

Ella Bay Integrated Resort Proposal



ELLA BAY

Supplementary Environmental Impact Statement

Submission Response: 1.3 Cassowary



1.3 Cassowary

1.3.1 Introduction

The Cassowary response has been developed in consideration of the overall objectives and philosophy of the Ella Bay Integrated Resort Proposal as set out in the EIS Executive Summary.

The Cassowary response has two key objectives; first, to identify the key issues relating to the cassowary population; and second, to address the questions and concerns raised by submitters. In further refining our cassowary impact mitigation strategies, the concerns of all the submitters and key stakeholders were taken into consideration.

Specific submission concerns have been collated into the following key areas for this section:

- *Cassowary Surveys,*
- *Management of Cassowary-Human Interaction,*
- *Cassowary Habitat,*
- *Fencing, and*
- *Additional Issues.*

Key Issues

The key cassowary management issues identified regard:

- protecting the Cassowary by being a catalyst in establishing a regional strategic plan for Cassowary management;
- devising an effective Cassowary Management Strategy, with consideration to the concerns of all the submitters and key stakeholders; and
- ensuring that impacts on the natural environment can be minimised.

Addressing the key issues

The first step was to identify and assess risks to the Cassowary. A detailed risk assessment approach was undertaken within Ella Bay. For more information on this approach, please refer to the various reports prepared by Les Moore in EIS Volume 8, Appendix A.6.4 and in the *Cassowary Population Viability Analysis* (Volume 4, Appendix A.2.4).

The key risk areas identified included:

- the impact of loss of habitat,
- impact of feral animals and pets (particularly dogs and feral pigs),
- road design,
- traffic movements,
- impacts of hand feeding,

- disease,
- artificial barriers preventing cassowaries moving about unimpeded, and
- the movement and the presence of people.

The proponent developed a Cassowary Management Strategy with objectives to:

- act as a catalyst in saving the endangered Cassowary from possible extinction;
- make Ella Bay a safe environment for the Cassowary and for people, both during daylight hours and at night time;
- help slow the rate of decline of the Cassowary;
- help reverse the rate of decline of the Cassowary;
- provide a number of mitigating strategies for possible threats to the Cassowary highlighted in the Les Moore's Population Viability Analysis (PVA) Report; and
- provide solutions to submitters and key stakeholder concerns.

The Cassowary Management Strategy also includes specific measures to implement:

- Cassowary-proof fencing;
- Cassowary road management strategies for the Ella Bay access road;
- strict dog control policies and procedures; and
- effective educational initiatives, community development and training programs for people living, working, staying at and visiting Ella Bay.

Overview of Proposed Solutions

The strategic objectives of the Cassowary Management Strategy are to:

- open up as much habitat as possible to fauna, particularly the Cassowary;
- provide connectivity between wildlife corridors; and
- reduce the risk of people interacting with the Cassowary.

The following diagram (figure 1.3.1), shows a network of wildlife corridors that will be created at on a staged basis to improve the environment for fauna including cassowaries. Directional fencing will be installed to guide cassowaries away from roads and people, and towards the wildlife corridor network. As a result, cassowaries will be able to move freely and safely through the majority of the Ella Bay Site, with the exception of residential precincts, resorts and the town centre precinct.

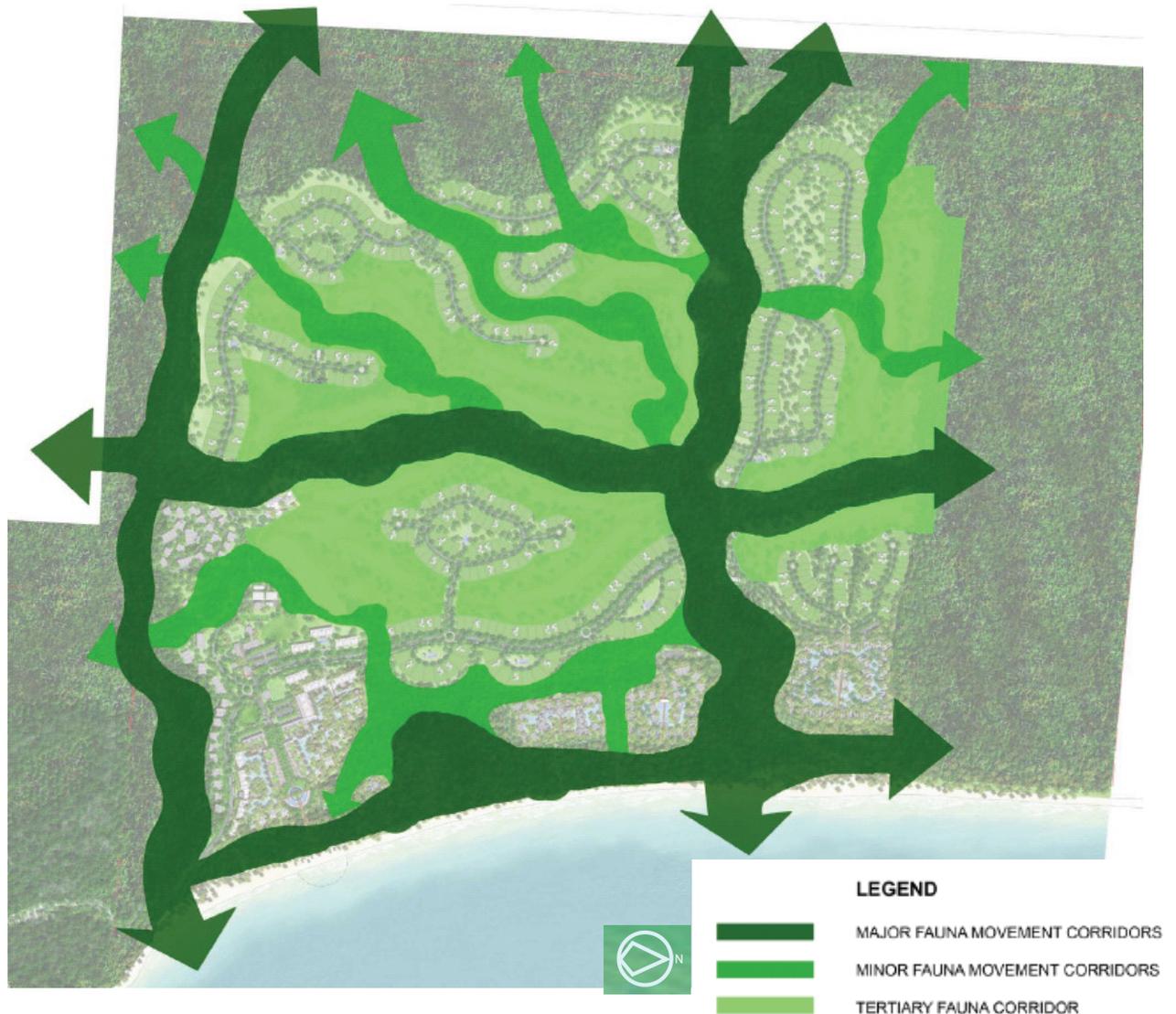


Figure: 1.3.1 Vegetation corridor analysis (Volume 3, Section 3.1)

An area of land between the town centre precinct and the beach zone will be fenced off, preventing cassowaries from moving into that area. The habitat is of low value to the Cassowary (as it is mostly now grass).

The following is an overview of the detailed solutions within the Cassowary Management Strategy. These solutions are part of an integrated, holistic approach to the design of the Ella Bay as a sustainable community. Individually, these measures will have important benefits, but when applied as an overall package they form a coherent strategy, capable of development and refinement over time.

Proposed solutions can be grouped into the following areas.

Fencing

Proposed solutions include:

- removing existing cattle fences and other barriers to allow unimpeded movement of the Cassowary;

- building effective fences including appropriate 'fence and funnel' approaches to guide and direct cassowaries away from possible harm and interaction with people;
- commissioning active Cassowary research programs, including the development of alarm systems and non-intrusive monitoring and surveillance techniques;
- trialing newly developed Cassowary monitoring and surveillance techniques to evaluate their effectiveness;
- strategically locating new plantings of food trees and other food plants for the Cassowary to draw the species away from people;
- adopting a staging plan that takes full account of the Cassowary and its needs; and
- constructing fencing prior to construction as part of the staging process.

Management Interventions

Proposed solutions include:

- establishing a focal point for the management of all issues to do with the Cassowary at the Welcome Centre (Volume 4, Appendix 1 (*Welcome Centre: Role and Purpose*));
- using solutions to reduce negative anthropogenic impacts influencing the rate of Cassowary decline;
- reducing traffic movements within Ella Bay by focusing on the use of alternative means of transport;
- controlling traffic speed at critical points within Ella Bay;
- adopting safe speed limits throughout Ella Bay;
- avoiding actions that foster Cassowary reliance on people for food or water; and
- developing relevant strategies and plans that manage and mitigate impacts affecting the Cassowary on the Site.

Education

Proposed solutions include:

- raising the awareness and profile of the Cassowary as an endangered species;
- inducting people at the Welcome Centre to explain rules, regulations and the importance of the Cassowary to the local area and wider region;
- adopting educational strategies to help people understand and appreciate the unique nature of the Cassowary as an endangered species;
- exciting visitors, tourists and residents about the Cassowary, fostering a desire to save the Cassowary from extinction and to becoming involved and committed in this campaign;
- educating people to understand the habits of the Cassowary species (for example, that they are active during daytime and passive at night); and

- making sure that people in the Ella Bay Community do not feed, leave food or provide artificial water sources that attract cassowaries.

Improving habitat

Proposed solutions include:

- increasing the extent and quality of the Cassowary habitat at Ella Bay;
- enhancing connectivity between the Cassowary's natural eco-systems within Ella Bay; and
- achieving a high level of 'fit' with local and regional conservation plans to restore the Cassowary's environment by planning more effective corridors to link habitats.

Other mitigation strategies

Mitigation strategies have been also developed including the:

- strict management of dogs and their owners at Ella Bay (refer to Volume 2, Section 2.2.9.4 (*Pet Management Strategy*));
- management of traffic throughout Ella Bay, including traffic calming, surveillance and education of drivers;
- reduction of the reliance on conventional motor vehicles (refer to Volume 2, Section 2.2.6 (*Getting Around Ella Bay: Transport Considerations*));
- provision of education programs about the Cassowary in and around Ella Bay;
- removal of existing cattle fences that impede access to vegetated corridors; and
- careful evaluation of where to place Cassowary food trees. Strategic planting plans of Cassowary food trees will be developed. The objective will be to plant food trees away from areas where there is a higher risk of human–Cassowary interaction. This will include the planting of Cassowary food trees within environmental corridors to attract cassowaries away from paths or walkways nearby.

The Research Process

To help the Proponent devise the Cassowary Management Strategy, Les Moore was engaged to undertake a Population Viability Analysis (PVA) and to contribute to Environmental North's *Access Road Strategy* into Ella Bay. Les Moore is a recognised research specialist with expert knowledge of the Cassowary ecology, its population dynamics, terrestrial and aquatic vertebrate and invertebrate fauna species and habitats.

The PVA report is provided in Volume 4, Appendix A.2.4. Using the findings, conclusions and recommendations from this report, and with further consultation with Les Moore and relevant authorities, a Cassowary Management Strategy was prepared.

Les Moore's PVA Report made use of a sophisticated simulation software application (Version 9.72 of the VORTEX simulation software application) to assess the viability of the Graham-Seymour Range subpopulation.

The geographical scope for the PVA is identified in figure 1.3.2.



