-fox and risks to species viability and Lyssavirus disease risk management.

4.5 Marine Turtles (As For GBRMPA above)

No marine turtles were reported during the surveys by BAAM in 2006 and 2008, however turtle nesting activity was recorded by Constable in 2008/2009.

4.5.1.1 2008 Turtle Surveys by Constable

Surveys of turtle nesting activity were undertaken by Constable et al, in November and December of 2008 and February of 2009. These surveys recorded a recently dug nest adjacent to the proposed resort site, 8 recently dug nests within approximately 300m to the north of the proposed resort site and a further 39 recently dug nests along the 20km of beach extending to the north. Of the nine nests recorded within the Ella Bay Development area none were viable. Weekly surveys by Ella Bay staff during 2009 and 2010 seasons recorded several nests however none were viable nests (dry nests, suspected goanna raid). One nest near Heath Point Headland (Constable 2010) was viable with greater than 100 hatchlings.

4.5.1.2 Ella Bay Site

The beach in the vicinity of the Ella Bay site is limited in suitability for turtle nesting; it is steeply sloping with dense foreshore vegetation and limited low dunes suitable for nesting. The low dunes are subject to overtopping in extreme weather from wave run-up inundating nests. Dune vegetation includes several exotic weeds (e.g. Singapore daisy), which can impede turtle nesting. The foreshore adjoining the site, and to the north is dynamic. Erosion scarps are indicative of widespread loss of the upper beach and fore dunes; elsewhere, sand has recently been deposited around the base of fore dune trees. (Thorogood, 2009).

4.5.1.3 Assessment of Potential Impacts on Marine Turtles

The Ella Bay Site is not critical for Marine Turtles, a number of the identified threats and possible actions are relevant to the development area from the construction and operation of the Ella Bay Integrated Resort and access road have been addressed in *Marine Turtle Species Management Sub-plan* (Volume Three). The major threats are:

- Exotic weeds such as Singapore daisy can impede turtle nesting;
- Noise and light impact may disorientate hatchlings, and nesting females;
- Offshore habitat can be impacted by urban runoff and sedimentation from construction;
- Vehicles can crush nests and/or damage nesting habitat;
- Faunal predation of eggs by feral Pigs, and feral Dogs;
- High levels of uncontrolled human access may deter females from landing; and
- Marine debris may tangle or choke turtles;

4.5.1.4 Conclusion

The Recovery Plan for Marine Turtles in Australia adopts a threat-based approach, where the premise is to reduce the likelihood that current threats will cause mortalities, or to modify activities to reduce the potential for future mortalities at all stages of a marine turtle's life. The Proposed Action for Ella Bay Resort complies with this intent to a level appropriate to the identified potential risk.

Thorogood (2009)

"…. the likely threats posed by the proposed development are minor: development is to be well set back from the beach and fore dunes, potentially damaging activities (such as vehicle access) are to be restricted, and the likely incidence of interactions between humans and turtles is low.

'Worst Case' scenarios would not lead to significant impacts on turtle populations. Likely negative impacts on turtles will have trivial consequences for turtle conservation. …"

On the basis of the material reviewed, the proposed resort poses a negligible threat to turtle nesting along the Ella Bay coast. Yet it offers the prospect of enhanced ecological

understanding through monitoring, and enhanced management primarily through education. On balance this is a desirable outcome. “

To minimise the impact on Marine Turtle Species, the proponent will:

a. Implement the *Marine Turtle Species Management Sub-plan* and monitor the foreshore during turtle nesting season;
b. Implement the *Weed Management Sub-plan* to control exotic species and revegetate with endemic species;
c. Restrict vehicular access on the beach all year round except for Emergency vehicles or with permit for human derived rubbish collection; and
d. Ensure that all lighting within the development area will be designed not to “spill” into adjoining habitat areas.
e. Induct all staff, construction workers, residents, and provide information to visitors with significance of Marine Turtles and risks to species viability.

4.6 Vegetation Communities and Flora Species

4.6.1.1 Threatened Vegetation Communities

The flora and ecological communities of Ella Bay and Ella Bay Road were surveyed in 2006 and in 2008 (3D 2008, (refer to Volume 6.2a). A detailed Baseline vegetation monitoring of edge effects on a number of permanent transect sites along Ella Bay Road was also reported in 2008. (3D 2008, refer to Volume 6.2b)

> *Across all project components, the survey identified 18 regional ecosystems with one of these being listed under the VMA as 'endangered', 13 as 'of concern' and 4 as 'not of concern'. The EPBC threatened ecological community 'Littoral Rain Forest and Coastal Vine Thickets of Eastern Australia (critically endangered)' was also identified in areas marginal to the development site and adjacent to the proposed access corridor.*

The Critically Endangered ecological communities '*Littoral Rain Forest and Coastal Vine Thickets of Eastern Australia*' (Littoral Rainforest) were listed under the EPBC Act in October 10, 2008 and are not part of the controlling provisions. The ecological communities '*Littoral Rain Forest and Coastal Vine Thickets of Eastern Australia*' are represented by Queensland RE's 7.2.1a-i, 7.2.5a on Ella Bay property and along Ella Bay Road.

- RE 7.2.1 is described as mesophyll vine forest on beach ridges and sand plains of beach origin, occurring mainly in small patches in the lee of coastal beach ridges in very high rainfall areas.
- RE 7.2.5 is described as mesophyll to notophyll vine forest of *Syzygium forte* subsp. *forte* on sands of beach origin.

4.6.1.2 Ella Bay Site

Within the Ella Bay site the Littoral Rainforest communities RE 7.2.1 and 7.2.1i occur on the northern boundary adjacent to the golf course to the north of the Northern Residential Precinct refer to Figure 4:11 (Volume 6.2a *Vegetation Survey Report*). Unlike most of the other vegetation on the site the canopy features of this community are relatively intact. The site has some previous agriculture based edge effect, logging tracks, and minor clearing. The area has small pockets of Pond apple, which could spread to northerly swamps. The pond apple will be removed and the area rehabilitated. A permanent monitoring site has been established in this ecosystem, establishing baseline floristic information for measurement and comparison on a regular basis (refer Volume 6.2b Baseline Vegetation Monitoring of Edge Effect– 3D).

RE 7.2.5 occurs on the foredune in front of the Village Precinct predominately on the Esplanade with only a thin strip of less than 50m wide on the Ella Bay property. The area is described as

> *…a severely altered example comprising secondary growth dominated by Euroschinus falcatus, Syzygium forte subsp. forte, Chionanthus ramiflorus and Hibiscus tiliaceus ……..*
>
> *Although severe disturbance is noted, the community possesses sufficient canopy height and canopy cover to be represented with remnant status.*

The vegetation community is severely degraded; the northern area is extensively infested with Pond Apple, while the southern area is degraded from historical camping, beach huts, rubbish and previous agriculture. The southern portion is shown as cleared in historical surveys (Surveyor General 1898, Army 1943) and the vegetation is regrowth.

In the northern area of this community the Pond Apple infestation, has a stem count greater than 90% and sub-cover greater than 70%, however Pond Apple is not recognised as a Transformer weed species in the Wet Tropics Bioregion in the listing for the Critically Endangered Littoral Rainforest.

The pond apple, camping huts and rubbish tip will be removed and the vegetation community will be rehabilitated.

The vegetation community directly in front of the Village Precinct lies on the Esplanade and will be at high risk of human interference. The property boundary will be fenced by the precinct fence in this area and access to the beach will be by two path-ways. Each of the pathways will be signposted restricting access to the pathways only. Signposts will be placed on both the Precinct and beach side.

A nature path will meander north within the vegetation to highlight the ecological rehabilitation through removal of the Pond Apple, the revegetation of the area and the ecology of the dunal swale. The nature walk will be non-invasive and feature no clearing or pruning.

Details of the importance of the Littoral Rainforest and Coastal Vine thickets will be included at the welcome Centre induction and "in-room" literature.

The rehabilitation of this area will require extensive weed management and revegetation. (Refer to Volume 6.2 d Weed Mapping Survey, Volume 6.2 e Vegetation management plan for the littoral rainforest and coastal vine thicket and Volume 3 Weed Management Sub-plan)

Both of these sites will be conserved by the Conservation Zones. The potential for indirect impacts will be managed under the EMP (Significant Flora Management Sub-plan refer to Volume 3.6).

4.6.1.3 Ella Bay Road

On the access road, the vegetation community is limited to two linear strips of vegetation formed on coastal back dunes in the central and northern portions of the alignment. The smaller of these occurrences is located within the national park boundary, with the more extensive northern occurrence outside the national park boundary to the immediate north.

The current unsealed access road skirts the western fringes of this community and direct impacts during road construction and operation are not proposed. The cassowary fence will wind through the edge of the community. The community was mapped by mapping the canopy extent whereas the ground-level is open and no clearing or only clearing of weeds will be required. The community is to be protected from indirect impacts through the maintenance of existing stream hydrology and erosion protection under the EMP (Integrated Water Management Sub-Plan and Erosion and Sediment Control Sub-Plan). The ground cover is heavily degraded in some sections with invasion of *Megathyrsus maximum* (Guinea Grass) into disturbed areas, particularly in the vicinity of the council camping grounds. Weed management during construction and operation will be implemented to ensure that this community is not further affected by weed invasion, as described in the EMP (Weed Management Sub-plan refer to Volume 3.7).

Small areas of vegetation RE7.2.5a are located in backdune situations along the northern portion of the Flying Fish Point beachfront. Similarly, small areas located on the coastal esplanade of the Ella Bay Integrated Resort Site are well away from areas of direct impact.

