Appendix A

Proposed Land Use Areas

Table 5: Proposed Land Use Areas

Landuse	Area (Hectares)	Lot Numbers Holiday/ Residential	Percentage of Total Area
Development Uses			
Marine Centre & Retail	2.50		0.21%
Boyne Channel Home Offices	2.30		0.20%
Hummock Hill Town Centre	3.40		0.29%
Conference Centre & Motel	4.70		0.40%
Airport Services	1.90		0.16%
Headland Resort Hotel	6.60		0.56%
Beach Front Tourist Hotel	6.40		0.55%
Tourist Park	10.00		0.85%
School Recreational Camp Ground	13.90		1.19%
Education Centre & Community Purpose	11.50		0.98%
Boyne Channel Apartments	5.70	160	0.49%
Golf Course Resort Apartments	4.40	160	0.38%
Headland Resort Apartments	2.40	85	0.20%
Beach Front Apartments	2.30	80	0.20%
Resort Town Apartments	2.30	90	0.20%
Village Town Houses	4.80	100	0.41%
Bushland Residential	23.50	195	2.01%
Lagoon Villas	16.60	136	1.42%
Riparian Eco Homesites	18.80	152	1.60%
Beachfront Holiday Homes	22.20	180	1.90%
Headland Holiday Homes	2.80	20	0.24%
Seaside Cottages	10.00	150	0.85%
Ridgetop Housing	36.50	277	3.12%
Hill Side Terraces	16.20	102	1.38%
Golf Course resort Homesites	23.40	155	2.00%
Sub Total	255.10	2,042	21.78%
Environmental			
Environmental Protection	580.		50.03%
Golf Course	95.2		8.30%
Town Park	0.4		0.03%
Green Space	194.		16.60%
Eco Parks	7.2		0.61%
Sub Total	876.8		75.57%
Services			
Airfield	28.80		2.46%
Waste Management	2.30		0.20%
Sub Total	31.10		2.65%
Total	**1,163.0**	**2,042**	

Appendix B

Development Program

Hummock Hill Island Development

Development Program

	No of Units	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Development Approvals		====== ====																			
Infrastructure																					
Access Road to the Island			===== ====																		
Bridge over Boyne Creek			===== ====	=====																	
Water Supply to the Island			====	=====																	
Waste Water Treatment Plant			====	=====																	
Power Supply				=====																	
Solid Waste Transfer Station				=====																	
Trans Island Boulevard and Services				====	=====																
Social Infrastructure																					
Colluseum Boat Ramp and Jetty					=====																
Beachside Picnic Parks					=====		=====		====												
Retail And Commercial Centre						=====			====				====				====				
Education Precinct																					
> Infants and primary School									====				====								
>Centre for Higher learning						=====															
Community Services																					
> Fire Station							=====														
>Police Station							=====														
>Ambulance Station							=====														
>Medical Centre							=====														
Boyne Channel Marine Centre and Boat Ramp								===== ====													
Boyne Channel Home Offices									===== ====												
Airport							====														
Tourist Park							===== ====														
School Recreational Camping Ground							===== ====														
Golf Course									===== ====	===== ====											
Resort and Residential Development																					
Headland Resort Hotel	150 rooms			====	===== ====																
Headland Resort Apartments	85				===== ====																
Headland Holiday Homes	20			=====																	
Beach Front Holiday Homes	180				===== ====		===== ====		===== ====												
Beach front Apartments	80					===== ====															
Seaside Cottages	150							===== ====		===== ====											
Ridgetop Houses	277		===== ====			===== ====		===== ====		===== ====											
Hill Side Terraces	102											===== ====		===== ====							
Lagoon Villas	136				===== ====	===== ====															
Riparian Eco Houses	152						===== ====		===== ====		===== ====										
Bushland Residential	195														===== ====		===== ====		===== ====		
Resort Town Apartments	90					===== ====		===== ====													
Resort Village Townhouses	100									===== ====		===== ====									
Golf Course Resort Homesites	155													===== ====		===== ====		===== ====			===== ====
Golf Course Resort Apartments	160									===== ====		===== ====									
Boyne Channel Apartments	160													===== ====		===== ====					
Beachfront Tourist Hotel	150														===== ====						
Conference Centre and Motel	50																		===== ====		