Figure 1.3.2: Study areas for PVA (Les Moore)

BASELINE PVA INPUT PARAMETERS

Model parameter	Data	Comments
Iterations	1000	
Years of population projection	100	
Mating system	Polygynous	Both male and females have multiple partners.
Age of first reproduction	4 years	Adult plumage is attained at approximately 4 years and birds are capable of breeding age in their fifth year.
Reproductive senescence	35 years	A conservative model using 35 years as the age of last breeding was selected.
Max. no. young	5	Offspring as percentage occurrence: 1 = 5% 3 = 40% 5 = 5% 2 = 20% 4 = 30%
Male breeding pool % (= Female parameter in Vortex)	33	This parameter has been modified to reflect the reversed sex roles in cassowaries (Lacy pers. comm. 2002). Male breeding numbers were calculated as follows: • 33% = breeding once in three years
Female breeding pool % (= Male parameter in Vortex)	100	As they have no commitment to parental responsibilities, it has been assumed that all adult females are available for breeding in a given year.
Mortality	Table 9	All models are based on age-specific mortalities using 'Low' or 'Moderate' mortality rates (Table 4: <i>sensu</i> Moore 2007c).
Initial population size	N	Based on overall density of independent birds i.e. adults and subadults was 0.78 birds/km ² reduced by 25% (Table 8).
Carrying capacity (K)	N	The carrying capacity (K) is calculated as maximum density of independent birds i.e., 0.78 birds/km ² (Moore 2007a).
Catastrophes	2	Two major parameters were modelled: <u>Catastrophe 1</u> : 5 % - Reproduction 0.05, Survival 0.65. <u>Catastrophe 2</u> : 3 % - Reproduction 0.50, Survival 90.
Genetic drift and in-breeding	No	Not included as uncertainty as to the exact role this would play in a long-lived species within a short timeframe.
Immigration/Supplementation	No	
Definition of extinction	Absence of one sex	

Table 1.3.1: Input parameters for the PVA (original is available in Volume 4, Appendix A.2.4)

1.3.2 Submitter Issue: Cassowary Surveys

1.3.2.1 Population Viability Analysis

Cassowary Population Viability Analysis at the local level was not provided in EIS. All the recommendations from the Cassowary Report should be taken into consideration including the performance of a PVA.

EIS reference: Volume 4, Section 4.7.1.2.3, Volume 8, Appendix A6.1,

Submitter reference: 21/52

Department of Environment and Water Resources (51), E Bock (11), B Harvey (12), R Eastment (13), J Beasley (14), Performa letter (15 submissions) (17,22-35), J Rainbird (CAFNEC) (20)

Proponent Response

To address further this issue, an assessment of the impact of human activities at the local level on the Cassowary population of the Seymour Range, a Population Viability Analysis (PVA) was conducted by Les Moore. Les Moore is a specialist researcher with expert knowledge of the Cassowary ecology and population dynamics, terrestrial and aquatic vertebrate and invertebrate fauna species and habitats. His work was carried out in June 2007. An overview of the PVA and results is provided below. The full report can be found in Volume 4, Appendix 2.4.

Key Findings

The PVA concluded the following:

- Regardless of landuse choices at Ella Bay, it is likely that the more localised of these impacts will be overwhelmed by the significant extinction vortex already in place. As such, trying to quantify the extent of the additional impact of either landuse options on the cassowary population is meaningless and was not specifically modelled.
- 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 risk probability that both population will die out within 60 years; and
- If the levels of threat can be reduced to 'low' and connectivity between the two protected and enhanced, the connected Cassowary population should still be extant in 100 years, albeit with its population reduced to approximately 57% of the current estimated size.

Recommendations

Recommendations regarding measures that could be adopted to mitigate impacts on the Graham-Seymour Range Cassowary population were provided by Les Moore in the PVA. These included the development of a Cassowary Management Plan giving consideration to:

- the maintenance and protection of the existing movement corridors lining the two range populations;

- the development and implementation of a Cassowary road management strategy for the Bramston Beach Road;
- the implementation of an effective dog control program for the communities adjoining the Graham-Seymour Range; and
- an Integrated Package of Regulatory Offsets and Additional Environmental Investments (refer to Volume 2, Section 2.7.3).

As a result of Moore’s recommendations, an improved and refined Master Plan, a Cassowary Management Strategy, a Regulated Offset and Additional Environmental Investments Strategy, an Education Strategy and Pet Management Strategy for Ella Bay have been prepared to address these areas of concern.

Study Area

In defining the spatial boundaries of the PVA, Moore suggested that the Graham-Seymour Range Cassowary population is currently at risk of being separated into two smaller isolated populations. Figure 1.3.3 identifies the narrow vegetated corridors, which are all that now connects this population. The corridors comprise:

- Corridor A = habitat bisected by the Buttigieg Access Road (<350 metres)
- Corridor B = habitat bisected by the Bramston Beach Road (<1200 metres)
- Corridor C = steep degraded hillside (<800 metres)

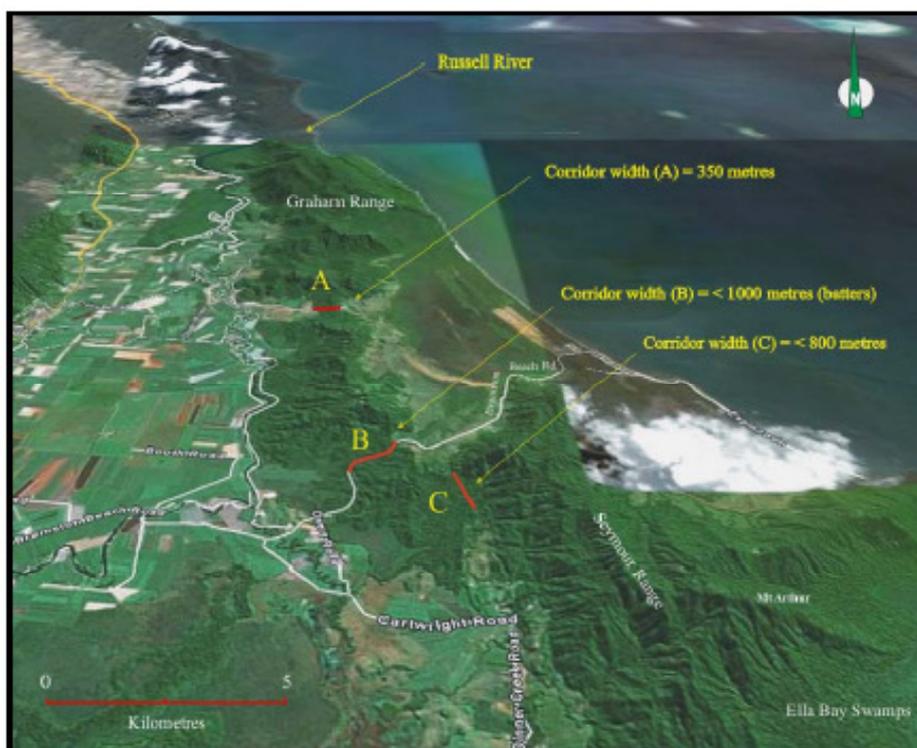


Figure 1.3.3: Cassowary ‘at risk’ movement corridors

Moore also suggested that it is not valid to subject only those birds identified in and directly surrounding the Ella Bay Property to a PVA, as they interact with, and are influenced by, the remainder of the Seymour Range Cassowary population.

Further, it is necessary to include Graham Range to the north in the population analyses, as the birds in this area constitute a functional part of the population. Therefore, it was concluded that the greater study area for the PVA (located within the yellow rectangle), is bounded in the north by Russell River and to the south by the Johnstone River, and comprises both Graham Range and Seymour Range. While the local Cassowary population potentially impacted by the Ella Bay Integrated Resort (i.e. Seymour Range), is located within the red rectangle (see figure 1.3.4).



Figure 1.3.4: Study areas for Moore's PVA

Model	Scenario
1	PVA of the Graham Range and Seymour Range as a connected population i.e., dispersal between areas. To evaluate the viability of the connected population, the simulations were run with both 'Low' and 'Moderate' Mortality rates (Table 9).
2	PVA of Graham Range and Seymour Range as isolated populations i.e., connectivity lost and no dispersal between areas. Mortality rate is categorised as 'Low' (Table 9) i.e., no change in levels of threats.
3	PVA of Seymour Range as an isolated population i.e., connectivity lost and no dispersal between Graham and Seymour Ranges, and with an increased level of anthropogenic threats i.e., 'Moderate' mortality. Moore and Moore (2007b) concluded that the Graham-Seymour Range was currently experiencing this higher level of threat.

Table 1.3.2: Model Scenarios (available in Volume 4, Appendix A.2.4)

Summary of Results

The PVA concluded that 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 risk probability that both populations will die out within 60 years.

However, Moore concluded that if the levels of threat can be reduced to 'Low' and connectivity between the two protected and enhanced, the connected Cassowary population should still be extant in 100 years, albeit with its population reduced to approximately 57% of the current estimated size.

Recommendations to help the current situation and outlook

Further discussions with Les Moore and Terrain, an environmental conservation organisation, identified the pressing need to link the Western Ranges.

Figure 1.3.5 shows the location of regional Cassowary corridors that could be developed.

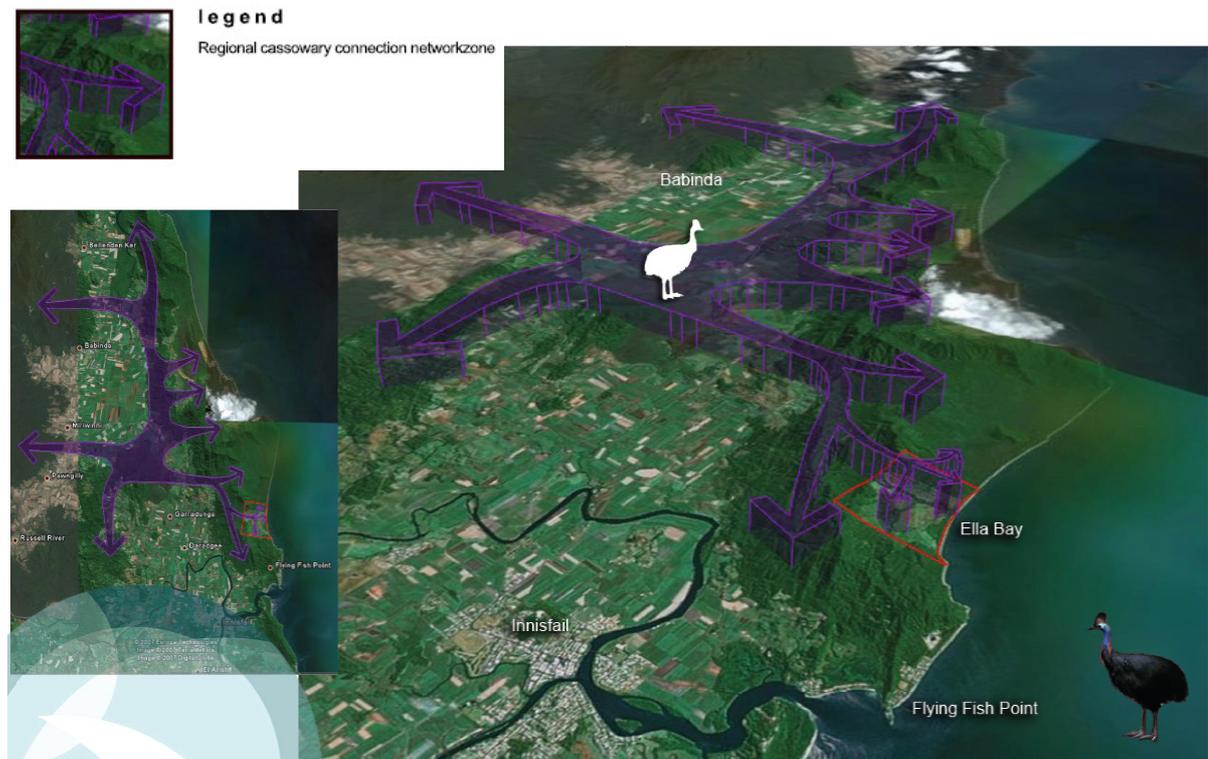


Figure 1.3.5: Regional Cassowary Corridors (Volume 3, Section 3.1)

To develop regional Cassowary corridors, a regional strategic plan is required. The Proponent will become an important catalyst in establishing this plan through its partnership with Terrain and the proposed Ella Bay Environmental Trust.

Submitters' specific questions and concerns regarding the Cassowary are addressed in detail in the following pages.

1.3.2.2 Seasonal Surveys

The Cassowary survey took place shortly after the cyclone, was at a lean time of year and was of short duration. The EIS Terms of Reference requests that fauna studies consider all the seasonal ecological requirements of a species. From seasonal Cassowary survey data, timing strategies to minimise disturbance of natal and feeding areas can be developed.

EIS reference: Volume 4, Section 4.7.1.2.3

Submitter reference: 1/52

Wet Tropics Management Authority (50)

Proponent Response

Les Moore's report drew from extensive ecological data available from previous studies of this species (Crome 1975, Crome and Benntripperbaumer 1982, Moore 1998, 1999, 2000, 2003, 2007a-c), allowing for seasonal ecological requirements to be ascertained and included in the revised Cassowary strategy.

The PVA outlines a comprehensive field survey at nearby Mission Beach prior to Cyclone Larry (Moore 2003, 2007a). Using records of Cassowary deaths and injuries kept by Queensland Parks and Wildlife Service (QPWS) following Cyclone Larry, it was estimated that approximately 35% of the known adult and sub-adult population died at Mission Beach as a result of the cyclone (Moore and Moore 2007b). Using the 2006 cyclone mortality figures as representative of the Graham-Seymour Range population, two major catastrophes were included in all scenarios covered in the PVA thus accounting for prior and potential future natural disasters.