No impacts to this community are proposed, being adjacent but away from the road infrastructure and the potential for indirect impacts will be managed under the Significant Flora Management Sub-Plan.

4.6.1.4 Threatened Flora

Stanton (3D, 2008) reported that

> *Four plant species recorded during the study are considered significant under Queensland's NCA. Macaranga polyadenia, Endiandra globosa, Icnanthus pallens var. majus and Rourea brachyandra are all listed as 'rare' under the NCA….*
>
> *….No species scheduled as significant under the EPBC Act were identified during the survey although several species are identified as likely to occur within the project area. Habitat suitable for Carronia pedicellata (endangered), Arenga australasica (vulnerable), Canarium acutifolium var. acutifolium (vulnerable), Hupzeria phlegmarioides (vulnerable)*

and Aponogeton proliferus (endangered) is present within the study area and potential for their occurrence is moderate to high.

While vegetation surveys in 2006 and 2008 failed to locate any individuals of these species, despite targeted searching, their presence cannot be discounted. A suitably qualified botanist will accompany surveyors marking the currently unformed sections of the access road and any tracks, roads or buildings on the Ella Bay Development Site to check for the presence of listed species (Refer to Significant Flora Management Sub-Plan for procedure).

Descriptions of the endangered species are reported in Volume 6.2a Vegetation Survey Report – 3D and Volume 3 Significant Flora Management Sub-plan. None of the listed species present on site are the subject of any current Species Recovery Plan.

Where suitable REs are being rehabilitated, listed species will be incorporated into the planting schedule providing they are able to be grown from local seed.

4.6.1.5 Assessment of Potential Impacts Vegetation Communities and Flora Species

Potential impacts on the Vegetation Communities and Flora Species from the construction and operation of the Ella Bay Integrated Resort and access road have been addressed in the *Significant Flora Management Sub-Plan* (Volume Three). The major threats are

- Human interference during construction and operation of the Development and Road through direct access and dumping of rubbish;
- Destruction of endangered flora species during clearing;
- Introduction of weeds and increase in the weed population; and
- Sediment and erosion from storm water runoff.

4.6.1.6 Conclusion

There are a number of areas of EPBC Act listed Critically Endangered ecological communities '*Littoral Rain Forest and Coastal Vine Thickets of Eastern Australia*' on the Ella Bay property and along Ella Bay Road. The critically endangered communities are not within the development footprint or within the clearing area or impact of the Ella Bay Road upgrade. The communities on the Ella Bay property will be protected by conservation covenanting.

There is no known presence of any of the endangered flora species on the site.

To minimise the impact on the ecological community, *Littoral Rainforest and Coastal Vine Thickets of Eastern Australia,* The proponent will:

a. Implement *The Significant Flora Management Sub-Plan* and *The Weed Management Subplan* to control exotic species including Pond apple (*Annona glabra)* and revegetate with endemic species;
b. Prepare and implement *Erosion and Sediment Control Sub-Plan* to prevent hydrological impact;
c. Restrict human and vehicle access during the construction of Ella Bay Road to the identified Littoral Rainforest through:

   i. Fencing with temporary high visibility barrier fencing and have signage to restrict access to construction workers;
   ii. Provision of an induction for construction workers to advise of the access restriction;

d. Provide educational material for all visitors, staff and construction workers. An awareness program will be a requirement for the induction for cassowary fence maintenance contractors.

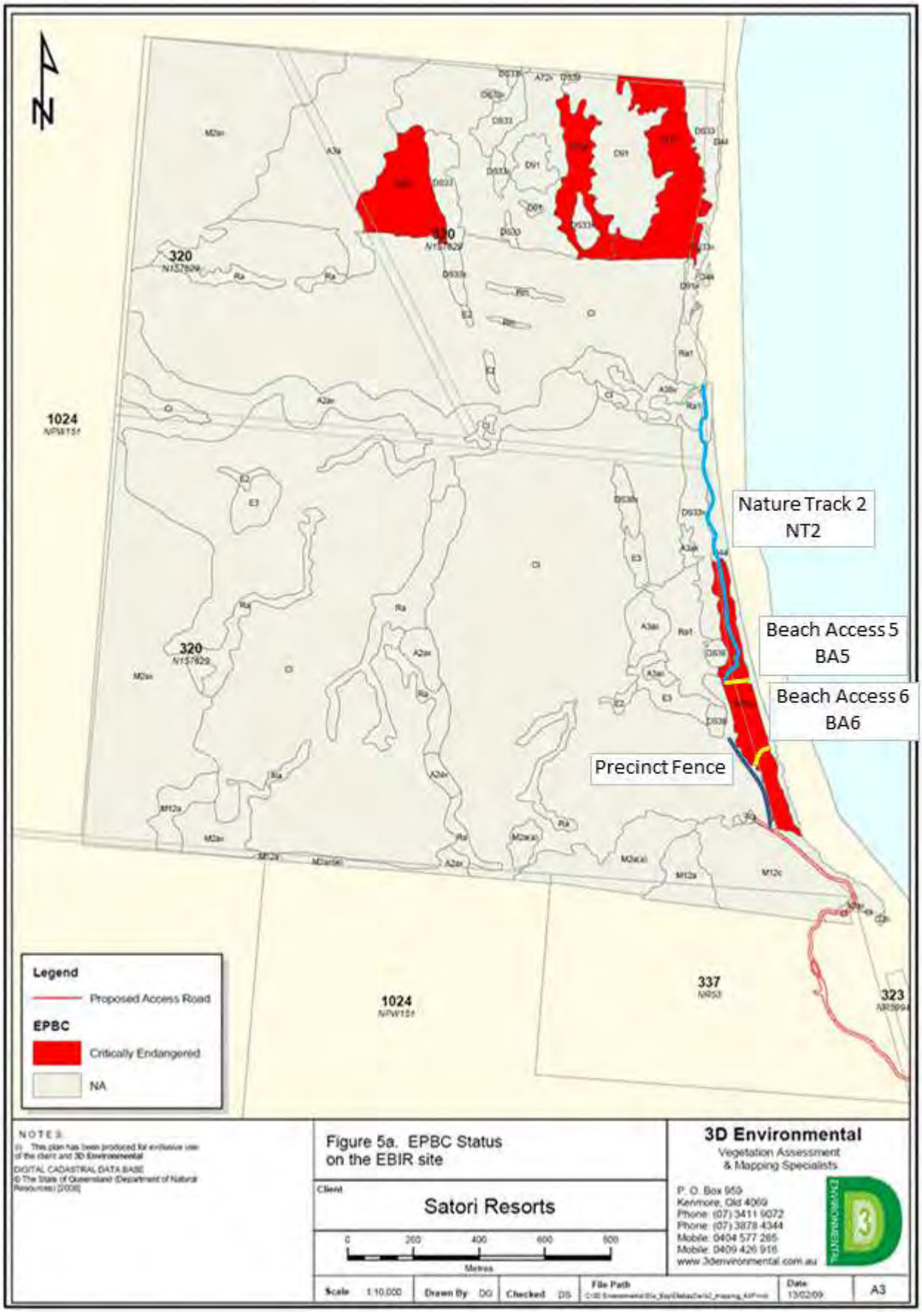

Figure 4:11 Map of EPBC status of critically endangered communities

5. Offset Package

A comprehensive compensatory Offset Strategy is proposed for the project. Details of the proposal are included in Volume 5 of the Submission Response.

The Proponent's goal is that there will be a long term positive outcome from the Offset Package and onsite mitigation. The package has been integrated into; and supports the aims of the Recovery Plan for the Southern Cassowary (Latch 2007). The Proponent's actions are designed to enhance the movement and ultimately the long term survival of cassowaries within the local Ella Bay Development and in the regional context.

Although extensive mitigation has been included in the design and environmental management plans of the Ella Bay Development and Ella Bay Road to minimise the environmental threats and impacts, the current anthropogenic impacts are overwhelming and will lead to extinction of the local cassowary subpopulation.

The Proponent has focussed on environmental stewardship of the area in mitigation design and in the provision of this offset package for the long term benefit of the local and regional habitat for the recovery of the cassowary. The objectives of the offset package will be in integrating elements of the Commonwealth EPBC and state based VMA principles to:

- Provide an offset that compensates the residual impacts of the project on biodiversity; in particular the cassowary;
- Deliver an offset that improves the environmental outcome of the cassowary;
- Develop an offset package that incorporates the key elements of the Southern Cassowary Recovery Plan; and
- Ensure in perpetuity security of the offset sites through incorporation with National Parks and provide a framework for their ongoing and long term maintenance.

The Offset Package will achieve an environmental benefit from the Ella Bay Integrated Resort for the Matters of National Environmental Significance and World Heritage Values. The proponent's goal is that there will be a long term positive outcome from the Offset Package and onsite mitigation such that the short term "do nothing" prediction of extinction of the Graham-Seymour subpopulation of cassowaries is reversed. (Moore, 2007)

5.1 Ella Bay Offset Package

The offset package has been developed for residual impacts and the current overwhelming anthropogenic impacts from the proposed development and road upgrade after all available impact mitigation strategies have been exhausted. The offsets have been developed in the context of the current approvals process under the *Environmental Protection and Biodiversity Conservation Act 1999* and protection requirements under the *Vegetation Management Act 1999 and Nature Conservation Act*.

The Proponent has taken a wider view and prepared an offset package that goes beyond maintaining the status quo and delaying the eventual population decline. For the population to survive the local population must also increase, and this will require a number of positive actions as well as threat minimisation.