Population	**Units**																				
Headland Resort Hotel	150					180															
Headland Resort Apartments	85					45		45		45											
Headland Holiday Homes	20			40																	
Beach Front Holiday Homes	180					120		120		120											
Beach front Apartments	80				27		27		27		27		27		27						
Seaside Cottages	150								120		120										
Ridgetop Houses	277				121		121		121		121				121		121		121		121
Hill Side Terraces	102												71		71						
Lagoon Villas	136					109	109														
Riparian Eco Houses	152							89		89		89									
Bushland Residential	195															114		114		114	
Resort Town Apartments	90						72		72												
Resort Village Townhouses	100										80		80								
Golf Course Resort Homesites	155														68		68		68		68
Golf Course Resort Apartments	160										128		128								
Boyne Channel Apartments	160														128		128				
Beachfront Tourist Hotel	150															180					
Conference Centre and Motel	50																			60	
Tourist Park	100							160													
Tourist					87		340 154	178	250 154	219	150	315	44	230		221	237	159	57	95	117 95
					87	87	427 581	759 759	1,008 1,162	1,382 1,382	1,531 1,531	1,847 1,847	1,891 1,891	2,121 2,121	2,121 2,121	2,342 2,342	2,579 2,579	2,737 2,737	2,794 2,794	2,889 2,889	3,006 3,100
Permanent				40	61		114	151	104	121	104	161	44	76		194	57	159	57	95	57 95
				40	101	101	215 215	366 366	470 470	591 591	695 695	856 856	900 900	976 976	976 976	1,170 1,170	1,227 1,227	1,385 1,385	1,442 1,442	1,537 1,537	1,594 1,688
Total				40	148		454	329	414	340	254	476	89	306		415	294	317	114	189	174 189
				40	188	188	642 642	971 971	1,385 1,385	1,724 1,724	1,978 1,978	2,454 2,454	2,543 2,543	2,849 2,849	2,849 2,849	3,264 3,264	3,558 3,558	3,875 3,875	3,989 3,989	4,178 4,178	4,351 4,540

Appendix C

State Government Policy Issues

C1 State Coastal Management Plan

The State Coastal Management Plan (SCMP) describes how Queensland's coastal zone is to be managed. The plan seeks to provide ways to protect and manage Queensland's coastal resources to benefit all Queenslanders.

A Regional Coastal Management Plan has not been developed for the Wide Bay-Burnett Region.

The SCMP balances the natural, cultural, economic and social significance of Queensland's coast in a sustainable manner. It does this by recognising both opportunities and threats to sustainable use of the coastal zone.

The SCMP recognises the social and economic value of the coastal zone for tourism and recreation related development and seeks to maintain and enhance access to the coast. In relation to coastal settlements, the SCMP identifies the need for these to be sustainable and well located. In particular, the SCMP seeks to control development of the coastal zone in a way that avoids direct and indirect disturbance of the coastal resources which, in themselves, underlie the success of tourism and recreational development of the coast. The proposed development at Hummock Hill Island is based on development principles that recognise these inter-relationships.

Section 2.1.2 of the SCMP is particularly relevant to the proposed development and states that, "to the extent practicable" coastal resources should be preserved in a natural or non-urban state. The words "to the extent practicable" were incorporated to reflect decisions made regarding coastal development that predated the plan. The tourism and residential development at Hummock Hill Island has been recognised for nearly two decades, and predates both the *Coastal Protection and Management Act 1993* and the SCMP. Successive development leases have been issued over the site since 1991. In mid 1990's, Miriam Vale Shire Council issued development approval for around 5,000 lots, a marina, 2 golf courses and hotel/convention centre, There is a clear precedent for this type of development on the island, and in fact, the currently proposed development represents a significant reduction in scale from previous proposals which have also included a rocket launching facility and industrial park centred on space industries.