The Cassowary densities from a pre-cyclone study of the Mission Beach cassowaries were included in the EIS for comparison with the Seymour Range post-cyclone studies (Refer to table 1.3.3).

As outlined in the PVA, environmental variability is incorporated as the standard deviation in mortality rates and the influence of catastrophic events. The Graham-Seymour Range (home to the regional Cassowary population), located in tropical eastern regions, is subject to severe climatic events such as cyclones (including Cyclone Winifred in 1986 and Cyclone Larry in 2006).

Age and Status	Area densities (bird/km ²)			Population densities (km ² /bird)		
	Ella Bay ¹	West Seymour Range ¹	Mission Beach ²	Ella Bay ¹	West Seymour Range ¹	Mission Beach ²
Adults and subadults	0.32	0.98	0.78	3.16	1.02	1.29
Known Adults	0.32	0.65	0.48	3.16	1.54	2.09
Known adult males	0.22	0.33	0.28	4.75	3.07	3.63
Known adult females	0.11	0.33	0.19	9.5	3.07	5.35
Known subadults	0	0.32	0.28	0	3.07	3.63

¹ Post-cyclone
² Pre-cyclone

Table 1.3.3: Cassowary Population Density

A total of six adult cassowaries and one nine-month old chick were identified in Les Moore's field survey in November 2006. Moore concluded that it is probable that this adult number approximates the original adult Cassowary population that was present in the study area pre-cyclone.

1.3.3 Submitter Issue: Management of Cassowary–Human Interaction

1.3.3.1 Golf Course and Open Space

The development of a contingency plan to address Cassowary–human conflict for the proposed golf course is recommended. Cassowaries traversing areas of open space such as the proposed golf course are considered to pose a low safety risk. However, details should be provided of proactive measures such as warning signs and their proposed locations to ensure that people understand that feeding birds may lead to the birds becoming aggressive and potentially requiring their removal.

EIS reference: Volume 4, Appendix 4.7.1.2.3

Submitter reference: 1/52

Environmental Protection Agency (45)

Proponent Response

A strategy has been developed to address the issue of people using the golf course and possibly coming into contact with the Cassowary. Measures have been proposed to manage and limit human-Cassowary interaction and contact should cassowaries be traversing open space, particularly the golf course.

Education

Ongoing education will be a vital part of an overall strategy to educate visitors, employees and residents at Ella Bay about the significance of the Cassowary and issues on how to live sustainably with the Cassowary. The Welcome Centre, through which all visitors and residents will pass, will have an education role, with displays and information aiming to:

- induct people at the Welcome Centre to explain rules, regulations and the importance of the Cassowary;
- excite visitors, tourists and residents about the Cassowary, fostering a desire to save the Cassowary from extinction and to become involved and committed in the process;
- adopt educational strategies to help people understand and appreciate the unique nature of the Cassowary as an endangered species;
- educate people about the habits of the Cassowary (for example, that they are active in the daytime and passive at night); and
- ensure that people in the Ella Bay Community do not feed, leave food or provide artificial water sources that attract cassowaries.

Signage

Signage will be strategically located throughout the development, warning of the dangers of approaching or feeding the cassowaries. These will be located on picnic facilities, at the golf facilities, in the village precinct and, most extensively, at the proposed Welcome Centre.

Placing of Cassowary Food Trees

Planting strategies that ensure Cassowary food trees are located away from higher risk areas of interaction between humans and cassowaries will be adopted.

Directional Fencing Strategies

Directional fencing strategies that direct the Cassowary away from higher risk areas of interaction between humans and cassowaries will be adopted.

Alarm and Warning Systems

It is proposed that all buggies will be fitted with Cassowary proximity alert alarms that feed alerts and information to Welcome Centre staff. These alarms will be triggered by information broadcast from the Non Intrusive Management System (NIMS). Each buggy will also have an audible alarm system that could effectively ward off a Cassowary should contact be made. Golf players will initially be able to participate in a trial of portable alarm systems, although it is intended that this would be extended to include all pedestrians in the proposed development.

1.3.3.2 Construction Phase Issues

Cassowary management strategy should be modified to include the construction phase and strategies developed to adaptively manage Cassowary issues. Further measures aimed at preventing human-Cassowary interaction and vehicle collision during each stage of construction is recommended.

EIS reference: Volume 4, Section 4.7.1.2.3

Submitter reference: 2/52

Wet Tropics Management Authority (50), Department of Environment and Water Resources (51)

Proponent Response

The Cassowary Management Strategy embraces the need to implement particular measures during the construction phase.

Education of construction workers

The induction process of staff involved in the construction phases of development will be comprehensive and focused particularly on issues related to the construction program and the workplace. A central objective of this induction process will be to instill the importance of construction work being only carried out when ecologically sustainable development (ESD) principles are met.

Construction staff will be advised of the Ella Bay contractor's Environmental Policy. This policy commits the Proposal to applying high standards of environmental performance and to implementing an environmental policy which is in accordance with the international standard, *Environmental Management System AS/NZS ISO 14001*.

Construction staff will be advised of their duties to notify incidents that breach Ella Bay's contractor's Environmental Policy.

Construction staff will be made aware of their obligations to work within the terms of:

- the Environmental Management Plan of the proposed development
- *Environment Protection (Impact of Proposals) Act*
- *The Environmental Protection Act*
- *The Endangered Species Protection Act*
- The Australian Heritage Commission
- *The National Environmental Protection Council Act*
- *The Environmental Protection and Biodiversity Conservation Act*
- Corporations Law
- Cultural Heritage Management Plan

Construction staff will be expected to work within best practice guidelines set out in industry codes of practice as well as comply with legislative requirements for their work and site specific standards.

Key environmental issues and related procedures that construction staff will be made aware of include:

- Cassowary, and other endangered/vulnerable species;
- existing vegetation protection;
- site fauna;
- air pollution;
- noise and vibration;
- solid waste treatment and disposal;
- pollution control of water, sewerage and waste;
- management of fuels, oils and greenhouse gas as toxic and potentially hazardous substances;
- nature conservation of land and marine environments;
- cultural heritage; and
- biodiversity conservation.

The above procedures will have to be assessed and reviewed based on how they work in practice. A process of continuous improvement will be implemented under the Environmental Management System (EMS).

Detailed Operational Works Plans

Detailed operational works strategies will be developed and implemented during the construction phase. These will incorporate buffers, barriers, education, and the prohibition of any pets at the site.

The PVA outlines that the occurrence of Cassowary traffic deaths can be effectively controlled with road management strategies. It is intended that traffic calming measures will be implemented within the construction period due to expected increased traffic.

These strategies are intended to be implemented during the early construction phases, to minimise any threats to the Cassowary population.

1.3.4 Submitter Issue: Cassowary Habitat

1.3.4.1 Cassowary Movement Corridors

Cassowary movement corridors are compliant with Department of Environment and Water guidelines. The northern corridor recommended in the Cassowary assessment is considered an integral component of on-site connectivity and should not be an optional item.

As per Moore's recommendations, Cassowary habitat locations 2a, 2b and 6 (north and west parts of site) should be retained as essential Cassowary habitat, locations 1b, 3 and 4 should be closed off to cassowaries and location 5 should be rehabilitated for Cassowary use.

Loss or compromise of Cassowary habitat will result in the disruption and disturbance of the known local Cassowary population during all phases of the project development, implementation and future residential/resort usage, regardless of the proponent's vegetation efforts.

It is unclear exactly how the developer proposes to quantify the assertion that essential Cassowary habitat will be increased over and above what is already present on the site.

EIS reference: Volume 4, Section 4.7.1.2.3 & Volume 8, Appendix 6.4

Submitter reference: 25/52

J Dall (6), R & J Croft (7), D & C Cook (9), E Bock (11), B Harvey (12), R Eastment (13), J Beasley (14), Performa letter (15 submissions) (17,22-35), J Rainbird (CAFNEC) (20) Wet Tropics Management Authority (50), Department of Environment and Water Resources (51),

Proponent Response

It is the Proponent's view that the proposed development does not result in a loss or compromise of Cassowary habitat. The Proponent's protection, rehabilitation and revegetation plans are clearly established and documented.

Les Moore has stated that the site at Ella Bay in its current state has little or no value as habitat for the Cassowary. The current site also has poor connectivity with fences criss-crossing the site and degraded riparian zones. Moore suggests that cassowaries only go to the site because of an outbreak of Pond Apple weed. Pond Apple Weed is a declared pest weed species which is required to be removed from the site.

Environmental corridors are considered an integral part of the sustainable development objectives of the proposed development. The following of Les Moore's recommendations have been adopted and included in the refined and improved Master Plan.

- Cassowary habitat locations 2a, 2b and 6 (north and west parts of site) will be retained as essential Cassowary habitat.
- Locations 1b, 3 and 4 will be closed off to cassowaries.

- Location 5 will be rehabilitated for Cassowary use.
- The northern corridor, which was proposed as a result of Moore's Cassowary surveys during the EIS preparation process, has been integrated into the refined Master Plan and Cassowary Management Strategy.

These revisions were prepared after a workshop was undertaken with the Wet Tropics Regional Authority, the Environmental Protection Agency, Les Moore and David Rivett. The conclusions of that workshop have been taken into consideration in devising the Cassowary Management Strategy.

The table below provides a summary of the major vegetation improvements and refinements involved in managing Cassowary habitat:

Overall Clearing, Rehabilitation and Revegetation Summary				
	<i>Not of Concern</i>	<i>Of Concern</i>	<i>Endangered</i>	TOTAL
Total Rehabilitated	20.535 ha	20.535 ha	0	41.07 ha
Total Revegetated	21.575 ha	22.065 ha	0	43.64 ha
Less Total Cleared	2.415 ha	1.135 ha	0	3.55 ha
NET GAIN	39.39 ha	41.77 ha	0 ha	81.16 ha

Table 1.3.4: Offsite and onsite clearing, rehabilitation and revegetation summary

Overview

In its present state, the largely cleared nature of the site at Ella Bay pastoral farm reduces the extent to which it is able to contribute to local corridor values in this context. However, corridors of riparian vegetation on the subject site do facilitate the movement of species between larger intact patches of vegetation in the south and west to coastal vegetation in the east.

The riparian vegetation traversing the subject site is used by a range of species. Macropods, rodents, bats and birds in particular are likely to move through these areas. Several species were observed moving along riparian habitats, with behaviour suggesting these strips may be utilised by local populations. The BAAM survey concluded that while at a regional level corridor values present on the subject site could not be considered to be significant, the riparian vegetation may be of local importance in facilitating fauna movements in an east/west direction between rainforest vegetation and coastal/swamp vegetation.

As a result of the fauna assessment of the Ella Bay Site (BAAM 2006), it was recommended that a buffer zone of at least 50 metres be established and revegetated either side of the existing drainage lines to protect the habitat of the threatened mist frog *Litoria rheocola*. This 100 metre-wide corridor, in addition to the requirement for the construction of appropriate Cassowary-proof fences lining the movement corridors, was considered an adequate width for cassowaries. Figure 1.3.6 shows the major

proposed Cassowary movement corridors within the Ella Bay Property superimposed onto the Master Plan.