The proposed offset comprises both a land based offset and research initiatives. The main element of the offset package is to increase the strength of the linkage and create a viable cassowary corridor linkage to the West through Eubenangee Swamp National Park. The research package is to further understanding in terms of reducing cassowary mortality and increasing the local population.

Land-based Offset				
Action Summary	*Offset Area*	*Contribution*	*Value (est.)*	*Timing*
Queensland VMA & NCA *For clearing of 3.75 ha and revocation of 0.014 ha National Park* EB REF CZ A.1	22.60 ha	In perpetuity regional corridor and essential cassowary habitat protection. Legally handed over to State for National Park	$ 250,000	<1 year
EPBC Direct Impact *For edge effect and isolation of 18.55 ha* EB REF CZ A.2	40.18 ha	In perpetuity essential cassowary habitat protection and extension of protection to Ella Bay Swamp Wetland. Legally handed over to State for National Park.	$ 450,000	<1 year
EPBC Indirect Impact Eubenangee Offset Property	63.62 ha	In perpetuity key regional cassowary corridor protection. Legally handed over to State for National Park.	$ 400,000	<1 year
Implementation of Management Strategy for Eubenangee Offset Property		Establishment of vegetated connectivity corridor between key habitats	estimated $ 500,000+	1-3 years
TOTAL	126.42 ha		$ 1,600,000	

Table 5:1 Land based direct offsets

Indirect Offsets			
Action Summary	*Contribution*	*Value (est.)*	*Timing*
Cassowary tracking	UQ/QPWS/Ella Bay project Using GPS telemetry to track rehabilitated juvenile Cassowaries	$30,000	In progress <1 year
Cassowary Diet and DNA analysis	University of Queensland/QPWS project Determining Cassowary Diet and Energetics through Remote Sensing,	$30,000	In progress <1 year
Cassowary Fencing & Escape Gate Research Project	Ella Bay Developments. Design, develop and trial Cassowary Fence & Escape Gate	$100,000	complete
Impact of Ella Bay Development on cassowaries, fauna and flora.	James Cook University Environmental impacts of Ella Bay Development access and internal roads, design of strategies to mitigate road impacts on adjacent habitats and internal corridors, and monitoring of road mitigation strategies	$130,000	Before and after construction +3 year
TOTAL		$290,000	

Table 5:2 Research based indirect offset package

5.2 Direct Impacts

The offset package for direct impacts has been prepared for with regards to clearing, isolation and edge effects. The offset package has been based on the Draft Policy Statement: Use of Environmental offsets under the Environment Protection and Biodiversity Conservation Act. 1999 and EPBC Act Consultation Draft Environmental Offsets Policy 2011 to determine direct and indirect impacts and offsets. The Queensland Draft Policy for Biodiversity Offsets has been used for determining offsets and multipliers with the direct Offsets.

Clearing of Native Flora					
	Revocation of National Park [1]	***Clearing of National Park Of Concern*** [2]	***Clearing of Essential Cassowary habitat*** [3]	***Clearing of remnant Of concern RE***[4]	***Total Area***
Ella Bay Road	0.014 ha	0.33 ha	2.13 ha	0.34 ha	2.82 ha
Ella Bay Development			0.70 ha	0.25 ha	0.95 ha
TOTAL	**0.014 ha**	**0.33 ha**	**2.83 ha**	**0.59 ha**	**3.77 ha**
Impact : Offset Ratio	5	5	5	2.5	
TOTAL Offset	*0.70 ha*	*1.65 ha*	*14.15 ha*	*1.48 ha*	*17.35 ha*

[1] *Refers to the area required for road corridor – actual clearing is 0.004 ha*
[2] *Policy for Biodiversity Offsets - Appendix 2 Offset Rules* section - Protected area estate
[3] *Policy for Biodiversity Offsets - Appendix 2 Offset Rules* section - Endangered Species
[4] *Regional Vegetation Management Code for Coastal Bioregions* – Of Concern RE

Table 5:3 Cleared Areas and Resulting Regulatory Offsets

The revocation of a small area 0.014ha (140m²) of Ella Bay National Park has been included to improve the alignment at the intersection of Stage 1 and Stage 2 resulting in a an overall reduction in clearing of 1400m². This area is not part of the WTWHA.

Areas impacted Endangered Fauna					
	Isolation Essential cassowary habitat	***Isolation General cassowary habitat***	***Edge Effect Essential cassowary habitat***	***Edge Effect Essential cassowary habitat***	***Total Area***
Ella Bay Road	1.05 ha		8.38 ha		9.43 ha
Ella Bay Development		1.07 ha		8.05 ha	9.12 ha
TOTAL	**1.05 ha**	**1.07 ha**	**8.38 ha**	**8.05 ha**	**18.55 ha**
Impact : Offset Ratio	3	1	1.5	1	
TOTAL Offset - Fauna	**3.15 ha**	**1.07 ha**	**12.57 ha**	**8.05 ha**	**24.84 ha**

Table 5:4 Proposed Direct Residual offset - EPBC

5.3 Indirect Impacts to World Heritage Area

Indirect impacts to the WTWHA have been mitigated extensively in the Masterplan design. The residual impacts are listed in Table 5:5. The listing includes reference to cultural and historical aspects of Australia.

Description	WHA listing	Impact Summary
Aesthetics/natural beauty	(vii)	Impact on visual amenity will be mitigated and temporary until revegetation reaches greater 10m height. The proponent considers that the mitigation adequately covers visual amenity and no offset is proposed for the temporary impact.
Significant geomorphic or physiographic features	(viii)	The proposed mitigation measures will reduce the potential of impact to the nationally significant Ella Bay Swamp Wetland and the Great Barrier Reef Marine Park; and along Ella Bay Road these measures will reduce the current impact. A high risk of temporary impact has been recognised

		during construction of the road The proponent considers that the mitigation adequately covers the impact and no offset is proposed. However the inclusion of the southern extent of the nationally significant Ella Bay Swamp Wetland within the direct impacts offset will provide a net positive benefit
Significant ecological and biological processes	(ix)	The proposed mitigation measures will reduce the risk of impact to evolutionary processes. The proponent considers that the mitigation adequately covers the impacts and no offset is proposed.
Significant biological diversity/threatened species	(x)	The PVA for the cassowary showed that the Graham-Seymour Range Subpopulation is in decline and with "do nothing" management, the cassowary subpopulation will be extinct within 100 years. Extensive mitigation measures will reduce the impact of the development however significant land and research offsets are proposed to reverse the current decline.
National Heritage Values - Cultural and Historical Impacts		The cultural and ethno-history impact of Ella Bay Development will be small in magnitude but will be significant to the Bagirbarra. A Heads of Agreement has been signed to establish the Ella Bay Bagirbarra Development Trust to establish a cultural economy and assist with sustainability of the Bagirbarra cultural heritage.

Table 5:5 Wet Tropics World Heritage Area Criteria and Summary of Impacts

5.4 Offset Property Description

The Offset will comprise three parcels of land which will be donated to National Parks. The time frame for all parcels is less than 12 months.

Ella Bay Property South-West corner.

- 22.60ha of RE 7.11.1 and RE 7.11.1b (Essential cassowary habitat) located on the south-western corner of Ella Bay property;
- The primary purpose of this offset is to increase protection of the Seymour range north-south corridor and essential cassowary habitat; and

Ella Bay Property Northern section:

- 40.18ha of RE 7.11.1, 7.3.3a, 7.3.10c, 7.2.9, 7.2.4, 7.2.1d and 7.2.7a (Essential cassowary habitat) located on the Northern boundary of the Ella Bay property;
- The primary purpose is protection of essential cassowary habitat, and the nationally significant Ella Bay Swamp Wetland.

Eubenangee Cassowary Corridor Offset property

- 63.62 ha of cleared sugar cane farm.;
- The primary purpose is to form a cassowary corridor between Eubenangee National Park and the WTWHA of the Seymour Range.

5.5 Eubenangee Offset Property

As part of the offset proposal the proponent has purchased property located within a strategic regional habitat connectivity corridor; identified within the Recovery Plan for the Southern Cassowary as an area of key ecological function, broad movement corridors and appropriate rehabilitating habitat. This corridor 'link' was identified as important for conservation by Terrain NRM and key regulatory stakeholders including Queensland Environmental Protection Agency,

Wet Tropics Management Authority, Queensland Parks and Wildlife Service and Cairns City Council.

The proposed offset comprises land on 3 titles totalling 63.62 ha. The land is contiguous with Eubenangee Swamp National Park on the south and western boundary and WTWHA on the northern boundary. The area is shown on Figure 5:1. The land has been procured and the time period for transfer to National Parks will be less than 12 months.