Development of Hummock Hill Island will not result in pressure for additional development along adjacent coastal areas (which have not previously been identified for development) and is readily containable. Immediately north of the island is Wild Cattle Island, most of which is national park. The adjacent mainland coastal areas south and west of Hummock Hill Island are not suitable for coastal development, being mangroves, salt marsh and mudflats, being subject to inundation and offering little or no residential amenity. The proposed development at Hummock Hill Island is not inconsistent with the policy which aims to avoid proliferation of urban development at the expense of coastal and marine ecosystems.

The development principles identified for the project include protection of coastal resources including coastal ecosystems and drainage patterns. The only works proposed to take place below HAT or in are the bridge crossing and one or two boat ramps. These are to be located in sheltered waters. No development is to take place in the designated erosion prone areas along the exposed northern coastline.

A coastal buffer strip is to be maintained around the island with controlled access to the beach to prevent destabilisation of remnant coastal dunes. Endangered regional ecosystems are to be protected, whether these are "coastal" (eg dune systems with littoral vine forest) or otherwise (eg poplar box).

Indirect impacts to the coastal zone and coastal/marine ecosystems are to be managed through careful planning and design. In particular, management of water

supply, stormwater and wastewater will be such that there are no significant changes to quality or quantity of water released into coastal ecosystems or shallow groundwater aquifers. Water sensitive urban design is to be incorporated into the development.

Section 2.8.1 of the SCMP stipulates that Urban and other development should not take place in areas of State Significance. The only area of state significance directly affected by the project is the Great Barrier Reef WHA. The EIS will need to assess the potential for the development to impact on the values for which the WHA was proscribed. A preliminary assessment has been undertaken and is included in Appendix B.

Similarly, the proposed lease is adjacent to the Great Barrier Reef Marine Park and while direct impacts on the Marine Park are limited to construction of a bridge and two boat ramps, the EIS will also need to demonstrate that the proposed development will not have any indirect impacts on the ecosystems protected by that park.

Measures already incorporated into the project to minimise impacts on coastal and aquatic ecosystems include:

- Maintenance of a coastal buffer zone of at least 100m along sandy coastlines and 40m on rocky coastlines. Where remnant dune systems with vine forest exist along the coastline, these will be retained.
- No clearing of mangroves except for at the bridge/boat ramp where no more than 10 mangroves are expected to require trimming or clearing.
- Recycling and ultimate land disposal of treated wastewater. Land disposal will be in accordance with Queensland EPA guidelines and will be such that nutrient rich runoff does not occur.

It is acknowledged that the ability of the proposed development to comply with the State Coastal Management Plan will need to be comprehensively addressed in the EIS. EIS investigations may identify further measures to ensure that aquatic and coastal ecosystems are not impacted on.

C2 Regional Growth Management Frameworks

Hummock Hill Island lies on the northern boundary of the Wide Bay regional planning area, immediately adjacent to the Central Queensland regional planning area. Its proximity to Gladstone, as the major urban and industrial centre of Central Queensland means that development patterns and pressures in the northern part of Miriam Vale Shire tends to be influenced more by Gladstone and the Central Queensland region than by the Wide Bay region. In particular, Hummock Hill Island and other localities in the far north of Miriam Vale are closely aligned to the Gladstone and Calliope subregion of Central Queensland.

On this basis, the proposed development will be examined against both the Wide Bay 2020 RGMF and the Central Queensland a New Millennium RGMF.

The Wide Bay 2020 RGMF sets out a vision for the region. This vision centres on enhancing lifestyles in the Wide Bay region through the attractions of the natural environment and a robust regional economy.

The three key components to the vision of the region in 2020 are:

1 Natural resource management, including development according to the principles of Ecologically Sustainable Development, safeguarding of ecological values and biodiversity and wise use of natural resources to underpin the region's prosperity.

2. People and settlement reflecting best practice in urban development, harmony with natural systems and lifestyle choices. Efficient access to services across the community, including rural communities is highlighted as is location and design of new residential development to minimise environmental impacts and maximise opportunities to take advantage of potential energy savings relating to the region's climate.