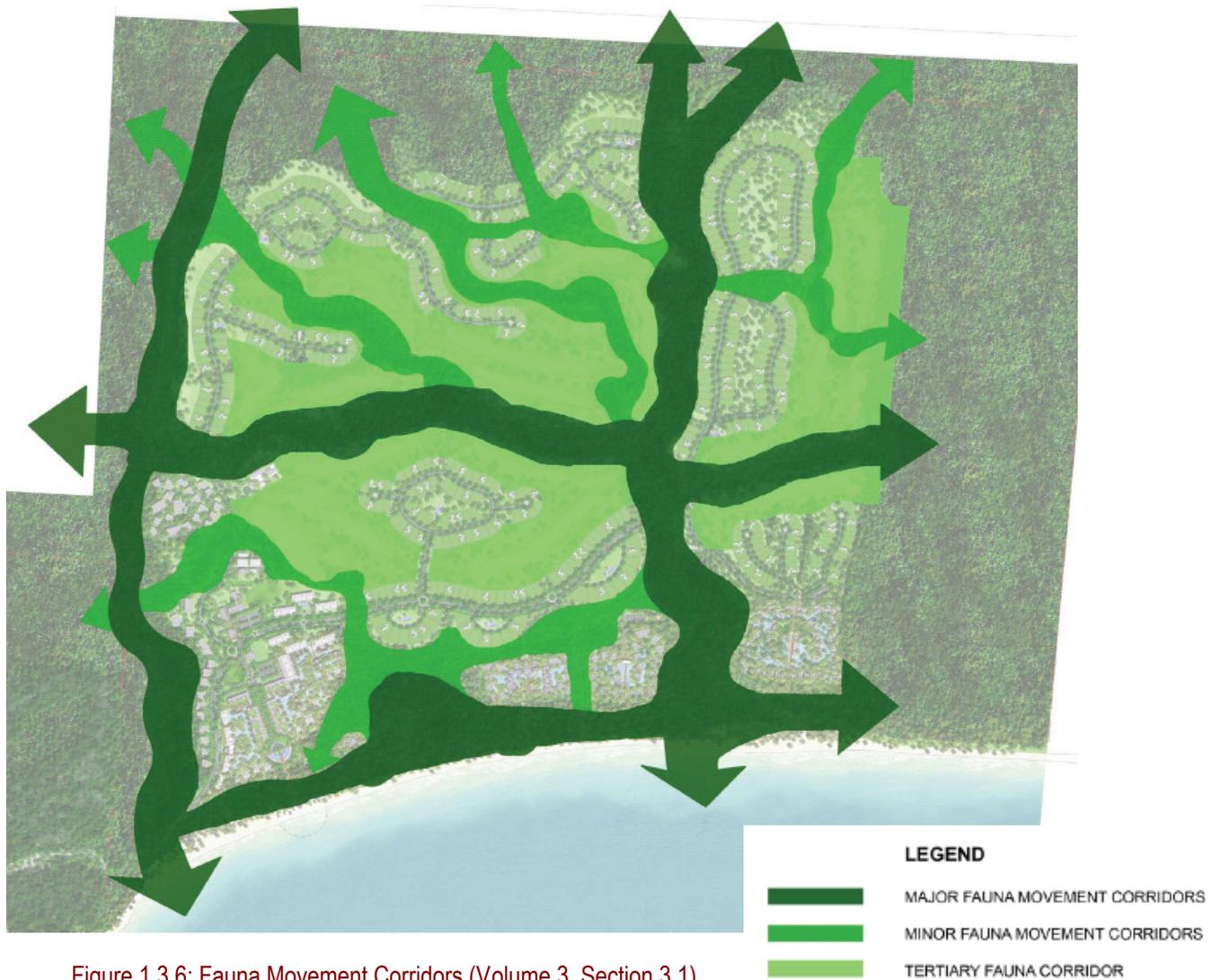


Figure 1.3.6: Fauna Movement Corridors (Volume 3, Section 3.1).

A series of sub corridors have been introduced on the revised Master Plan. There are also two separate northern corridors facilitating north/south Cassowary movement. The Fencing Plan shown in Figure 1.3.7 clearly depicts the extent and location of habitat available to the Cassowary.



Figure 1.3.7: Cassowary Fencing Plan (Volume 3, Section 3.1).

1.3.4.2 Weed Removal

Removal of Cassowary food resources, whether native or introduced plant species will further reduce existing remnant habitat for cassowaries.

EIS reference: Volume 4, Section 4.7.1.2.3

Submitter reference: 2/52

E Bock (11), J Rainbird (CAFNEC) (20)

Proponent Response

The revised and improved Master Plan for Ella Bay will increase, rather than reduce, cassowary habitat. The quality of food sources available to the Cassowary will also be improved, with the rehabilitation of non-remnant habitat as well as the intention of revegetating with endemic species native to the area. Weed removal from currently open pasture areas will take place as the golf course areas are established.

While the pond apple is a current periodic food source, it is a noxious weed which is required to be removed. Pond apple is currently located among the foreshore vegetation, and is not a native food source for the Cassowary. This weed species is located close to expected human activity and the Proponent would not wish to attract cassowaries to this area. To compensate for the removal of this periodic food source, extensive replanting of cassowary foods trees is proposed as part of the revegetation program.

The revegetation and rehabilitation works proposed are extensive, and provide for a net gain of habitat for the Cassowary. This can be identified in Figure 1.3.8 below.



Figure 1.3.8: Proposed Revegetated and Non-remnant Areas Rehabilitated

The current land use of the Site is resulting in the continued degradation of all remnant vegetation within the boundaries of the cattle grazing property, due to uncontrolled access by cattle. There is also concern regarding the incremental loss of 'essential' and 'general' Cassowary habitat (EPA 2004) within and adjoining the property due to on-going farm management practices. There is concern that the current land use could potentially damage the local Cassowary population as a result of the permanent decrease in both 'essential' and 'general' Cassowary habitat area and quality, both at and adjoining the Ella Bay Site. As cattle grazing and agricultural management practices continue to degrade the remnant vegetation along drainage lines and the foreshore, the ecological values of the adjacent World Heritage Area may be significantly reduced.

A major concern for the Cassowary of the concomitant influences of degrading habitat and weed invasion is the continued exploitation and dispersal of declared weed species present on the property. An extensive weed removal program will also be implemented both during construction and thereafter on an on-going basis. Many weed-filled clearings are currently shifting vegetation from rainforest to pioneering and secondary tree species, with limited food potential for the Cassowary. The weed removal program will be implemented sensitively in response to Cassowary habitats and food resources, ensuring that cassowaries are not adversely affected by weed removal.

The rehabilitation proposal which also includes weed removal is planned to be implemented with local conservation body, Terrain Natural Resource Management.

1.3.4.3 Impact of Coastal Exclusion

The exclusion of the Cassowary from the coastal strip would reduce the area of available foraging habitat for the Cassowary and greater discussion of the impact that exclusion from the coastal habitat, balanced against the interaction risks, should be provided.

EIS reference: Volume 4, Section 4.7.1.2.3

Submitter reference: 1/52

Department of Environment and Water Resources (51)

Proponent Response

Cassowaries will have access to beach areas and the coastal strip apart from a relatively small area directly in front of the Village Precinct. Access to other coastal areas for cassowaries will be monitored so as to minimise human–bird interaction. Les Moore suggests that this excluded area has a very low habitat value, and the impact of the loss of habitat) is small compared to the risk of increased interactions between people and the Cassowary.

All visitors will be made aware of the special arrangements in place for monitoring and managing the Cassowary using the non-intrusive management scheme (NIMS) that provide monitoring and alerts. Visitors will be informed about how these monitoring and alert systems work. The system would be designed to alert staff at the Welcome Centre when a Cassowary has moved through a virtual access point on the Site boundary. The system would then be able to monitor and predict when and where the Cassowary is most likely to be within the Site itself.

All visitors will be also be made aware of audible alarms system which will inform people when and where a Cassowary is moving through the Site, for example, along the beachfront area.

People will also be educated at the Welcome Centre about the dangers of feeding or approaching the birds, and these messages will be reinforced through signage in strategically located positions, including at the beach and well-used public spaces.

Corridors will provide access for cassowaries to the beach areas and these are identified in figures 1.3.9 and 1.3.10.



Figure 1.3.9: Cassowary fencing plan (Volume 3, Section 3.1).

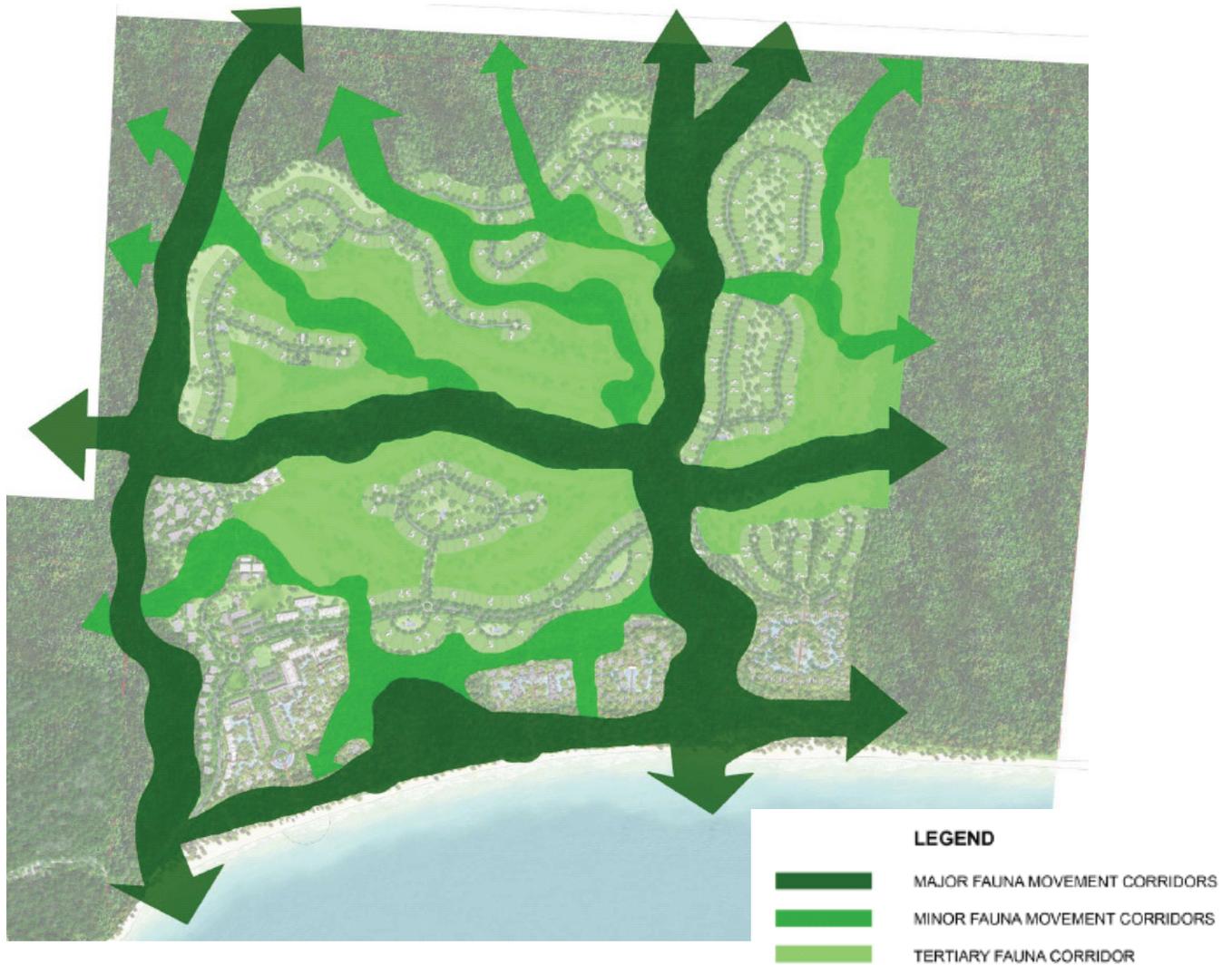


Figure 1.3.10: Fauna Movement Corridors (Volume 3, Section 3.1).

1.3.4.4 Appropriateness of Offsets

The proponent states that there will be 'no massive clearings' and offers offsets of alternative compensatory habitat. Both measures fail to adequately address critical issues affecting both essential Cassowary habitat and the protection of key 'of concern' remnant vegetation.

EIS reference: Volume 4, Section 4.7.1.2.3 & Volume 3, Section 3.4

Submitter reference: 16/52

E Bock (11), Performa letter (15 submissions) (17, 22-35)

Proponent Response

A draft *Regulatory Offset and Additional Environmental Investments Strategy* has been prepared is currently under negotiation with government environmental agencies. The proponent believes that the offsets will act as a catalyst for slowing the decline of the Cassowary in the region. The Proponent will greatly exceed its statutory obligations in terms of compensating for the minimal clearing of 'of concern' vegetation. Please refer to *Regulated Offsets and Additional Environmental Investments*, (Volume 2, Section 2.7.3), *Revegetation, Rehabilitation and Enhanced Environmental Corridors* (Volume 2, Section 2.2.1), and *Improved Natural Environment* (Volume 2, Section 2.2.9).

Existing Vegetation

The current extent of non-remnant vegetation is shown in light green in figure 1.3.11.