The land is currently laying fallow following purchase of the operating sugar cane farm. The land will be revegetated before providing an important corridor between the WTWHA and Eubenangee Swamp National Park

The offset property will undergo extensive revegetation/rehabilitation to create a habitat corridor linking a World Heritage area and Eubenangee Swamp National Park. A revegetation management plan has been prepared (refer to Volume 5 Appendix 2). This on-ground property-based offset will:

- deliver real conservation outcomes;
- will be commensurate with the magnitude of the impacts of the development;
- will be within the same area as the development;
- will be delivered in a timely manner and be long lasting; and
- will be enforceable, monitored and auditable as required

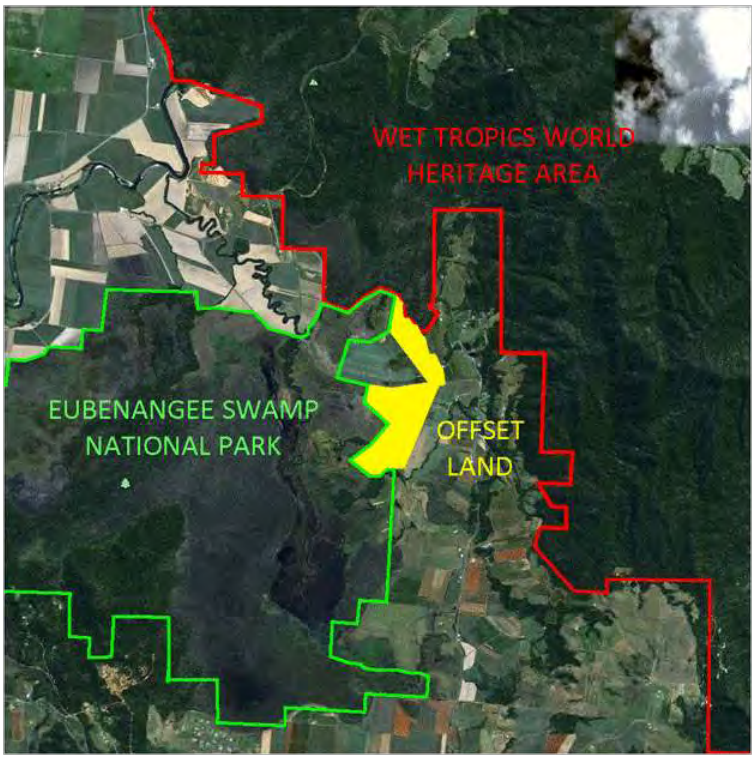

Figure 5:1 Offset land showing the relationship between Eubenangee Swamp National Park and WTWHA

5.6 Offset Package Matrix

The offset package has been designed for maximum immediate outcome as per the Offsets Matrix tool (DEWR 2007). Table 5.6 provides a review of the key characteristics of the Proponent's offset package proposal and an indication of the probable conservation outcome, and whether there is a balance of high and low risk actions.

	IMMEDIATE OUTCOME (less than 12 months)	MEDIUM TERM OUTCOME (within 1 to two years)	LONG TERM OUTCOMES (greater than 2 years)
HIGH LEVEL OF CERTAINTY technique used regularly with effective results good quality scientific data is available on key conservation needs of the matter of NES	22.60 ha of essential cassowary habitat for ecological cassowary corridor on private land to be gifted to National Parks; 40.18 ha of essential cassowary habitat including the southern extent of the nationally significant Ella Bay Swamp Wetland on private land to be gifted to National Parks; 63.62 ha Eubenangee offset property to be gifted to National Parks; 67.8 ha of buffer from World Heritage/ National Park will be placed in Conservation Covenants; and 87.3 ha of fauna corridors will be placed in Conservation Covenants. Research - Cassowary Tracking. Juvenile Tagging and Tracking – research has been 50% completed		Research - impact of Ella Bay Development on cassowaries, fauna and flora
MEDIUM LEVEL OF CERTAINTY -approach has successfully been used previously in relation to this or highly similar matter of NES	Eubenangee offset property: Creation of essential cassowary habitat under a Revegetation Management Strategy (with precedence). Research – Cassowary fencing and escape gate project - complete	Targeted Survey: Specific monitoring of cassowary usage of Eubenangee offset habitat corridor	
LOW LEVEL OF CERTAINTY New or untested on-ground conservation activity limited scientific data on the matter of NES	Research – Cassowary diet and DNA analysis.		Education Programs Frog fencing erected at creek crossings on Ella Bay Road

Table 5:6 Offset Package Matrix based on Offsets Matrix tool (DEWR 2007)

6. Review of the EIS and SEIS

On 15 September 2005 the Ella Bay Development was declared a 'significant project' under section 26(1)(a) of the State Development and Public Works Organisation Act 1971 (Qld) (SDPWOA). The statutory impact assessment process under the SDPWOA Act is also the subject of a bilateral agreement between the state and federal governments in relation to environmental assessment under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).

The proponent referred the proposal to the Federal Minister for the Environment, Heritage and the Arts in accordance with the provisions of the EPBC Act. The minister decided, on 4 July 2005, the proposal did constitute a 'controlled action' under Section 75 of the EPBC Act, with the controlling provisions being:

- World Heritage (sections 12 and 15A)
- listed threatened species and communities (sections 18 and 18A).

The terms of reference (TOR) were prepared by the Coordinator-Generals Department with input under the bilateral agreement from DSEWPaC. The TOR was advertised for public comment in November 2005 in The Courier Mail, The Australian, The Innisfail Advocate, and was made available for viewing at www.sdi.qld.gov.au/eis.

The EIS was prepared and submitted to the Coordinator-General on April 3rd 2007. The EIS was publically advertised on April 3rd to May 21st 2007.

The EIS was available for viewing at the

- Johnstone Shire Council offices (70 Rankin St Innisfail)
- Johnstone Shire Library North (49 Rankin St Innisfail)
- State Development Centre in Cairns (Cnr of Hartley & Grafton St)
- State Library of Queensland, Brisbane.

A Supplementary EIS was advised in response to substantive comments submitted, and necessitated a change to the referral description under the EPBC act. The change to the referral was approved to include “a suitable access route from Flying Fish Point to Ella Bay” on 18th January.

Due to some significant amendments/refinements to the project, it was decided to seek public comment on the Supplementary EIS.

The Supplementary EIS was available for viewing during business hours from 12th April 2008 to 16th May 2008 at:

- Cassowary Coast Regional Council (70 Rankin St Innisfail)
- Cassowary Coast Regional Library North (49 Rankin St Innisfail)
- State Development Centre in Cairns (Cnr of Hartley & Grafton St)
- State Library of Queensland, Brisbane.

This Submission Response provides additional information to address final issues in submissions on the SEIS

Additionally a request for reconsideration of the original referral determination was sort by an environmental group and an invitation for Public comment was advertised on 25th Feb 2009. The Proponent provided a reply to the reconsideration which is included in Volume 6.3c Marine Turtle Review. A decision to confirm that the proposed action was in accordance with the original controlling provisions under Section 78C of the EPBC Act was made on 9th June 2009.

A copy of the SEIS was forwarded to government agencies requesting their specific comments or advice to the Coordinator-General to be considered for inclusion as conditions or recommendations in this report. An electronic copy of the SEIS was also provided to members of the public who commented on the EIS. The SEIS was also available via the both the DIP and proponent’s websites.

Government Agencies – 16

- Dept of housing
- DEEDI (Fisheries Queensland)
- Department of Environment and Resource Management (DERM)
- Wet Tropics Management Authority
- Queensland Health
- Queensland Transport
- Land & Vegetation Services
- DSEWPaC
- Dept Main Roads
- Dept of Employment & IR
- Dept of Communities
- Dept of Premier and Cabinet
- Dept of Tourism, regional Development
- Dept of Emergency Services
- Tourism Queensland
- CCRC

Private individuals – 9 (5 support)

Petition (5 signatures) - 1

Pro - forma letter - 36

Environment groups - 4

Issues raised in the submissions are addressed in detail in Volume 2. The major issues raised were:

- Stormwater Treatment and Wetlands Management;
- Requirement for post SEIS fauna and flora surveys;
- Domestic pets;
- Potential impact on cassowary population;
- Ella Bay Road Alignment and upgrade; and
- Fauna impact and mitigation.

Of the government agencies, the following advised that they were satisfied that all issues had been addressed, had no further comment or were in support:

- Dept Main Roads
- Dept of Employment & IR
- Dept of Communities
- Dept of Premier and Cabinet
- Dept of Tourism, regional Development
- Dept of Emergency Services
- Tourism Queensland

The following government agencies either provided advice or recommended conditions:

- Dept of housing
- DEEDI (Fisheries Queensland)

The following government agencies provided advice or recommended conditions and/or requested further information on specific issues which were addressed in additional documentation to the SEIS:

- Department of Environment and Resource Management (DERM)
- Wet Tropics Management Authority
- Land & Vegetation Services
- DSEWPaC
- CCRC

6.1 Public Consultation and Community Involvement

Consultation with the community and other stakeholders has been an important part of the environmental impact assessment process. A program of public information, consultation and participation was incorporated into the route selection for the access road and appraisal of the project as a whole. This process ensured that the concerns of local residents, businesses, road users and other interest groups were taken into account during the assessment.

The following activities formed the basis of the consultation program:

- public notices and media releases;
- community involvement in the access route selection process;
- public feedback on the ELLA BAY DEVELOPMENT proposal;
- provision of a website for project information and specialist studies;
- provision of a telephone number for direct inquiries;
- public displays attended by the study team; and
- meetings and presentations with authorities and interest groups.

Issues raised by the community were taken into consideration at key stages in the study including the setting of the project objectives, the access route selection process and the assessment of impacts. Community concerns were also considered during the refining of the engineering concept. Public exhibition of the Environmental Impact Statement and the subsequent Supplementary Environmental Impact Statement provided two further opportunities for formal community input to the assessment of the proposal.

6.1.1 Scope of the Consultation

Meetings with Local Councils

- Cairns City Council (now amalgamated into Cairns Regional Council)
- Johnstone Shire Council (now amalgamated into Cassowary Coast Regional Council) - A presentation was made on the 29th April 2008 to the new amalgamated council and relevant professional staff.