3. The region's economy is linked to a healthy environment, and retains agriculture as a key contributor. Transport and communication innovations are in place to minimise disadvantages of the region's remoteness from major centres and economic development is based on the region's competitive advantages. Higher education and targeted training opportunities underpin economic growth and stability.

The proposed residential development at Hummock Hill Island will contribute to this vision:

- The development is intended to be in harmony with the natural environment and showcase innovative urban and residential design in relation to energy and water consumption as well as protection of ecosystems.
- There will be a diverse community with a range of lifestyle options available. Employment opportunities will underpin the proposed development, particularly in relation to tourism and recreation. The proposed learning centre will enhance educational opportunities available within the Wide Bay region.
- The proposed development takes maximum advantage of its coastal location and environmental setting to encourage people to live on and visit Hummock Hill Island. The proposed level of development can be achieved without detracting from the natural resources or ecological values that will, in themselves, attract visitors to the region. The coastal location and associated lifestyle benefits is an important attraction for residents and visitors and also allows building designs to take advantage of the cooler coastal climate.
- Hummock Hill Island is not considered to be viable for agricultural uses, and its development for residential and tourism uses does not detract from the central role of agriculture in the region's economy.
- In spite of its remote location, Hummock Hill Island can be developed without undue demands on existing infrastructure and community services. The proposed development will have a large enough population to be self sufficient with regard to basic services. It is also close enough by road to Gladstone to allow residents to travel to Gladstone for specialist services.

- There are a number of other residential developments occurring or proposed in northern Miriam Vale Shire and southern Calliope Shire. These include residential subdivisions at Turkey Beach and "Foreshores" estate. Services and recreational opportunities provided at Hummock Hill Island may contribute to the lifestyles in these developments.
- Infrastructure will be installed by the proponent in accordance with the Development Lease conditions. Ongoing maintenance will be funded through rates and development charges from residents. Renewable energy and water recycling will be maximised in the development to reduce the dependence on external services such as water and power. The Proponent will consider dedicating a primary school site on Hummock Hill Island or the mainland to services the growing population in the north of Miriam Vale Shire and south of Calliope Shire.

Analysis of Wide Bay 2020 will be undertaken in the Development Approval documentation. Where necessary, the master plan for Hummock Hill Island will be amended to ensure that the proposed development aligns with, and contributes to the strategic directions set out in Wide Bay 2020.

The vision statement for the Central Queensland A New Millennium RGMF centres on the industrial core of the region and the opportunities presented by this:

> *Central Queensland aspires to be the most diverse and prosperous region in Australia.*
>
> *This will be achieved by economic growth that is ecologically sustainable and where people and industry work in harmony with the environment for the benefit of both present and future generations whilst respecting the diversity of our past.*

Central Queensland A New Millennium has six key policy areas with guiding principles as shown in Table 6.

Table 6 Central Queensland – A New Millennium Guiding Principles

Policy Area	Guiding Principle	Response
Resource use, conservation and management	The allocation, use and management of the natural resources of Central Queensland shall be in accordance with the principles of ecologically sustainable development and shall be undertaken through the processes of integrated catchment management.	Water supply and management will maximise sustainable harvesting and reuse and minimise dependence on mainland surface water resources. Impacts on ecological resources will be minimised through avoidance of direct disturbance of all significant natural resources, and management of indirect impacts.
Economic development	Viable, environmentally sustainable economic growth and development takes place	The proposed development provides a tourism, recreational and residential focal point for the region that currently