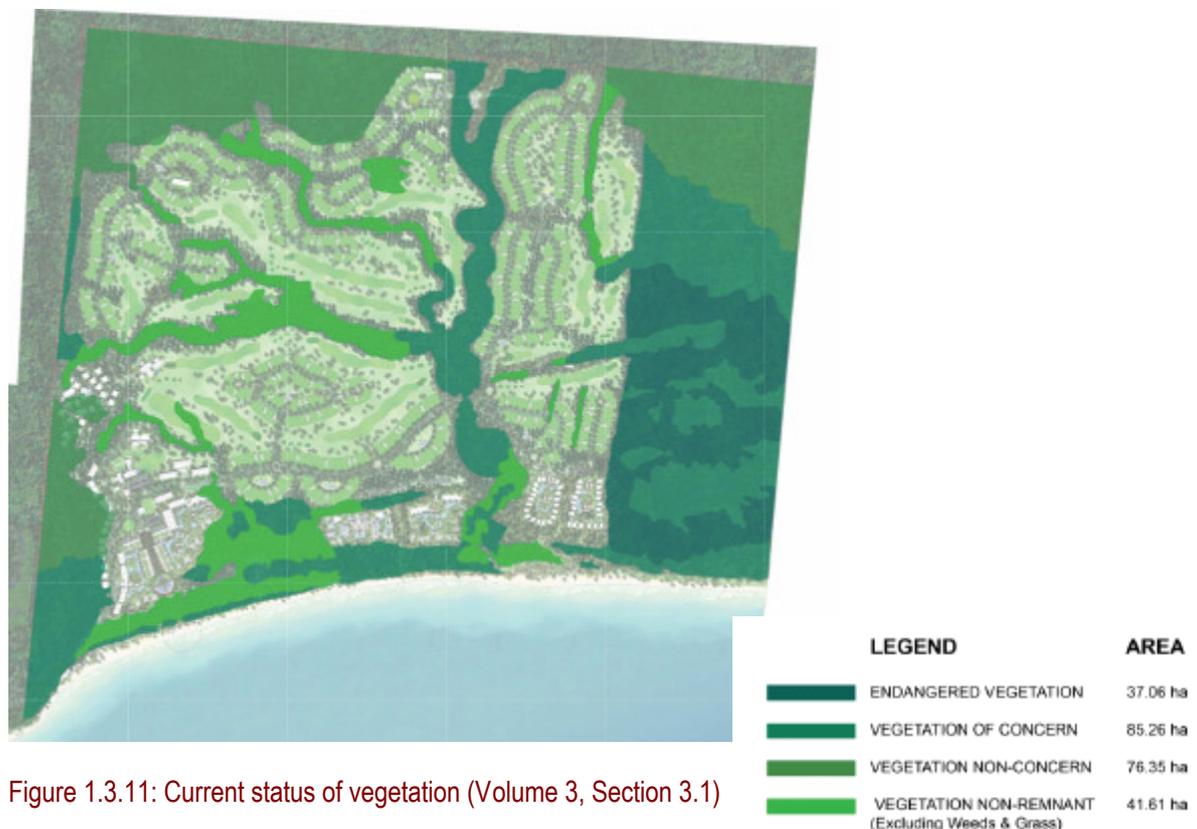


Figure 1.3.11: Current status of vegetation (Volume 3, Section 3.1)

Proposed Vegetation

All of the non-remnant vegetation depicted in figure 1.3.11 could legally be cleared without a permit under the current pastoral land use. It nevertheless provides a good basis for a corridor habitat for the Cassowary, as well as for many other species, and could be relatively easily rehabilitated as many of the native rainforest and related species still occur within these areas.

The Policy for Vegetation Management Offsets developed by the Queensland Department of Natural Resources and Water establishes the principle of using offsets to mitigate the loss incurred from vegetation clearing. The proposed Ella Bay Integrated Resort has been declared a State Significant Project, and will comply with this Policy. The draft *Regulatory Offset and Additional Environmental Investments Package* (currently under negotiation with government agencies) allows for rehabilitation and revegetation to occur in the early stages of the proposed development and the staging plan (see Volume 3, Section 3.1) also indicatively shows how the site will be revegetated in conjunction with the staging of the project.

The Ella Bay Integrated Resort Proposal may impact on some remnant *of concern* regional ecosystems, and some essential habitat, resulting in the initial loss of a small proportion of these types of ecosystems. However, the Ella Bay Proposal anticipates compensation in the form of substantial offsets against this loss on the Site, and will include a comprehensive management program to ensure that the offsets are well managed in order for them to return to their original condition and become equivalent to remnant ecosystem types. It is expected that the proposed offsets will contribute substantially to essential habitat for the Cassowary and Common Mist Frog, as well as to reintroduce some or all of the threatened species listed under both the *EPBC Act* and the *Nature Conservation Act*. The Ella Bay Integrated Resort Proposal aims to achieve no net negative impact on the Cassowary and to restore local connectivity by expanding Cassowary habitat through an extensive revegetation program which re-establishes local Cassowary corridors and sub-corridors.

The Ella Bay Master Plan proposes specific east-west and north-south movement corridors to facilitate the movement of cassowaries as well as a series of sub-corridors, focusing on drainage lines, to complement this strategy. The rehabilitation and revegetation of these corridors will result in an increase of 84.71 hectares of connective Cassowary habitat. The golf course and other open space areas also have habitat value for the Cassowary, although to a lesser extent.

The following figures indicate the proposed clearing works (figure 1.3.12) and areas to be revegetated and rehabilitated (figure 1.3.13).

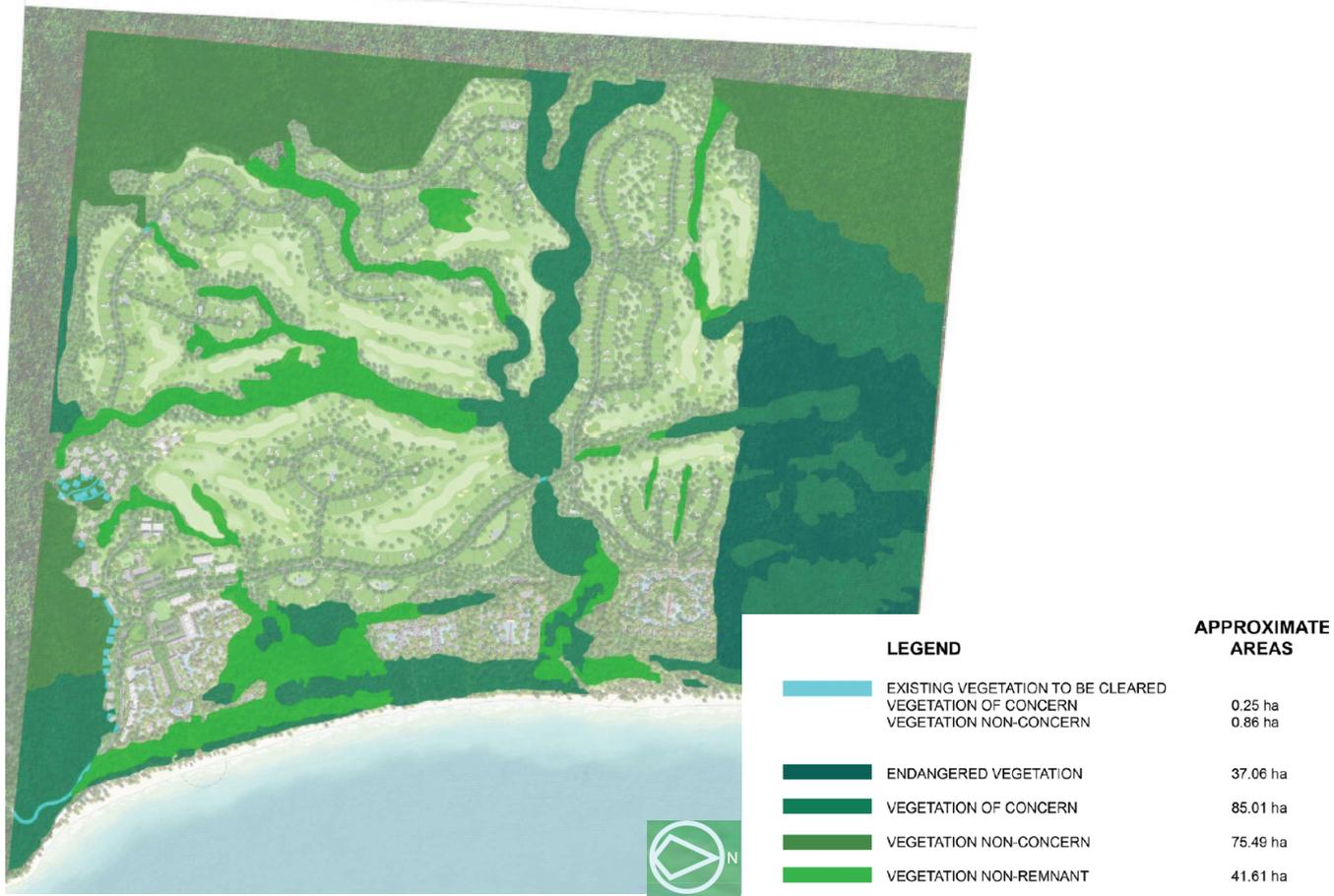


Figure 1.3.12: Areas proposed to be cleared (Volume 3, Section 3.1)



Figure 1.3.13: Proposed onsite revegetation and rehabilitation (Volume 3, Section 3.1)

Overall Clearing, Rehabilitation and Revegetation Summary				
	<i>Not of Concern</i>	<i>Of Concern</i>	<i>Endangered</i>	TOTAL
Total Rehabilitated	20.535 ha	20.535 ha	0	41.07 ha
Total Revegetated	21.575 ha	22.065 ha	0	43.64 ha
Less Total Cleared	2.72 ha	0.83 ha	0	3.55 ha
NET GAIN	39.39 ha	41.77 ha	0 ha	81.16 ha

Table 1.3.5: Overall onsite and offsite clearing, rehabilitation and revegetation summary for the proposal

The existing Ella Bay property is a freehold pastoral grazing property, which means that the clearing of non-remnant regrowth is an exempted practice for the landholder under the *Vegetation Management Act 1999 (VMA)* and *Vegetation Management Regulations*.

As such, the current landholder could legally clear all non-remnant vegetation on the property, resulting in a net loss of over 40 ha of regrowth between the north and south of the property (see *Landholders' Guide for Vegetation Clearing Applications*, 2006, Appendix 2, Table 1, published by Qld NRM). The non-remnant vegetation is shown in Figure 1.3.10.

The Cassowary Population Viability Analysis (Moore, 2007) commissioned by the Proponent concluded that should the Cassowary populations of both the Graham Range and Seymour Range remain isolated, there would be a high probability of them becoming extinct within 60 years, with or without development on the Site. However, with connectivity between the two populations and a generally reduced threat (as a result of mitigation measures), the populations may be extant in 100 years (Moore, 2007).

It is a clear intention of the Ella Bay Proposal that clearing and revegetation works will result in no net loss to Cassowary habitat, and an improvement in the overall amount and quality of potential Cassowary habitat.

1.3.5 Submitter Issue: Fencing

1.3.5.2 Fencing Concerns

A number of views were expressed regarding the proposed Cassowary fencing:

A) Give detail of the proposed fencing plan, including consideration of alternative options. Fencing plan to consider feeding patterns of cassowaries, difficulty of construction across drainage areas, maintenance schedule and costs, other wildlife movement, amenity and weed control.

B) Describe in detail the proposed fencing plan (the Agency's preferred strategy is to limit fencing to residential and resort areas as per Attachment 3 – alternative options such as confining birds to the use of fenced wildlife corridors would facilitate predation by dingoes, reduce foraging habitat available to birds and likely be controlled by dominant cassowaries preventing access to the corridors by subordinate birds).

C) It is noted that when considering fencing the following issues need to be taken into account:

- Construction across drainage areas will be difficult or impractical.
- The on-going maintenance schedule and costs. All fencing will need regular checking, particularly after storms to ensure fence integrity.
- Establishment and maintenance costs. The total length of the fence and costing per 100m of fence are not shown but the on-going commitment (financial) of residents and the various Body Corporate to the fence strategy may be difficult to enforce.
- A fence design that excludes cassowaries (both chicks & adults) and that does not impede other wildlife movement has not been illustrated.
- The danger of the fence itself becoming an eyesore
- Maintenance corridor along the fence could become a weed invasion point.
- The Cassowary's access to its natural range and the existing remnant Cassowary habitat on the Ella Bay property will be greatly restricted by the development in general and any associated exclusionary fencing.

EIS reference: Volume 4, Section 4.7.1.2.3

Submitter reference: 7/52

J Dall (6), E Bock (11), C Head and C Belbin (21), J Rainbird (CAFNEC) (20), Environmental Protection Agency (45), Wet Tropics Management Authority (50), Department of Environment and Water Resources (51)

Proponent Response

Background

Submissions concerning the proposed fencing strategy in the initial Master Plan were received. Issues of concern were that the fencing strategy would:

- confine cassowaries to the use of fenced wildlife corridors which would
 - facilitate predation by dingoes; and
 - reduce foraging habitat available to cassowaries;
- potentially enable dominant cassowaries to prevent access to the corridors by subordinate birds; and
- mean the loss of potential future habitat.