Government Agencies

- Department of Environment, Water, Heritage and the Arts (DEWHA)
- Department of Infrastructure and Planning - Coordinator General (COG)
- Department of Natural Resources and Water (DNRW)
- Department of Main Roads
- Wet Tropics Management Authority (WTMA)
- Environmental Protection Agency (now DERM)
- Queensland Primary Industries and Fisheries (DPI)
- Great Barrier Marine Park Authority (GBRMPA)
- Queensland Transport
- Queensland Health

Briefing meeting in Innisfail (including site visit) on the 3rd November 2005 with all relevant State Government Departments, Johnston Shire Council, and the (then) Commonwealth Department of Environment and Heritage.

Meeting in Sydney with Senator Campbell, his Undersecretary, Johnstone Shire Council mayor, and Qld Government Coordinator General Representatives (23 June 2006).

On-site meetings with the (then) Commonwealth Department of Environment and Heritage Federal Government DEH (22 Dec 2005 & 18 July 2006), the (then) Department of Environment, Water, Heritage and Arts (DEWHA) 27 February 2008 and Department of Sustainability, Environment, Water, Population and Communities, (SEWPaC) 2 February 2012.

Community and Special Interest Groups

Specific Meetings:

- Fitzgerald Innisfail Rotary Club (early 2006)
- Innisfail Rotary Club (early 2006)Judd99
-
- Tourism Tropical North Queensland (December 2004 & February 2005)
- Innisfail Chamber of Commerce – Executive Committee (May 2005) and Monthly Meeting (Feb 2006)
- President and Secretary of the Flying Fish Point The Coconuts Ratepayers Association (October 2005)
- Northern Development Industry Association, Cairns (September 2005)
- Terrain Natural Resource Management (NRM) (Ongoing)
- Cairns and Far North Environment Centre (CAFNEC) and members (April 2008)
- James Cook University; University of Queensland (3 July 2006) and TAFE (FNQ)
- Innisfail Revegetation Centre (2008)
- Community for Cassowary and Coastal Conservation (C4)(Warren) and
- Society for Growing Australian Plants.

Cultural Groups

Consultation was held with indigenous groups on three occasions in late 2006. An Aboriginal Heritage advisor Dr Nicky Horsfall was employed to conduct further consultation in early 2007.

- Ma: Mu Aboriginal Corporation, Innisfail (Chairman – 6 December 2006)
- Girringun Aboriginal Corporation, Cardwell

Subsequent to agreement of the Cultural Heritage management plan with the Ma:Mu the Bagirbarra clan notified of their interest as traditional owners and the proponent held a number of meetings (>10) and negotiated a Heads of Agreement. The clan was later recognised by the North Queensland Land Council and became a member of the Ma:Mu.

Bagirbarra are now recognised as the Traditional Owners of the area north of Flying Fish Point and Ella Bay.

Meetings with Directly Affected Property Owners

- Management of Seahaven Prawn Farm, 6th May 2010 (plus a number of subsequent meetings)

Media Releases

September 2006 - Media Release on project resulting in front page news in Innisfail Advocate, Headline news for Cairns Channel 7 news, press in Cairns Post, The Australian, the Courier Mail, Townsville Bulletin.

June 2007 - Media Release on project resulting in articles within the AAP Newswire, The Australian Financial Review; Bendigo Advertiser; Courier Mail; Sunshine Coast Daily; Age; Australian; Innisfail Advocate; and Townsville Bulletin.

Public Information Sessions

Information letter to local Flying Fish Point residents regarding the SEIS – 29 October 2007

Introduction and Information relating to the project:

- Between 28 February – 1 March 2007, two public information sessions were held for the community, one in Innisfail, the second at Flying Fish Point (Both were advertised in The Cairns Post – 27 February 2007; and the Innisfail Advocate - 24 February 2007)
- In May 2007 a third meeting followed to introduce the community to the EIS process and how interested parties may make a submission. This was advertised in the Innisfail Advocate - 26 April 2007.

From 29 April – 10 May 2008 three information sessions (one in Innisfail, the second two at Flying Fish Point) were held in relation to the SEIS. These were advertised in *Innisfail Advocate* newspaper.

- Crown Hotel, Innisfail on– 4.30pm – 7.30pm
- CWA Hall, Flying Fish Point on 9th May, 2008 – 4.30pm – 7.30pm
- CWA Hall, Flying Fish Point on 10th May, 2008 – 9.00am – 12 noon

Approximately 30 people attended the public information sessions.

Informal Guided Site Visits

Members of the public who showed an interest in learning more about the project were taken onsite for an informal tour. E.g. Innisfail Revegetation Centre members

Website

The Ella Bay website contains the Masterplan and both the EIS and the SEIS freely available for viewing and/or downloading.

Access Road Focus Meeting

A 'roundtable' was held in Cairns to bring all the interested professional parties together to discuss the outstanding issues resulting from the proposed access road. (15 October 2008)

Representatives from DEWHA, CoG, DNR, EPA, WTMA, CCRC, ATFI (Australian Tropical Forest Institute), JCU and external consultants from Projex North, The Missing Link – Resource Coordinators, BAAM and Eco Logical were present.

Offset Property Multi-Criteria Analysis Meeting

A stakeholders meeting was held in Innisfail to bring all the interested parties together to discuss MCA ranking of prospective offset properties. (February 2008)

Representatives from DEWHA, CoG, DNR, EPA, WTMA, Cairns City Council, QPWS, Missing Link Resource Coordinators, and Terrain NRM were present.

7. Study Team for Submission Response

Volume One

Ella Bay Staff edit and reporting

Heather Tolley	*Environmental Consultant, Eco Logical Australia*
Kim Forde	*Principal, The Missing Link Resource Coordinators*

Volume Two

Ella Bay Staff edit and reporting

Les Moore -	*PhD Candidate, School of Tropical Biology James Cook University*
Paulette Jones	*Director and Senior Environmental Scientist, Biodiversity Assessment and Management Pty Ltd*

Volume Three

Ella Bay Staff edit and reporting

Les Moore	*PhD Candidate, School of Tropical Biology James Cook University*
Paulette Jones	*Director and Senior Environmental Scientist, Biodiversity Assessment and Management Pty Ltd*
Terry Reis	*Director & Principal Ecologist, Biodiversity Assessment and Management P/L*
Kim Forde	*Principal, The Missing Link Resource Coordinators*

Volume Four

Ella Bay Staff edit and reporting

John Martin	*Director/Engineer Projex north*
Peter Evans	*Design Office Manager Projex north*
Bryce Trevilyan	*Senior Consultant, McCormick Rankin Cagney*
Frits Kamst	*Director ASK Consulting (Noisexonsultants)*
Peter Harris	*Principal Road Safety Auditor, Road Safety Audits Pty Ltd*
David Francis	*Principal/Environmental Scientist, Chenoweth-Cardno*

Volume Five

Ella Bay Staff edit and reporting

Alan Dale	*Ceo, Terrain*
Daniela Gambotto	*Local Government NRM Planner*

Volume Six

Part 1 Cassowary Reports

Les Moore	*PhD Candidate, School of Tropical Biology James Cook University*
Peter Buosi	*Senior Ecologist NRA Environmental Consultants*
David Francis	*Principal/Environmental Scientist, Chenoweth-Cardno*
Heather Tolley	*Environmental Consultant, Eco Logical Australia*

Ella Bay Staff edit and reporting

Part 2 Flora Reports

David Stanton	*Specialist Botanist/Geologist & Principal, 3D Environmental*
Jason Weber	*Principal Specialist Botanist, Weber Environmental Management Services Ella Bay Staff edit and reporting*

Part 3 Fauna Reports

Paulette Jones	*Director and Senior Environmental Scientist – Biodiversity Assessment and Management Pty Ltd*
Dr Glen Ingram	*Director, Biodiversity Assessment & Management Pty Ltd*
Mark Sanders	*Senior Ecologist - Biodiversity Assessment & Management Pty Ltd*
Dr. Ross A. Alford	*Professor (Personal chair) of Tropical Ecology, School of Marine and Tropical Biology, James Cook University*
John Thorogood	*Managing Principal, FRC environmental*
Paul Smith	*Director, NQ Feral Pig Management Solutions Pty Ltd*

Part 4 Water Reports

Malcolm Andrews	*CEO Manager of the Coastal Discipline, BMT WBM*
David Hamlyn-Harris	*Director, Principal Engineer Water & Environment, Bligh Tanner Consulting Engineers*
Robin Davis	*Hydrogeologist, Golder Associates Pty Ltd*
Shaun Leinster	*Director, DesignFlow*
James Begg	*Senior Environmental Engineer – Golder Associates*
Paul Scells	*Associate – Golder Associates*

Part 5 Masterplan Reports

Tim Cross	*Director of Landscape Design, DBI*
Raith Anderson	*Senior Project Architect, DBI*
Ella Bay Staff edit and reporting	

Ella Bay Staff

Rod Lamb	*Director, Chemical Engineer, Ella Bay Services Pty Ltd*
Katherine Roper	*Senior Ecologist, Ella Bay Services Pty Ltd*
Daniel Figueiredo	*Project Manager, Ella Bay Services Pty Ltd*
Dr Michael Walker	*Senior Zoologist, Ella Bay Services Pty Ltd*
Grant Seaton	*Hydrologist, Ella Bay Services Pty Ltd*
Steve Garrad	*Environmental Coordinator*
Adrian Hogg	*Wildlife and Environmental Coordinator*

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Appendix 1. Changes to the Master Plan

The Ella Bay Integrated Resort Development has undergone continual refinement and optimisation. This section details the changes from the EIS and SEIS that have occurred during this review.