Policy Area	Guiding Principle	Response
	through the recognition, protection and promotion of the region's competitive advantage, support of existing industries, diversification and the identification and encouragement of new economic opportunities.	only exists at Yeppoon in the far north of the region. The development will support and balance industrial development at Gladstone and mining development in inland areas by providing temporary and permanent accommodation. Attraction of visitors and residents from outside the region will be enhanced by the tourism and recreational opportunities and those already living in the region will also benefit as these opportunities are currently very limited in the Gladstone/Central Queensland area.
Infrastructure	The region's infrastructure shall be developed to anticipate the long term needs of communities and industries, regional prosperity and wellbeing, community vitality and ecological sustainability	The proposed development will not undermine any of the major infrastructure items that support industrial development in Gladstone. The proposed development will be fully self supporting with respect to infrastructure provision and maintenance.
Social and cultural development	Social and cultural fabric and vitality of the community that is underpinned by sound, ethically based planning, institutional support and investment that recognises the past, embraces the present and prepares for the future.	The proposed Hummock Hill Island development is centred on creating a viable and diverse community that includes a mix of local and non-local tourist attractions, holiday home and residential opportunities and recreational activities. The entire Hummock Hill Island development will be master planned to ensure consistent standards, compatibility and appropriate levels and types of development.
Education, training and research	The promotion of a climate of culture and learning in which Central Queensland strives for equity access to emerging technologies, knowledge, information and associated infrastructure which underpin the region's capacity for effective decision making, innovation and competitiveness.	An educational facility is the key focus of the proposed town centre. Discussions are underway with several organisations to position the educational facility to support growth and development goals for Central Queensland.

Policy Area	Guiding Principle	Response
Planning and governance	Planning and governance systems in the region recognise the uniqueness and diversity of the individual communities of Central Queensland, and are underpinned by the principles of participation, collaboration, intergovernmental cooperation, equity, accountability, integrity, ethics and transparency.	Not directly applicable.

C3 Vegetation Clearing

Development Approval applications for Material Change of Use that require clearing of remnant native vegetation must be referred to Department of Natural Resources and Mines (NRM) as a Concurrence Agency. NRM has developed a policy for assessment of such applications, being the *Concurrence Agency Policy for Material Change of Use* (June 2005).

Part A of the policy applies to non-urban land.

For endangered and of concern regional ecosystems, the policy requires these to be conserved unless:

- A project is declared to be a significant project under the State Development and Public Works Organisation Act 1971
- Essential community infrastructure for which there is no suitable alternative site for meeting the community need for essential community infrastructure
- An extractive industry in a resource processing area or key transport route in a Key Resource Area
- An MCU from a rural to environmental use.

For not of concern regional ecosystems, in addition to the exemptions above, vegetation may be cleared for an MCU that involves establishing necessary built infrastructure.

Where assessment of the proposed Hummock Hill Island development takes place under the *State Development and Public Works Organisation Act 1971*, the policy allows clearing of any remnant vegetation. However, the proponent is committed to meeting the performance requirements for vegetation clearing set out in Part A2 of the policy.

Without providing a detailed analysis of performance of the project against these performance requirements, the following points are made to demonstrate that an acceptable level of performance can be achieved:

- The site has been surveyed and areas of remnant ecosystems that are endangered and of concern have been mapped at a 1:10,000 scale.
- The master plan for the development has been adjusted to ensure that the development footprint avoids endangered or of concern regional ecosystems as far as possible and clearing will only occur where necessary to provide infrastructure connections, for example where a road needs to pass through an area of endangered or of concern vegetation to link together development on either side of that area.
- Existing tracks through these ecosystems will be used where access is required.
- Not of concern regional ecosystems will also be preserved as far as possible within the development footprint by minimising clearing for buildings on individual lots and providing vegetated areas between areas of residential development.
- The proponent is interested in pursuing means by which to ensure the long term conservation of remnant endangered and of concern vegetation on Hummock Hill Island.
- There are no natural wetlands, lakes and springs within 50 metres of the development footprint. There are also no natural streams within the meaning of the policy.
- Clearing of any trees in discharge areas at the toe of slopes will be avoided as far as possible. Vegetation will be retained in areas potentially subject to salinisation and waterlogging.
- Vegetation will be retained on steeper slopes and areas of dispersible soils. An Erosion and Sediment Control Plan will be developed for the site development phase with an emphasis on reinstating all disturbed surfaces as quickly as possible with suitable treatments to prevent long term erosion while also maintaining the natural ecosystem as closely as possible.
- Disturbance of acid sulfate soils will be minimal and will be managed through an Acid Sulfate Soil Management Plan, with strategic reburial the preferred management method, followed by neutralisation.
- Connectivity of vegetation to be retained will be maintained to allow movement of the types of animals that inhabit Hummock Hill Island to occur. Note that Hummock Hill Island is not in itself an important wildlife corridor link as the island is permanently separated from the mainland by water. Fauna on the island is largely birds and larger mammal and terrestrial reptile species such as kangaroos and wallabies that have been able to cross the causeway at very low tides.