The Environmental Protection Agency (EPA) suggested a strategy to fence off precincts. The Proponent has further developed EPA's suggested strategy. This refined *Fencing Strategy* is discussed in detail in Volume 2, Section 2.2.9.3.

Cassowary Fencing Strategy

In response to these submissions, a refined and improved fencing strategy has been proposed which includes:

- removing existing cattle fences and other barriers to allow unimpeded movement of the Cassowary;
- building effective fences including appropriate 'fence and funnel' approaches to guide and direct cassowaries away from possible harm and from people;
- commissioning active research programs into the development of alarm systems and non-intrusive monitoring and surveillance techniques;
- trialing these systems to evaluate their effectiveness;
- locating food trees and other food plants for the Cassowary to draw them away from people;
- adopting a staging plan that takes full account of the Cassowary and its needs; and
- constructing fencing prior to construction during staging.

The principles of the Fencing Strategy have been established to take into account the submission issues raised. The Strategy will be based on proven approaches to fencing, and where no reliable solution exists, research programs will be commissioned to identify appropriate solutions. The Fencing Strategy is based on the need to fence areas where possible high levels of interactions between fauna (including the Cassowary) and people are considered likely. The Fencing Strategy has been prepared with the recognition that human activity, and the consequences of such activity, need to be carefully managed in order to balance the interests of the Cassowary and the people sharing the community environment.

High risk activities to be carefully managed include:

- motor vehicle movements;
- noise; and
- pedestrian, electric buggy and bicycle traffic.

A clear separation of people and fauna will be arranged in areas assessed as containing high risk activity. The high risk areas include the town centre precinct, the Welcome Centre area, resort areas, road crossings and roads or paths in general.

Despite the intention to separate people and fauna in high risk areas, an underlying objective of the Fencing Strategy is to open up as much habitat as possible to fauna, including the Cassowary. The achievement of this objective will be facilitated by improving currently degraded land and using fencing to direct fauna through suitable habitat throughout the Site.

A network of wildlife corridors will be established during the course of the Proposal to begin the process of improving the environment for fauna and cassowaries. Directional fencing will be installed during the course of the proposed development to guide fauna away from roads and people, and towards the wildlife corridor network. Detailed planning will be carried out with regard to fencing and gating designs and placing based on a program of trials and supported by appropriate research.

Crossing points for fauna and fauna friendly bridges have also been added as part of the Fencing Strategy as well as traffic calming measures at crossing intersections. Traffic speed limits will be set at 20 km per hour in these areas. Figure 1.3.14 outlines the Proponent's fencing plan.



Figure 1.3.14: Proposed Cassowary Fencing Plan (Volume 3, Section 3.1)

On-going responsibility for fencing maintenance and repairs will ultimately be the responsibility of the Body Corporate.

Specific answers to submitter responses regarding the fencing plan and cassowary strategy are as follows:

- A) A detailed discussion of the proposed Fencing Strategy is included in Volume 2, Section 2.2.9.3. The refined Fencing Plan predominantly avoids construction of fencing over water courses and drainage lines. Fencing maintenance will be by the Body Corporate and the majority of fencing is now in cleared areas allowing for easy inspection. The Fencing Strategy incorporates a policy to strategically locate food trees and other food plants for the Cassowary to draw them away from people.
- B) As previously described the fencing plan aims to open up as much habitat as possible to the cassowary but at the same time reduce the risk of injury to the cassowary from people, cars, dogs etc. The refined Fencing Plan increases available habitat, decreases the risk of predators and avoids dominant cassowaries preventing access to the corridors by subordinate birds.
- C) The refined fencing plan predominantly avoids construction of fencing over water courses and drainage lines. Fencing maintenance will be by the Body Corporate. The majority of fencing is now in cleared areas allowing for easy inspection.

It is intended the type of fencing will be selected after carefully considering both social and environmental needs. It is proposed a Research project be undertaken by James Cook University into fencing design. This research project will take into consideration the Cassowary and other fauna, as well as residents and visitors.

It is proposed that monitoring and management of the Cassowary using a specially developed Non Intrusive Management Scheme (NIMS). The NIMS alerts the Welcome Centre Operations Management when and where a Cassowary has entered a virtual access point at 'fauna friendly' underpasses along the Site boundary fence. It will also predict where it is most likely to travel to within the Site. All visitors will be informed of the arrangements in place with regard to alert signs and audible alarms. Golf buggies will also be equipped with audible alarm systems to be used to ward off cassowaries once they have been sighted.

A fence is proposed to be built along the road from Flying Fish Point outside of the Development boundary. Traffic calming measures will be introduced at two crossing points for cassowaries. Refer to Volume 2, Section 2.1.1 (*The Access Road to Ella Bay*); Volume 2, Section 2.2.9.3 (*Fencing Strategy*) and Volume 4, Appendix A.2.6. (*Access Road Strategy (Environment North)*).

The Fencing Strategy provides for a regular appraisal and review of its success. This process will be carried out by specialist fauna and flora and Cassowary consultants recognised as authorities in this area.

1.3.5.2 Internal Roads and Pedestrian Walkways

Cassowary access to existing habitat will be greatly restricted by the development in general and any associated exclusionary fencing and other human infrastructure.

Further detail regarding infrastructure measures proposed to avoid collisions or interaction with cassowaries on all internal roads and pedestrian pathways, especially where these cross wildlife corridors should be discussed.

EIS reference: Volume 4, Section 4.7.1.2.3

Submitter reference: 3/52

E Bock (11), J Rainbird (CAFNEC) (20), Environmental Protection Agency (45)

Proponent Response

The Master Plan has been designed with the facilitation of safe Cassowary movement through Ella Bay a key objective. While the initial fencing strategy involved the exclusion of cassowaries from a number of large areas at Ella Bay, submissions were received expressing concerns that the proposed fencing strategy would confine cassowaries fenced in wildlife corridors which would:

- facilitate predation by dingoes,
- reduce foraging habitat available to cassowaries, and
- potentially be controlled by dominant cassowaries preventing access to the corridors by subordinate birds.

A refined and improved Fencing Strategy has been developed in response to submissions, as well as a strategy to manage internal road design. Refer to Volume 2, Section 2.2.9 (*Improved Natural Environment*).

Internal Road Design

The road design, in conjunction with the transport strategy for Ella Bay, will reduce or eliminate the risk of road injury to cassowaries. The traffic strategy outlined in *Getting Around Ella Bay: Transport Considerations* (refer to Volume 2, Section 2.2.6) demonstrates the extent to which vehicle movement in the Ella Bay Township would be reduced.

People within Ella Bay will be encouraged to use low impact forms of transport as an alternative to traditional motor vehicles. There will be widespread use of electric buggies, bicycles and public shuttle buses, as well as high walkability. As these alternative forms of transport are encouraged, conventional vehicle movements will be reduced, serving to reduce the possibility of a Cassowary being injured or otherwise affected by moving traffic.



Figure 1.3.15: Ella Bay circulation plan (Volume 3, Section 3.1)

The circulation plan (figure 1.3.15) indicates that roads will be classified as primary (red) or as secondary (orange) access within the proposed Ella Bay Township. Highlighted in brown are 50 km roads; in red 40 km roads; and in orange 20 km roads.

Pedestrian and electric buggy routes are shown as dotted grey lines. A dedicated bicycle and electric buggy route will run parallel with the main road that runs from the Ella Bay Welcome Centre past the resorts to the north east corner of Ella Bay.

Fauna crossing points are marked in green and at these points traffic speed limits will be not exceed 20 km per hour. These areas will be pointed out at the Ella Bay Welcome Centre, as well as clearly displayed along the roads, so that drivers are fully aware.

External road design has been discussed in detail in the *Access Road Strategy* (refer to Volume 4, Appendix A.6). Surveys have been carried out to identify where and when cassowaries cross roads outside of Ella Bay. Crossing areas have been assessed as being of either lower or higher risk and

appropriate strategies for each situation have been developed. Lower risk crossings will have speed control measures in place to slow traffic. Higher risk crossings will have additional measures to slow traffic. As a result of these initiatives, all visitors to Ella Bay will already be made aware of the range of protections put in place on the external road to Ella Bay.

Pedestrian pathways

A clear separation of people and fauna will be arranged in areas assessed as containing high risk activity. The high risk areas include the town centre precinct, the Welcome Centre area, resort areas, road crossings, and roads or paths in general.

Despite encouraging the separation of people and cassowaries in these high risk areas, an underlying objective of the proposed development will be to open up as much habitat as possible to fauna, including the Cassowary. The achievement of this objective will be facilitated by improving currently degraded land and using fencing to direct fauna through suitable habitat throughout the Site.

1.3.6 Submitter Issue: Additional Issues

1.3.6.1 Threats to the Cassowary Population

Short term the development is an every day threat to the life of the individual local Cassowary and long term to the Seymour Range Cassowary population. The project has considerable direct, indirect and cumulative impacts on the Cassowary.

Because of impacts from the development on the Cassowary it is highly likely that some birds will be lost from the population. If the population cannot sustain a 'critical mass' it may go into decline and become a population 'sink'. The introduction of so many new threats to the Cassowary is a serious consideration which must throw considerable doubt on the approval of the project.

EIS reference: Volume 4, Section 4.7.1.2.3

Submitter reference: 21/52

E Bock (11), B Harvey (12), R Eastment (13), J Beasley (14), Performa letter (15 submissions), J Rainbird (CAFNEC) (20), Wet Tropics Management Authority (50)

Proponent Response

The principal conclusions from various reports prepared for the Proponent by Les Moore are that the Cassowary sub-population is currently facing extinction unless significant changes are made in the short, medium and long term regarding how coastal Cassowary populations are protected and supported. Short term improvements proposed include opening up more Cassowary habitat and improving the connectivity between habitats. The Proponent believes that the Proposal will not stop the threat of extinction to the Cassowary in the short term, but that the Proposal does have the potential to help turnaround this situation over time by acting as a catalyst for change at the local and regional levels.

Background

In response to concerns regarding the threats to the Cassowary, a Population Viability Analysis (PVA) was conducted by Les Moore. PVA is the quantitative evaluation of all known factors and their interactions that act on populations and contribute to their risks of short and long-term decline or extinction (Boyce 1992). It was determined that with suitable mitigation measures, the development could have a positive effect on the existence of the local Cassowary populations.

The major threats to the Cassowary identified with the proposed development relate to those posed by increased traffic along Ella Bay Road and the concomitant flow-on impacts associated with a large permanent human population using the Ella Bay Property. However, it was found that there are a range of strategies available to mitigate the major impacts within the development footprint, to that approximating those for existing pastoral land use. They include Cassowary-proof fencing, Cassowary road management strategies for the Ella Bay access road, rehabilitation of degrading habitat, improving bird movement connections throughout the site, and strict dog control.

Population Viability Analysis

The PVA indicates that the Graham Range and Seymour Range connected Cassowary population is already in decline, even under 'Low' mortality rates, with a predicted loss of 41% of its Cassowary population within 100 years. Unfortunately, this population is currently experiencing 'Moderate' mortality (Moore and Moore 2007b). At 'Moderate' mortality, both deterministic and stochastic growth rates are strongly negative, resulting in a severe deterministic decline. Reflecting this negative growth, population size decreases by 82% over the 100 years population projection and, as the population decreases in size, the dominating influence of stochastic events increases and the extinction spiral is firmly in place.

As two small isolated populations (ie the Graham Range and Seymour Range populations), there is approximately 13% greater loss of cassowaries than if the two populations were functioning as a single, connected population. In addition, the risk of extinction increases four-fold with the predicted mean time to extinction dropping to 46 years. It is apparent that the isolated populations are significantly influenced by a smaller habitat area, which naturally results in small population ceilings, and the subsequent vulnerability of small Cassowary populations to chance events. If connectivity is permanently lost, therefore, environmental stochasticity in the form of continued habitat degradation, variable fruiting regimes, and natural catastrophes such as severe cyclones will dominate the population dynamics of these two, small populations.

The PVA concluded that 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 risk probability that both populations will die out within 60 years.

However, Moore also concluded that if the levels of threat can be reduced to 'Low', and connectivity between the two populations can be protected and enhanced, then the connected Cassowary population should be able to survive in the next 100 years, albeit with its population reduced to approximately 57% of the current estimated size.