Masterplan Layout	
Conservation zones and covenants – defined and increased ▪ 62.78 ha Essential Cassowary Habitat to be transferred to National Parks ▪ 63.62 ha of identified corridor to Eubenangee Swamp to be revegetated and transferred to National Parks ▪ 126.42 ha total of land to be transferred to National Park.	Volume 6 – 6.5 f Conservation Zones at Ella Bay Volume 5 Offset Package Proposal Volume 7 – Drawing 10 - Ella Bay Setbacks
▪ Additional Riparian Buffers – waterway envelope design methodology added ▪ 100m setback from National Parks increased on Southern boundary ▪ Setbacks 50m from northern vegetation line	Volume 6 – 6.5 f Conservation Zones at Ella Bay Volume 7 – Drawing 10 - Ella Bay Setbacks
Precinct plans and areas have been modified to accommodate additional conservation zones.	Volume 6 – 6.5 a - Local Area Plan
100 year ARI storm surge climate change inundation levels ▪ Masterplan modified to meet new climate change inundation levels ▪ Habitable Floor level increased to +0.3m above Inundation Level.	Volume 6 – 6.4 a Coastal Inundation Study – 6.5 c Ella Bay Architectural Inundation Report
Cassowary Research Area added	Volume 1 MNES Report Volume 7 – Masterplan Conceptual Layout Dwg 15 – Local Area Plan Dwg17
No cats or dogs permitted, with the exception of guide and assistance dogs	Volume 1 MNES Report
Development and Revegetation Staging Plan modified	Volume 1 MNES Report – Appendix 3 Staging plan for Ella Bay Development
Beach Access points surveyed (6) And proposed walking tracks	Volume 6 – 6.5 d Beach Access Report – 6.5 e Walking Track Design Report
Permanent and Construction fencing of precinct area added	Volume 6 – 6.1 k Cassowary Fencing Strategy
Visual Amenity Assessment and Modelling	Volume 6 – 6.5 b Visual Assessment and Mitigation
Building heights added to Local Area Plan	Volume 6 – 6.5 a Local Area Plan

Water Resources	
Integrated Water Management Report ▪ predicted consumption ▪ Groundwater drawdown and storage requirement ▪ Recycle wet season storage ▪ Potable water usage and storage	Volume 6 – 6.4 b Integrated Water Management Plan – 6.4 f Groundwater Resource Evaluation

Stormwater Management Plan ▪ Performance based objectives ▪ Constructed wetlands – designed in northern precincts ▪ Analysis of impact of water tanks and hard surfaces minimised through wetland design	– 6.4 c WSUD Stormwater Objectives – 6.4 d Northern Precinct Stormwater Management Plan
Ground Water Resource Evaluation ▪ Abstraction flowrate quantified and impact on wetlands	Volume 6 – 6.4 e Groundwater Resource Evaluation Supplemental Report – 6.4 f Groundwater Resource Evaluation
Pre-Construction Water Quality Monitoring ▪ Sampling undertaken to establish a baseline for both site and along EB road	Volume 6 – 6.4 g Water Monitoring Results

Energy, Sewage and Waste Management	
Sewerage The sewer treatment plants will be sited in two locations. Class A+ recycled water will be produced for non-domestic use. Minimum class B water will be used for irrigation.	Volume 6 – 6.4 b Integrated Water Management Plan
Power A connection to the State Supply grid will not be installed. The SEIS proposed the grid connection would run under the road. Back-up Power supply will be from distributed LPG/LNG generators. The SEIS proposed a centralised power station. Power will be generated by solar photovoltaic cells and LPG/LNG generators and fed into an internal grid	Volume 2 Response to Public and Agency Comments
Council Water Supply A connection to the council water supply for trickle recharge will not be installed. The SEIS proposed a supply which ran under the road.	Volume 2 Response to Public and Agency Comments
Fibre optic A fibre optic connection will be installed under the road shoulder.	Volume 4 - Ella Bay Road Design and Environmental Management Plan

Flora and Fauna	
Additional Fauna studies ▪ November 2008 Fauna Survey ▪ Amphibian chytrid skin fungus ▪ Marine Turtle Review Refer to next section for Cassowary specific studies	Volume 6 – 6.3 a Fauna Survey Report – 6.3 b Chytrid Fungus – 6.3 c Marine Turtle Review
Additional Flora studies ▪ Vegetation Survey Report ▪ Baseline Vegetation Monitoring of Edge Effect, Ella Bay Road ▪ Assessment of Ella Bay's Littoral Rainforest and Coastal Vine Thicket vegetation community ▪ Weed Survey and mapping	Volume 6 – 6.2 a Vegetation Survey Report – 6.2 b Baseline Vegetation Monitoring of Edge Effect – 6.2 e Vegetation management plan for the littoral rainforest and coastal vine thicket – 6.2 g Pond Apple Assessment – 6.2 d Weed mapping Ella Bay
Environmental Management Plans completed ▪ Southern Cassowary Management ▪ Stream Dwelling Rainforest Frog	Volume 3 Environmental Management Plan

Environmental Management Sub-Plan ▪ Spectacled Flying-fox Environmental Management Sub-Plan ▪ Marine Turtle Species Sub-Plan ▪ Significant Flora Management Sub-plan ▪ Cultural Heritage Management Sub-plan ▪ Weed Management Sub-plan	
Revegetation ▪ Staging of revegetation ▪ Area of revegetation ▪ Revegetation and weed surveys ▪ Revegetation for Cassowary habitat research	Volume 1 - MNES Report – Appendix 3 - Staging Plan for Ella Bay Development Volume 6 – 6.2 c Revegetation and Weed Management Issues – 6.2 f Cassowary Specific Revegetation -A Cyclone Tolerant Orchard Volume 7 – Revegetation And Rehabilitation Plan Dwg 12 – Revegetation Staging Plan Dwg 13
Feral Pig Management	– 6.3 d Feral Pig Control Report

Cassowary	
Additional independent Cassowary Population Surveys ▪ February 2009 ▪ Dry Season November 2009 ▪ Wet Season April 2010 ▪ Dry Season November 2010	Volume 6 – 6.1b Cassowary Survey Feb. 2009 – 6.1c Cassowary Survey Nov. 2009 – 6.1d Cassowary Survey Apr. 2010 – 6.1e Cassowary Survey Nov. 2010
Independent review of previous cassowary reports	Volume 6 – 6.1a Review of EIS and SEIS Cassowary Reports
Survey of Cassowary bridge underpasses	Volume 6 – 6.1h Cassowary Underpass Survey October 2009
Survey water availability for cassowary use during dry season	Volume 6 – 6.1g Cassowary Water Survey October 2009
Increased data, knowledge and understanding of the Cassowary population and movement in the area.	Volume 6 – – 6.1m Upgrade of Cassowary Habitat Assessment
Cassowary Recovery Plan Assessment	Volume 1 – MNES Report Volume 5 – Offset Policy Proposal Volume 6 – – 6.1m Upgrade of Cassowary Habitat Assessment
Cassowary Monitoring Cassowary ID descriptions Monitoring camera photograph database	Volume 6 – 6.1f Cassowary Identification Drawings Ella Bay Cassowary Monitoring Database – Not published
Cassowary Road Workshop ▪ Agreement on Fence specification ▪ Agreement on Bridges if proved that cassowaries use bridges as underpasses	Cairns 2008 Stakeholder Workshop (presentation not included)
Cassowary research projects. Supported UQ and QPWS in GPS tracking of Juvenile cassowaries	Volume 5 – Appendix 3. Research Proposals

Ella Bay Road – Access Road	
Road Design Changed to two part road design to mitigated final alignment in Stage 1.	Volume 1 – MNES Report Volume 4 - Ella Bay Road Design and Environmental Management Plan – Chapter 2
Road design changes ▪ 3.5m lanes with 1.5m shoulder bikeway full seal. ▪ Alignment and clearing modified to save mature trees and canopy connectivity. ▪ Traffic calming detailed ▪ Constrained sections deleted. ▪ Road width increased around Heath Point as per safety review. ▪ Pull off lanes added for maintenance	Volume 4 - Ella Bay Road Design and Environmental Management Plan – Chapter 5 Road Design and Design Criteria Volume 7 - Drawings – EBR1CE-PD01 to EBR1CE-PD09 Presentation Drawings – EBR1CE-DD01 - 22 Road Layout Drawings – EBR1CE-DD30 to EBR1CE-DD70 Road Detail Drawings
Preliminary Road Safety audit	Volume 4 Ella Bay Road Design and Environmental Management Plan – Appendix 4. Road Safety Audit of Ella Bay Road
Clearing modified to account for ▪ Road Safety audit and ▪ Canopy Connectivity and Mature Tree Retention	Volume 4 Ella Bay Road Design and Environmental Management Plan – Chapter 9 Flora Sensitive Road Design Volume 7 Presentation Drawings – EBR1CE-PD09 Clearing Vegetation Management
Cassowary fence ▪ Cassowary fence location detailed ▪ Cassowary fence detailed and trialled. ▪ Cassowary escape gate detailed and trialled.	Volume 4 Ella Bay Road Design and Environmental Management Plan – Chapter 8 Fauna Sensitive Road Design Volume 7 Presentation Drawings – EBR1CE-PD08 Fauna Fencing Management Volume 6 Consultant and Ella Bay Reports – 6.1i Cassowary Gate Trial – 6.1j Cassowary Fence Trial – 6.1 k Cassowary Fencing Strategy
Fauna Underpass (near Prawn Farm) changed to bridge based on North Hull River bridge, and Bridges 2 and 3 concept designed	Volume 7 Road Detail Drawings – EBR1CE-DD60 to EBR1CE-DD62 Road Detail Drawings
Fauna Friendly culverts for small fauna detailed	Volume 4 Ella Bay Road Design and Environmental Management Plan – Chapter 8 Fauna Sensitive Road Design Volume 7 Road Detail Drawings – EBR1CE-DD04, 12, 13, 17
Frog Fence design and located along road creek crossings for 25m either side	Volume 4 Ella Bay Road Design and Environmental Management Plan Volume 7 Road Detail Drawings – EBR1CE-DD12 - 13, 16 - 18.
Visual Landscape Assessment along Ella Bay Road	Volume 4 Ella Bay Road Design and Environmental Management Plan – Chapter 4 Environmental Significance and Potential Impact to WHA – Chapter 7 Visual Values – Appendix 1 Visual Landscape Assessment Ella Bay Road
Road Revegetation Strategy	Volume 4 - Ella Bay Road Design and Environmental Management Plan