C4 Environmental Protection Policies

Four Environmental Protection Policies have been declared under the *Environmental Protection Act 1994*:

- *Environmental Protection (Air) Policy 1997*
- *Environmental Protection (Noise) Policy 1997*
- *Environmental Protection (Water) Policy 1997*
- *Environmental Protection (Waste Management) Policy 2000*.

Among other things, these policies set out the ambient environmental quality requirements for management of air, noise and water components of the environment and the strategic approach to management of waste in Queensland.

For the proposed Hummock Hill Island development, the proponent will require Environmental Authorities to operate water and wastewater treatment systems. In assessing a Development Approval application for these Environmental Authorities, the EPA will consider whether the conduct of these activities will comply with the Policies, and in particular, whether the environmental values identified in the policies can be maintained.

Appendix D

Draft Terms of Reference for Environmental Impact Statement

Hummock Hill Island Development
East Wing Corporation

ABN 79 000 155 591

TERMS OF REFERENCE

-
- November 2005

Contents

Document history and status

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1. Introduction

1.1 The Proposal

East Wing Corporation holds a development lease over approximately 1,200 hectares of land on Hummock Hill Island, located in Rodds Bay in the north east of Miriam Vale Shire. The Island is 30km south of Gladstone and 500km north of Brisbane. The Development Lease was issued by DNRM in March 2005 and covers about 40% of the total land area of the island.

Figure 1 Hummock Hill Island

East Wing Corporation proposes to develop an ecological community of approximately 4,000 people within this lease. The natural values of the island make it an attractive location for such a development, provided that the development is consistent with these values and fits within the natural constraints and opportunities offered by Hummock Hill Island.

The conceptual framework for the community is based on living in harmony with natural systems and residents will take responsibility for managing their own ecological footprints. Management of water, wastewater and energy supply services will be based at the household and local community levels, taking advantage of a number of innovative technologies that are now being applied successfully at this level. Householders attracted by the natural values of the Island and its surrounds will be committed to conducting their own activities to ensure protection of these values and the 21st Century village will provide the infrastructure systems to allow this to happen.

A community of about 4,350 people, and a development offering a range of lifestyles and residential options will allow diverse and dynamic social systems to develop, providing the social cohesion and support recognised as being increasingly important to quality of life in the 21st Century village.

The proposed Hummock Hill Island community comprises the following components:

- 1550 residential allotments
- 181 residential units
- 200 room Hotel

- 40 Condos
- Education Campus
- Town Centre
- Airport for light aircraft
- 18 hole golf course with associated clubhouse
- Village centre
- Marine centre with boat ramp

The Master Planning approach, to ensuring sympathy and harmony with the natural environment, proposes a number of different development "units" which provide a combination of high, medium and lower density development and various recreational, educational and commercial activity centres which can be arranged to fit with the natural environmental features. The final location of each of these units is flexible and will be determined once mapping of vegetation, drainage systems and soils is complete.

For Hummock Hill Island, a comprehensive set of controls and guidelines for living within the natural environment will be produced. These are likely to include:

- Building envelopes on larger lots requiring retention of vegetation outside the area designated for construction of houses, outbuildings and access
- Conservation covenants or similar controls over land of high conservation significance
- Guidelines advising on preferred landscaping species and maintenance of remnant vegetation on and adjacent to residential lots.

Access to the Island is from Turkey Beach Road, Foreshores Road and Clarke's Road with a causeway to the island. Access will require some upgrading of existing roads and a gateway entry bridge at the southern end of the island is proposed in the Master Plan and is a requirement of the lease. Near the bridge are the Village and Marine Centres and close access to the golf course. The Town Centre forms the northern hub in the community with the Education Campus and the Hotel.