The Proponent believes that its Regulatory Offset and Additional Environmental Investments Package, its commitment to an Ella Bay Environmental Trust Fund and its support for a regional approach can act as an important catalyst for the adoption of significant regional change to protect the Cassowary.

Change is necessary in terms of the:

- short term where the Proponent's strategies for managing people interaction with the Cassowary, control of dogs, access road design, fencing and funnel strategies and the use of North South corridors will be important and necessary interventions; and
- medium and long term regional policies designed to protect the Cassowary and which require support at all levels of the community within the region.

1.3.6.2 Off-site Road and Traffic Impacts

Off-site road and traffic impacts on Cassowary will require further analysis. This should include detailed discussion of the proposed risk management measures, and potential offsets, associated with the preferred route. The content of any proposed Cassowary Management Strategy should form part of this analysis.

EIS reference: Volume 4, Section 4.7.1.2.3

Submitter reference: 1/52

Department of Environment and Water Resources (51)

Proponent Response

Background

As identified by Moore (2006), the major impacts associated with proposed development relate to the threats posed by increased traffic along Ella Bay Road. Cassowary road management strategies comprise an integral part of the Proponent's road management process. Please refer to *Improved Natural Environment* (Volume 2, Section 2.2.9).

The threat of Cassowary road death is greatest on the Bramston Beach road where it crosses the Graham Range, and at the southern end of Seymour Range. Records from Mission Beach over 20 years (Moore 2003, 2007a, 2007c) indicate that road death accounts for >70% of all known Cassowary mortality. As the Bramston Beach Road is similar in form to the high-speed roads which traverse Cassowary habitat at Mission Beach, it is likely that the number of Cassowary road deaths will increase as coastal development grows. The Ella Bay Road will not have any high speed areas. As a result, the Proponent does not envisage this problem on the Ella Bay Road.

To avoid duplicating the high number of Cassowary road deaths that occur annually at Mission Beach, an effective Cassowary Road Management Strategy is essential. Specific attention to traffic calming is crucial in order to protect road-crossing cassowaries.

Managing Road and Traffic Impacts

The approach to creating an effective Cassowary Management Strategy has been to:

- identify and assess the risks;
- provide appropriate solutions and monitor results;
- slow traffic;
- manage crossings;
- monitor driver behaviour; and
- commission research where immediate, proven solutions are not available.

Road Management from Flying Fish Point to Ella Bay

The road to Flying Fish Point from Little Cove has been assessed in terms of the risk it poses to the Cassowary. The principle objective is to slow traffic on the access road at Cassowary crossing points and establish fences along the side of the road elsewhere. The fencing will protect cassowaries in adjacent or nearby habitat from traffic flows. At the crossing points, traffic calming measures will be put in place with speed cameras and surveillance measures where appropriate. Education remains the most important way of informing drivers to slow down.

Traffic calming measures will include:

- designing bends in the road at appropriate places to help slow traffic flows,
- using humps and artificially rutted sections of road to make it uncomfortable for a car to exceed 20 kms per hour as it approaches a crossing section, and
- educating drivers of the need to slow down and drive responsibly.

There are four sections of the road from Flying Fish Point to Ella Bay to consider separately:

- 1 Flying Fish Point bypass
- 2 Flying Fish Point to Heath Point
- 3 Heath Point to Little Cove
- 4 Little Cove and the entrance to Ella Bay

These are discussed in detail below:

Flying Fish Point bypass

This area of road is considered to be lower or no risk. At the tunnel a fence and funnel strategy will direct cassowaries away from the road and tunnel entrance. The cassowaries will be able to move through this area unhindered. As a result there is no segregation of habitat. Loss of habitat arising from the road construction will be offset and the draft *Integrated Package of Regulated Offsets and Additional Environmental Investments* is under negotiation with government agencies.

Flying Fish Point to Heath Point

This area of road is considered to be higher risk. Two crossing points will be prepared for cassowaries. Speed cameras maybe appropriate, flashing warning lights and speeding alert signals as well as traffic slowing measures will be implemented. Education and Traffic slowing measures include speed restriction road humps and rutted road approaches to either side of the hump.

Heath Point to Little Cove

This area of road is considered to be lower risk. The road has very steep sides to it and has in places lots of bends and turns, which forces vehicles to slow down lowering the possibility of collision. It is difficult for cassowaries to access the road here due to the steepness of the sides. No fencing will be constructed as a result.



Little Cove and the entrance to Ella Bay

This area of road is considered to be higher risk. One crossing point will be constructed in this area.

This area will have traffic slowing measures including speed restriction road humps and rutted road approaches to either side of the hump.

These issues are discussed in further detail in *Getting to Ella Bay* (Volume 2, Section 2.1) and in the Consultant Report *Access Road Strategy* prepared by Environment North (refer to Volume 4, Appendix A.2.6).

1.3.6.3 Impact of Pastoral Activities versus Integrated Resort

The local Cassowary population has already adapted to the current Ella Bay situation and habitat degradation will be more of a long-term nature and more predictable in time and amplitude. It is arguable that the indicated adverse impacts from a continuing pastoral operation can be mitigated through the introduction of appropriate management regimes under the revised State Leasehold Land provision.

EIS reference: Volume 4, Section 4.7.1.2.3

Submitter reference: 2/52

E Bock (11), J Rainbird (CAFNEC) (20)

Proponent Response

Ella Bay farm is a freehold property, not leasehold. As freehold ownership includes an 'as of right' entitlement to agricultural activities within the property, there are few, if any, mitigation strategies that are assured of being enacted, outside the requirement for controlling pond apple. For example, there is no statutory obligation on the landowner to fence off the drainage lines or the remnant vegetation to prevent ongoing habitat degradation. In addition, while a permit is required to undertake further vegetation clearing, there is no obligation on the landowner to revegetate already cleared land or restore degraded habitat, or fence riparian corridors or Cassowary habitat to reduce cattle access.

The impacts of the two land use options at Ella Bay are discussed in detail in Volume II: Impact Assessment and Mitigation Strategies and comprise: Option A: developing the Ella Bay Integrated Resort (EBIR); Option B: continued pastoral use (EIS Volume 8, Appendix A.6.4). Les Moore (2006) found that while a number of mitigation strategies can be incorporated into the design and management of Option A, impacts resulting from the continued use of the Ella Bay Property as a pastoral property are not as easily addressed.

As the existing Ella Bay property is a freehold pastoral grazing property, clearing of non-remnant regrowth is an exempted practice for the landholder under the *Vegetation Management Act 1999* and *Vegetation Management Regulations*. The landholder could clear all the non-remnant vegetation on the property, resulting in a net loss of over 40 ha of regrowth between the north and south of the property (see *Landholders' Guide for Vegetation Clearing Applications*, 2006, Appendix 2, Table 1, published by Qld NRM.)

Currently the owner of the land can:

- fence the property;
- create dams;
- clear remnant vegetation for fire breaks and fencing;

- subdivide the property (under town planning laws) into 12-15 rural lots which would inevitably cause further impact, without the need for offsetting of those impacts. Dwellings and ancillary buildings would be able to be constructed pm all rural lots; and
- increase the production capacity of the existing agriculture base.

The impacts of the two land use options at Ella Bay are discussed in detail in Volume II: Impact Assessment and Mitigation Strategies and comprise: Option A: developing the Ella Bay Integrated Resort (EBIR); Option B: continued pastoral use. Moore did not consider another implication of continued pastoral use which is that a more intensive regime of pastoral use could occur on the site (as it is permissible under the law to carry out a more intensive regime). Ella Bay’s environment would potentially be worse off as a result of this third land use option.

Les Moore (2006) found that that the generic potential for impact is very similar both both of the investigated activities (i.e., 24.5% (Option A) compared to 23.0% (Option B)), although the nature of the specific impacts influencing the total outcomes differs markedly between the two (see figure 1.3.16). Moore’s comparison also does not take into account any positive management by the Proponent or possible rural intensification. While able to mitigate the on-site impacts to individual birds, the Cassowary impact assessment of the Ella Bay Site concluded that both land use options, i.e. continued pastoral land use and the Ella Bay Integrated Resort, pose threats to the Cassowary population of Seymour Range.

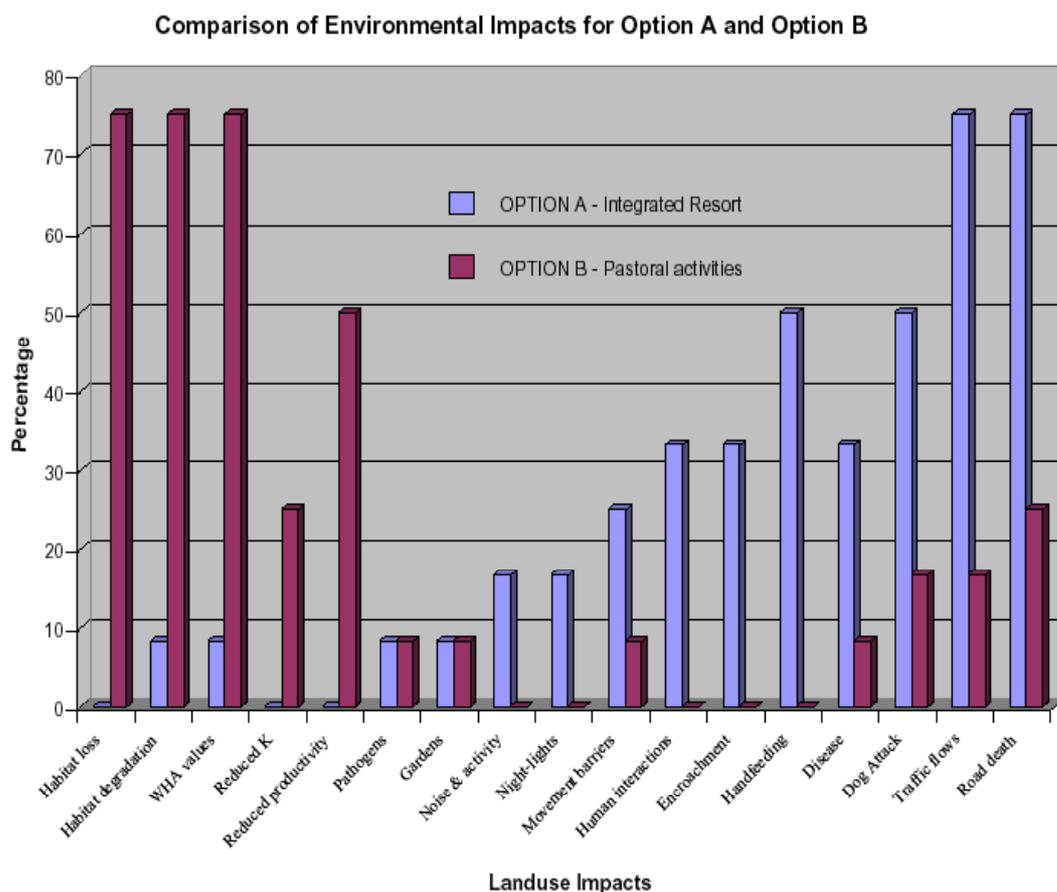


Figure 1.3.16: Land use impacts

Option A: Integrated Resort

It should be noted that the study of Option A was carried out before many of the mitigation measures outlined in this document were put in place.

The major impacts associated with Option A (EBIR) relate to the threats posed by increased traffic along Ella Bay Road and the concomitant flow-on impacts associated with a large permanent human population using the Ella Bay Property. Issues result from an increase in long-term human activity of the area, and the problems associated with Cassowary and human interactions.

These include negative interactions with humans, the potential for an increased use of the adjoining forests by residents and visitors, disease and movement barriers.

There are a number of strategies available to mitigate the major impacts within the development footprint. These include the provision of Cassowary-proof fencing, Cassowary road management strategies for the Ella Bay access road, effective land use planning, education of visitors and residents, and strict dog control strategies.

Option B: Pastoral Use

The major impacts identified with Option B relate to the continued degradation of all remnant vegetation within the boundaries of the cattle grazing property due to uncontrolled access by cattle. There is also concern regarding the incremental loss of 'Essential' and 'General' Cassowary habitat (*sensu* EPA 2004) within and adjoining the property due to cattle grazing and on-going farm management practices. The major issues resulting from Option B that potentially affect cassowaries at the Ella Bay Property result from the permanent decrease in both 'essential' and 'general' Cassowary habitat area and quality both on and adjoining the Ella Bay Property.