	– Chapter 9 Flora Sensitive Road Design – Appendix 5.Revegetation Planting List
Revegetation plan for Fauna Underpasses (bridge 1,2,&3)	Volume 4 Ella Bay Road Design and Environmental Management Plan – Chapter 9 Flora Sensitive Road Design – Appendix 5 Revegetation Planting List Volume 7 Road Detail Drawings – EBR1CE-DD60 to EBR1CE-DD62 Road Detail Drawings
Road Noise impact and edge effect	Volume 4 - Ella Bay Road Design and Environmental Management Plan – Chapter 8 Fauna Sensitive Road Design
Preliminary management plans ▪ construction methodology ▪ operational Management and Monitoring plans ▪ Local Area Traffic Management plan	Volume 4 - Ella Bay Road Design and Environmental Management Plan – Chapter 10 construction methodology – Chapter 11 Traffic Management Plans – Chapter 12 operational Management and Monitoring
Response to Uni SA report ▪ Revised Multi Criteria Analysis ▪ Revised Demographics of road use ▪ Road design modifications for safety	Volume 2 Response to Public and Agency Volume 4 Ella Bay Road Design and Environmental Management Plan – Appendix 2. Revision to Multi Criteria Analysis of Ella Bay Road Options – Appendix 3. Revision to Road Usage Demographics for Ella Bay Road – Appendix 4. Road Safety Audit of Ella Bay Road
Ella Bay Road Survey including ▪ Survey of all trees >300mm identification of mature trees and canopy connectivity ▪ Edge of vegetation	Volume 4 Ella Bay Road Design and Environmental Management Plan – Chapter 8 Fauna Sensitive Road Design Volume 7 - Drawings – EBR1CE-PD09 – EBR1CE-DD01 - 22 Road Layout Drawings

Cultural	
Cultural Heritage Management Plan updated	Volume 3 Cultural Heritage Management Sub-Plan
Negotiations with Bagirbarra Traditional Owners: ▪ Bagirbarra recognised as traditional owners ▪ Heads of Agreement with Bagirbarra re Traditional Owners Tourism Development Plan	Confidential Document – Bagirbarra permission required to disclose

Offset package proposal	
Offset package developed	
Property-Scale Options for Regional Corridor Protection – ▪ Workshop 2008 ▪ Stakeholders Report	Volume 5 Offset Proposal – Appendix 1. Terrain NRM Offset Corridors Report –
Purchase of Offset Property and management plan	Volume 5 Offset Proposal – Chapter 5 Ella Bay Offset Package – Appendix 2 Revegetation Strategy for Ella Bay Offset Property
Research Proposals initiated	Volume 5 Offset Proposal

	– Appendix 3 Research Proposals – GPS tracking of Juvenile cassowaries 75% complete.

Ella Bay Master Plan Infrastructure (as based on SEIS Executive Summary Page 5)

Precinct	Description	Details	EIS Reference	SEIS Reference	Submission Response
Village	Village Centre	Retail/commercial precinct and pedestrian plaza e.g. professional offices, retail outlets, convenience store/supermarket, cafes, restaurants and resort fashion stores.	1.2.1 p14	2.2.4 p31	6.5a 4.3.2.1
	Village Resort	Integrated into the Village Precinct and will comprise with up to four storey resort style apartments.	1.2.1 p15	Exec Sum 5.0 p7	6.5a -5.1.1
	Eco day spa facilities	Day spa facility located adjacent to the Ella Bay beach frontage.	1.2.1 p15		
	Public pool facility	Public pool facility and recreation centre with access for visitors and residents.	1.2.1 p14	A.2.12 5.0 p4	6.5a - 5.5.1
	Protected beach swimming zone	Net protected public swimming zone on beach opposite Village Precinct.		1.2.5.1 p117	
	Welcome Centre	Located at the entrance of the Village Precinct. Designed to showcase 'green' principles. The centre will carry out administrative tasks and informing and educating visitors and residents. The centre will be cyclone shelter and operate as the emergency command and control centre.		2.2.3 p25 1.7.7.3 p358 1.7.7.2 p354	Vol 1 - p8
	Village Community centre	Community recreation centre including, sports centre, a small church, and green spaces.	1.2.1 p19 3.3.8 p31		
	Sports oval	Part of the recreation centre infrastructure, for sporting events uses.	1.2.1 p19	A.2.12 5.0 p4	
	Village green	A focal point location for community events and gatherings.		2.2.4 p30	
	Education facility, institute of sustainability, private school	A private school and Institute for Sustainable Development (in collaboration with UQ and JCU).	1.2.1 p19	1.6.3.1 p292 2.7.2 p116	MNES - currently at p79
	Rainforest nursery	Established to assist in the revegetation and rehabilitation of the project.		1.8.3.2 p384	Vol 1 - 2.3 p23
	Core utilities site	Located on the Village Precinct (power, fuel, gas, laundry, sewer).	3.5.2.3.2 p93 3.5.5 p132	1.5.2.1 p247 1.5.4.3 p266	Vol 1 - 2.3 p20 Vol 2 - 7.3.1
	Community recycle centre	Community based recycle centre.		2.2.4 p30	Vol 1 - 2.3 - p23
	Sewer transfer pump	Low pressure or vacuum transfer pump will be located in various sites to pump the sewerage to the treatment plants.		A.2.5 5.0 p9	6.4b - 13.3 p40

Precinct	Description	Details	EIS Reference	SEIS Reference	Submission Response
	Car parking	Public car parking, up to three storeys in height in order to minimise land coverage, and screened by native vegetation.	1.2.1 p23	Executive Summary 4.0p6	
	Pedestrian beach access	Designated and marked beach access for pedestrian from resort precincts.	1.3.2.3 p30	Vol 3 p29	6.5d Beach Access Report
	Community Garden Plots	feature gardens as well as communal food gardens		2.2.4 p30	
Northern Resort/Residential Precinct	Northern Resort	Resort villas predominantly single storey with 2 storeys for central facilities. Will include other resort facilities such as restaurants, shops, etc.	1.2.1 p16	A.2.12 7.0 p12	6.5a - 5.3.1 p18
	Residential lots	Resort residential buildings up to 2 storeys height	3.2.2 p18	A.2.12 7.0 p12	6.5a - 5.3 p18
	Resort Emergency Shelter	A building built to be used as an emergency shelter for the precinct.	3.3.8 p31		
	Car parking	Centralised parking area for the resort	1.2.1 p15	Exec Sum5.0p7	
	Pedestrian beach access	Designated and marked beach access for pedestrian from resort precincts.	1.3.2.3 p30	Vol 3 p29	6.5d Beach Access Report
	Distributed power station	Smaller power substations will operate within precincts.		1.5.2.1 p247	Vol 2 - 7.3.1
	Sewer transfer pump	Low pressure or vacuum transfer pump will be located in various sites to pump the sewerage to the treatment plants.		A.2.5 5.0 p9	6.4b - 13.3 p40
Central Resort Precinct	Central Resort	Resort villas 2 & 3 storeys height.	3.2.2 p16	A.2.12 6.0 p9	6.5a - 5.2.1 p15
	Resort Emergency Shelter	Emergency shelter for the precinct included in resort or neighbourhood recreation facility	3.3.8 p31		
	Residential houses	Resort residential houses up to 2 storeys height	3.2.2 p18	A.2.12 6.0 p9	6.5a - 5.2.1 p15
	Car Parking	Half-basement car / buggy parking	1.2.1 p15		
	Neighbourhood recreation facility / Precinct Community Centre	Includes swimming pools, barbecue facilities, playgrounds, etc for each residential precinct. The building will be used as an emergency shelter for the precinct.	3.3.8 p31	2.3.1 p74	
	Pedestrian beach access	Designated and marked beach access for pedestrian from resort precincts.	1.3.2.3 p30	Vol 3 p29	6.5d Beach Access Report
	Sewer transfer pump	Low pressure or vacuum transfer pump will be located in various sites to pump the sewerage to the treatment plants.		A.2.5 5.0 p9	6.4b - 13.3 p40
	Distributed power station	Smaller power substations will operate within precincts as night supple and backup.		1.5.2.1 p247	Vol 2 - 7.3.1

Precinct	Description	Details	EIS Reference	SEIS Reference	Submission Response
Residential Precincts	Detached dwelling residential lots	Privately owned houses up to 2 storeys height	3.2.2 p18	A.2.12 8.0 p16	6.5a - 5.4 p22
	Car parking	Each house will accommodate own parking garage and buggy parking spot			6.5b - 2.4.12
	Neighbourhood recreation facility Community Centre	Includes swimming pools, barbecue facilities, playgrounds, etc for each residential precinct. The building will be used as an emergency shelter for the precinct.	3.3.8 p31	2.3.1 p74	
	Sewer transfer pump	Low pressure or vacuum transfer pump will be located in various sites to pump the sewerage to the treatment plants.		A.2.5 5.0 p9	6.4b - 13.3 p40
	Distributed power station	Smaller power substations will operate within precincts.		1.5.2.1 p247	Vol 2 - 7.3.1
	Cassowary Research Centre	Research centre within the revegetated area of the East/West Fauna Corridor			Vol 1 - 2.3 p22
Open Space	18 hole Golf Course	Signature' championship 18-hole golf course	1.2.1 p10	2.2.8 p47	
	Golf Clubhouse	Golf clubhouse design will incorporate a bar, restaurant, conference facilities, pool maintenance and storage facilities for golf course.	1.2.1 p18	A.2.12 5.0 p4	
	Driving Range	Golf driving range opposite the Clubhouse			
	Communications Infrastructure		3.5.6.2 p146		6.5f - 6.0 p14
	Sewerage Treatment Plant	De-centralised Sewerage Treatment Plant	3.5.5.1 p134	1.5.4.3 p266	Vol 1 - p39
	Water Storage	Potable, groundwater and recycled water tanks. Tanks will be screened by vegetation.	3.5.3	1.5.3	Vol 1- p43 6.5f - 6.0 p14
	Recycled Water Storage	Recycled water tanks (tanks or sealed covered dams), screened by vegetation.	3.5.5.4.3 p142	1.5.4.2 p264	Vol 1 - p39 6.4a 6.5f - 6.0
	Walkways and Cycle paths	An integrated network of pedestrian, electric buggy and cycle paths will be constructed throughout the proposed development. Cyclist paths will be provided throughout the development and through to Flying Fish Point.	3.5.1.2.7 p78	1.4.7.1 p238 1.4.7.2 p241 1.8.5.4	
	Nature paths	Nature trails will be located to provide ecological and environmental education	3.4.4 p47	1.8.6.1 p397	Vol 6.5e Walking Track Design

Appendix 2. List of Quantities

The Ella Bay Integrated Resort Development has undergone continual refinement and optimisation. This section details the revised quantities (areas, lengths and numbers) and compares that to the SEIS and EIS. Note that quantities are not necessarily additive.

Description	Revised Quantity	Change from SEIS/EIS	Reference
Ella Bay Property			
Lot NR320 N157629		n/a	Volume 1 MNES Volume 7 – Context / Location Map p5
Property area	449.2 ha		
Property area including road easements	469.9 ha		
Latitude	17º28' S		
Longitude	146º00' E		
Ella Bay Development			
Dwellings			
Total number of dwellings	1400	No change	Volume 1 MNES
Number of residential Lots	540	No change	
Number of units	860	No change	
Population			
Maximum number of residents and visitors	3,304	3,044	Volume 4 Appendix 3 Revision to Road Usage Demographics for Ella Bay Road
Nominal number of residents and visitors	2,856	2,539	
Maximum number of residents	1,274	1,404	
Nominal number of residents	1,102	1,404	
Maximum number of visitors	2,030	1,640	
Nominal number of visitors	1,754	1,135	
Maximum number of staff	1042	1240(760)	
Nominal number of staff	802	930	
Maximum number of construction workers	404	990	
Nominal number of construction workers	355	Not stated	

Description	Revised Quantity	Change from SEIS/EIS	Reference
Regional Ecosystem mapping *revised 2008 mapping			
Cleared area	241 ha*	Not stated	Calculated from 6.2 a Vegetation Survey Report Volume 7 – Dwg 15 Conservation Status Of Vegetation Communities And Clearing
Non remnant	33 ha*	42 ha	
Not of concern	73 ha*	76 ha	
Of concern	103 ha*	85 ha	
Endangered	20 ha*	37 ha	
Total vegetated area	229 ha*	240 ha	
Ella Bay Property Clearing			
Clearing Non Remnant	0.10 ha	Not specified	Volume 7 Dwg 15 Conservation Status Of Vegetation Communities And Clearing
Clearing Not of Concern	0.60 ha	0.86 ha	
Clearing Of Concern	0.25 ha	0.25 ha	
Total Clearing	0.95 ha	1.11 ha	
Precincts Areas			
Total Precinct – Developable footprint	132.0 ha	145.4 ha	Volume 6 - 6.5a Local Area Plan Volume 7 Dwg 11 Masterplan Conceptual Layout
Northern Resort Precinct	13.7 ha	14.1 ha	
Northern Residential Precinct	21.8 ha	26.9 ha	
Central Resort Precinct	33.2 ha	34.2 ha	
Central Resort Precinct (Development Area only)	21.0 ha	21.0 ha	
Village Precinct	25.4 ha	31.1 ha	
Southern Residential Precinct	8.7 ha	11.6 ha	
South-Western Residential Precinct	16.7 ha	15.1 ha	
Western Residential Precinct	12.5 ha	12.4 ha	
Open Space / Golf Course area	61.1 ha	Not stated	

Description	Revised Quantity	Change from SEIS/EIS	Reference
Precinct building height			
Northern Resort Precinct	10 m	2 Storey	Volume 6 - 6.5a Local Area Plan
Northern Residential Precinct	8 m	2 Storey	
Central Resort Precinct	15 m	3 Storey	
Central Resort Precinct (resort residential)	10 m	2 Storey	
Village Precinct	18 m	4 Storey	
Southern Residential Precinct	8 m	2 Storey	
South-Western Residential Precinct	8 m	2 Storey	
Western Residential Precinct	8 m	2 Storey	
Other			
Number of beach access points	6	7	Volume 6 – 6.5 c Beach Access Report
Inundation Level (100ARI and Climate Change)	3.1m/2.57mAHD	2.57m AHD	Volume 6 – 6.4 a - Coastal Inundation Report
Construction Floor Level	3.4m AHD	Not specified	Volume 1 MNES
Conservation Zones and Covenants			
Transferred to National Park	62.8 ha		Volume 6 - 6.5 f Conservation Zones
Conservation covenant B	67.8 ha		
Conservation covenant C	87.3 ha		
Conservation Zone D	58.9 ha		
Total Conservation Area Sum (B+C+D)	214.0 ha		
Cleared Area	241.0 ha		
Revegetation and Rehabilitation			
Revegetation	50.0 ha	43.64 ha	Volume 7 Dwg 16 Revegetation And Rehabilitation Plan
Rehabilitation	64.3 ha	41.07 ha	

Description	Revised Quantity	Change from SEIS/EIS	Reference
Ella Bay Road			
Road Width	2 x 3.5m	2 x 3.5m	Volume 4 Chapter 5.0 Volume 7 Dwg. EBR1-PD05
Sealed Shoulder/Bikeway width	2 x 1.5m	2 x 1.0m	
Maximum number of vehicles per day	4,138	3,990	Volume 4 Chapter 5.0 & Appendix 3
Nominal number of vehicles per day	2,800	2,570	
Average Annual Daily Traffic AADT	3,134	3,000	
Maximum number of Construction vehicles/day	284	220	
Overall Length Alice St to Ella Bay	4,790m		Volume 7 Dwg. EBR1-PD01 Dwg. EBR1-PD02
Area of Existing Clearing Total – Ella Bay Road	3.13 ha	3.13 ha	Volume 4 Chapter 9 Volume 7 Dwg. EBR1-PD09
Area of Existing Clearing WTWHA	1.95 ha	1.95 ha	
Clearing for Ella Bay Road Upgrade and Flying Fish Point Bypass (Excluding Little Cove) exc. Non-Remnant	2.80 ha	2.47 ha	
Clearing of concern	0.93 ha	0.58 ha	
Clearing not of concern	2.56 ha	1.86 ha	
Clearing WTWHA	0.66 ha	0.44 ha	
Clearing of concern WTWHA	0.33 ha		
Clearing not of concern WTWHA	0.33 ha		
Area of Revegetation along road Area of vegetation on Gabions WHA only	1.1 ha 0.5 ha	Not calculated	
Net Clearing (Clearing – Revegetation)	1.96 ha	Not calculated	
Net Clearing WHA (Clearing – Revegetation)	0.16 ha	0.04 ha	
Stage 1			
Stage 1 Length	4,000m	No change	Volume 7 Dwg. EBR1-PD03 Dwg. EBR1-PD05
Length of Road WHA Zone C	1,560m	No change	
Length of Road Ella Bay National Park	1,080m	No change	
Cassowary fence length	3,425m	Not defined	Volume 7 Dwg. EBR1-PD06 Dwg. EBR1-PD07
Culverts (replace pipe with box) No of.	22	(stage 2 only)	

Description	Revised Quantity	Change from SEIS/EIS	Reference
Fauna culverts (dry ledge & furniture) No. of	4	2	
Bridge fauna underpasses No. of	3	2 + 2 culverts	
Cassowary Escape Gates No. of	19	Not included	
Stage 2			
Stage 2 Length	880m	No change	
Length of Road State Land	440m	No change	
Cassowary fence length	785m	Not defined	Volume 7 Dwg. EBR1-PD06 Dwg. EBR1-PD07
Cassowary Escape Gates No. of	6	Not included	
Fauna overpasses No. of	1	No change	
Culverts (replace pipe with box) No of.	4	No change	
Offsets			
Ella Bay Offsets	62.8 ha		
Eubenangee offset property Area	63.62 ha		
Total Offsets to be handed to National Parks	126.42 ha		
Eubenangee Property Description			
Lot 5 RP 747500	19.47 ha		
Lot 6 RP 713994	12.27 ha		
Lot 7 RP 713994	30.99 ha		
Latitude	17°25'0" S		
Longitude	145°59'30" E		