Cattle grazing and agricultural management practices will continue to degrade the remnant vegetation along drainage lines and the foreshore due to uncontrolled access by cattle. Similarly, the 300 metre-wide vegetated buffers of essential Cassowary habitat (*sensu* EPA 2004) adjoining the Ella Bay National Park on the northern and western boundaries of the property, are at considerable risk of attenuation or removal. Therefore, the ecological values of the adjacent World Heritage Area may be significantly reduced by the concomitant influences of degrading habitat, edge effect and weed invasion. A major impact is the continued exploitation and dispersal of declared weed species present on the property by cassowaries.

1.3.6.4 Education

Cassowaries should be an integral part of Ella Bay Master Planned Community including through education, facility design, fencing and public accessible natural areas.

EIS reference: Volume 4, Section 4.7.1.2.3

Submitter reference: 1/52

C Head & C Belbin (21)

Proponent Response

It is a strategic objective that Ella Bay community will be planned, built and operated based on the acceptance of the central importance protecting endangered species (including the Cassowary) and for those species to co-habit Ella Bay.

Welcome Centre as an educational resource

A key aspect of the proposed development will be to incorporate the education of residents and visitors to the area about the Cassowary. On entrance to the development, it is proposed that all visitors to the Township and resort will be inducted at the Welcome Centre, which will give staff the opportunity to explain rules, regulations and the importance of the Cassowary.

The induction process will include day visitors, people staying at the resorts and guests of residents as well as residents on their initial arrival. The Centre will comprise a key component of the arrival arrangements that visitors use to access Ella Bay. The traffic flow will be structured such that all new traffic will arrive near the Welcome Centre.

In addition to carrying out necessary administrative tasks, it is intended that the Welcome Centre will become a tourist attraction in its own right. Entertaining, informing and educating visitors will be a key objective. Achievement of this objective will be monitored and assessed using periodic surveys and interviews of residents and visitors. Key education objectives include:

- raising the awareness and profile of the Cassowary as an endangered species;
- exciting visitors, tourists and residents into wanting to save the Cassowary from extinction and becoming involved and committed;
- adopting educational strategies to help people understand and appreciate the unique nature of the Cassowary as an endangered species;
- educating people to understand the habits of the Cassowary, for example that they are active in the daytime and passive at night; and
- making sure that people in the Ella Bay Community do not feed, leave food or provide artificial water sources that attract cassowaries. For further details of the role of the Welcome Centre refer to Volume 2, Section 2.2.3.

A key objective of the induction and education process will be to provide comprehensive information on how to live safely with the Cassowary and to communicate the important differences about being in a unique eco-environment development. This is applicable whether people are simply visiting for the day, staying on holiday or living as a permanent resident.

Community Rules and Regulations

Ella Bay Township rules and regulations will be explained with regard to not feeding cassowaries or leaving food sources where they could attract cassowaries, not disturbing them and how to re-act if a person comes across a Cassowary.

All visitors will be made aware of the special arrangements in place for monitoring and managing the Cassowary using the Non Intrusive Management Scheme (NIMS) that provides monitoring and alerts. Visitors will be informed about how these monitoring and alert systems are employed. The NIMS would be designed to alert the staff at the Welcome Centre when and where a Cassowary has moved through a virtual access point located along the Site boundary. The system would be able to monitor and predict when and where the Cassowary is most likely to be within the Site itself. All visitors will be also be informed about the use of audible alarms to alert people when a Cassowary is moving through, for example, a part of the golf course or one of the greenways.

The Welcome Centre will be designed so that it has the potential to become a tourist site in itself, with the important opportunity to make the induction process as enjoyable and interesting as possible. This can be achieved in a number of ways, such as:

- providing a full interactive multimedia presentation on the Cassowary and other fauna and flora found at Ella Bay; and
- explaining, in an interesting and informative manner, what 'sustainability' means and how it is put into practice at Ella Bay.

Sustainable Development Institute

the proposed Sustainable Development Institute constitutes another key aspect of Cassowary awareness education within the proposed development. In December 2006, a Letter of Agreement between Ella Bay Development Pty Ltd and James Cook University and The University of Queensland to collaborate in the development of joint initiatives addressing both research and training and focused on the development of a sustainable town as well as reducing environmental impacts in the Ella Bay Proposal (see Volume 4, Appendix A.3.9). It is envisaged that this type of research program would fall within the responsibility of the Ella Bay Environmental Trust Fund.

A more detailed agreement is being planned with the aim of developing specific projects in priority areas, including research into management of the Cassowary. Both universities have expertise in vegetation and wildlife management and will be involved in designing and auditing mitigation solutions.

The resources and expertise brought together under this agreement will be well-placed to provide research and feedback on existing sustainability measures, while allowing for a process of continuous

improvement in best practice sustainable design. The Universities will be able to undertake collaborative research within the proposed Institute for Sustainable Development, and take on an audit role in monitoring, evaluating and continually improving measures of achieving the goal of sustainable development. It is intended that this research into sustainable development, including the Cassowary, and subsequent findings, will have flow-on effects into the Ella Bay community.

Research projects undertaken by University of Queensland and James Cook University are likely to be part of the off-set strategy (refer to Volume 4, Appendix A.3.9) and will potentially include:

- *Research Projects for Non Intrusive Tracking and Monitoring*

Research will be conducted into the effectiveness of these proximity alert and audible warning systems which, if successful could be used for other communities. The output of this and other types of research programs conducted at Ella Bay will have a positive ripple effect out to a wider community in Northern Queensland and beyond.

- *Experimental Trial and Research Project*

Experimental trials will be held to evaluate monitoring and management of the Cassowary. It is proposed that this will be done using a specially developed Non Intrusive Management Scheme (NIMS). This system alerts the Welcome Centre Operations Management when and where a Cassowary has entered a controlled access points under 'fauna friendly' bridges. These access points will be along the environmental corridors running north to south and east to west across the Ella Bay Development.

These controlled access points will be sited at strategic locations along the Development boundary fence. It is envisaged that the NIMS system will also predict where a Cassowary is most likely to travel to within the Site.

This trial will be conducted as part of a research program with the support of the Ella Bay Environmental Trust Fund. Its successful adoption will enable such a system to be introduced to other parts of Queensland to help manage and protect the Cassowary population.

The proposed development is designed to maximise Cassowary access to habitat, while minimising the interaction with humans. Natural areas will be made accessible to the public by providing designated walkways with educational signage to provide visitors and residents with an understanding of the Cassowary's natural habitat. An extensive fencing strategy has also been prepared (outlined in Volume 2, Section 2.2.9.3), as well as a proposal to include strategically placed signage warning visitors of the dangers of feeding or approaching cassowaries.

1.3.6.5 Dog Control

A number of concerns were received regarding the management of domestic animals. Concerns included:

- A)** Describe how dogs will be prohibited from the development and what actions would be taken by the body corporate or other means to enforce such measures.
- B)** The Authority considers it essential that dogs and cats are excluded from this property, including the construction phase. Mechanisms as to how such exclusions of domestic animals could be achieved require consideration.
- C)** Prohibiting cats and dogs from the site will help ensure the protection of the endangered Cassowary and its associated environs.

EIS reference: Volume 3, Section 3.4.4

Submitter reference: 4/52

J Dall (6), Environmental Protection Agency (45), Wet Tropics Management Authority (50), Department of the Environment and Water Resources (51)

Proponent Response

A detailed Pet Management Strategy has been prepared to address these concerns. This Strategy can also be found in Volume 2, Section 2.2.9.4.

The Pet Management Strategy will be implemented from the beginning of the construction phase. Further, it is intended that all pets will be prohibited from Ella Bay during the construction phase. Enforcement of this policy will be undertaken in co-operation with the Johnstone Shire Council.

The vision of the Proponent is to create a vibrant, sustainable and harmonious township, in which biodiversity and the natural environment is a significant priority. In order to achieve this, a rigorous pet control program is to be implemented and monitored.

Objectives

The Proponent has provided a Dog and Cat Management Strategy with the following objectives:

- To manage effectively domestic pet ownership and regulations so that the presence of domestic animals will result in minimal to no environmental impact.
- To ensure that the keeping of domestic animals does not have a negative impact on native fauna species populations, particularly the southern Cassowary population.
- To ensure accepted standards of animal welfare is maintained

Details

Cat ownership

Due to the difficulties in controlling cats, and the threat that they pose to the natural environment and native animal species, residents of the Ella Bay Township will not be entitled to own cats. Nor will cats be permitted on the site.

Dog ownership

The following dog ownership policies will apply:

- A permit must be obtained to own a dog within the Ella Bay Township.
- Dogs will not be allowed in units within the proposed development.
- Dogs will not be allowed in the proposed Ella Bay resort areas.
- It is proposed that Ella Bay as a community will support no more than 200 residential dog-permitted sites. The sites will be incorporated into a number of dog friendly residential precincts, each with extra security fencing which will also serve as cassowary fences. There is to be a maximum of one dog registered to each site.

Dogs on residential premises

The following policies regarding dogs within their owners' properties will apply:

- Dogs must be confined to the premises of the residential property of their owner by an electronic fence or a monitoring collar. An electronic fence or monitoring collar is defined as a fence or a collar that monitors the movement of a dog by notifying the owner, and site security and/or the Welcome Centre staff when the animal wearing the collar is beyond the boundary of the owner's property. The collar may be controlled manually by a person or automatically in a predetermined manner. This technology is available (Volume 4, Appendix A.3.8).

Dogs outside residential premises

Dog owners need to exercise their dogs, but this must be balanced against environmental considerations and the rights and safety of others. Different dog access designations are a reality of the modern open space planning environment, given the range of needs and priorities that need to be accommodated. The challenge is to provide adequate free running opportunities for owners and dogs, while ensuring that native species and the environment are suitably protected.

There are four options to consider in relation to dogs in public places

- 1 Dog-off-lead in all public places;
- 2 Dog-off-lead in all public places with designated areas where dogs are excluded and/or required to be on a lead;
- 3 Dog-on-lead in all public places; and
- 4 Dog-on-lead in all public places with designated areas where dogs are excluded and/or allowed off lead.

The RSPCA and the Lost Dogs Home both support Option 4, which has been adopted by the Proponent.

The following policies regarding dogs outside their owners' properties will apply:

- Dogs must be under the effective control of a person by means of a chain, cord or leash no longer than 3 metres:
 - in public open space except designated off leash area;
 - within five metres of a shared use path;
 - in all boardwalks, footpaths, streets, roads and public carparks;
 - at the beach, during the designated hours.
- Dogs are not permitted whether restrained or otherwise:
 - within five metres of any childrens playground or public barbecue;
 - in environmentally sensitive areas as designated by signs; and
 - at the beach, during designated hours.
- Dogs are permitted in designated off-leash areas provided they are under effective control of their owner. A dog is deemed to be under effective control of its owner if it will return to its owner upon command and if the owner retains a clear and unobstructed view of the dog.
- Designated dog-off-leash areas will be provided in the form of an off-leash park. These off-leash areas will be fenced in order to avoid any interaction with native wildlife, including the Southern Cassowary.
- Dog access to the beach areas will be tightly restricted, to between 6-8am and 8-10pm, with total exclusion from the beach during peak periods or during periods of animal nesting activity (yet to be determined).
- The removal of dog faeces is to be the responsibility of dog owner. Disposal units providing environmentally-friendly biodegradable bags will be provided in strategic locations throughout the proposed development including in the off-leash areas.

Monitoring and enforcement

Dog permit requirements

Residents of the Ella Bay Township will require a permit to own a dog within the proposed Ella Bay Township. In order to obtain a permit, a number of conditions must be met.

- All dogs must be registered and permanently identified with a microchip.
- All dogs must be de-sexed.
- All dogs must have an obedience certificate issued by a Government approved organisation.
- There will be a restricted dog species list which will prohibit the ownership of known aggressive, anti social or noisy breeds of dog.

- Evidence must be provided to ensure that all dogs have been vaccinated and are in good health.
- All dogs have accepted standard tick collars.

Infringements

Any failure to comply with the dog management policies outlined above, detected by employees, contractors, guests or residents of the Ella Bay community will be reported immediately to site security and/or the Welcome Centre staff. Discretions will also be reported to the Welcome Centre via the incident reporting system. The Welcome Centre staff will investigate the incident and suggest infringement penalties as appropriate.

The following enforcement measures will be undertaken:

- Heavy consequences, including fines and impoundment, will be incurred for dogs off-leash in non-designated off-leash areas. The detail of these penalties are to be arranged with the Johnstone Shire Council.
- Fines, to be arranged with the Johnstone Shire Council, will be incurred for failing to correctly dispose of dog faeces.
- Penalties will also be incurred for failing to comply with each of the policies listed above. These are to be determined in cooperation with the Johnstone Shire Council.

This strategy will form part of the Ella Bay Body Corporate rules and regulations.