Major environmental impacts of residential development are typically associated with water and energy consumption and waste generation. The underlying intent for infrastructure and facilities for these services will be to maximise self sufficiency at the household, community and Island level, with as little dependence on outside sources as possible. Contingencies would be available for drought periods and emergencies such as fire fighting. Some of the key concepts to be explored further in the master planning and infrastructure planning include:

- Water sensitive urban design, which recognises the importance of managing the entire water cycle in urban areas to maintain water quality and other environmental values
- Harvesting of stormwater, particularly through roof top catchments
- Water reuse and recycling at household, community and Island level

- Other water supply options
- Renewable energy, including household based solar energy and wind turbines (preferably with grid connection to allow back up power and also sale of surplus to the grid)
- Lower impact sources of energy such as natural gas or LPG
- Waste avoidance practices, waste reuse and recycling activities both on and off the island.

Infrastructure alignments would typically follow existing roads. Underground power transmission will minimise visual impact.

1.2 About these Terms of Reference

The draft Terms of Reference (ToR) are for the Hummock Hill Island Community Development, and relate to the assessment of the impacts on the environment of the proposals as described in this document.

The ToR have been compiled for compliance with the Queensland *State Development and Public Works Act 19719?*. Reference was also made to the *Generic Terms of Reference for EIS Studies (EPA 2002)*.

The objective of the legislation is to ensure that matters affecting the environment to a significant extent are fully examined and take into account decisions by the Commonwealth and Queensland Governments.

In these ToR, the term 'environment' refers to all aspects of the surroundings of human beings, whether affecting human beings as individuals or in social groupings, including:

a) Ecosystems and their constituent parts, including people and communities;

b) All natural and physical resources;

c) The qualities and characteristics of locations, places and areas, however large or small, that contribute to their biological diversity and integrity, intrinsic or attributed scientific value or interest, amenity, harmony and sense of community; and

d) The social, economic, aesthetic and cultural conditions that affect, or affected by, things mentioned in items (a) to (c).

In preparing the EIS, the proponent should be cognisant of the following aims of the EIS and public review process:

- To provide a source of information from which interested individuals or groups may gain an understanding of the proposal, the need for the proposal, the alternatives, the environment which it would affect, the impacts that may occur and the measures to be taken to minimise these impacts;
- To provide a forum for public consultation and informed comment on the proposal;
- To provide a framework in which decision-makers can consider the environmental aspects of the proposal in parallel with economic, technical and other factors.

The ToR describes those matters which are to be addressed in the EIS. The EIS document should give priority to the major issues associated with the proposal. Matters of lesser concern should be dealt with only to the extent required to demonstrate the matter has been adequately considered and addressed.

It is envisaged that the EIS will be based on the results of available research, studies and data, with further studies being conducted where necessary or practicable. The extent to which any limitations of available information may frustrate the conclusions of the environmental assessment should be discussed.

In this ToR, the terms "description" and "discussion" should be taken to include both quantitative and qualitative matters and be practicable and meaningful. Similarly, adverse and beneficial effects should be presented in quantitative and/or qualitative terms as appropriate.

The main text of the EIS should be written in clear, concise style that is easily understood by the general reader. Technical jargon should be avoided wherever possible. Detailed technical information necessary to support the main text should be included as appendices issued with the EIS, so that the document is complete and self-contained. Cross-referencing should be used to avoid unnecessary duplication of text, but needs to be cross-checked for accuracy.

Where appendices include results of studies conducted in preparing the EIS, the public availability of the studies should be indicated.

The EIS must cite references and a list of individuals and organisations consulted during the preparation. Relevant maps and illustrations should also be included, but the cost of the Draft EIS to the public should be minimised by using black and white figures wherever possible.

Once finalised, copies (number to be advised) of the EIS should be lodged with the relevant Government authorities for distribution to advisory bodies for comment and review during the public review period. A quantity of the EIS should also be prepared for distribution to relevant libraries. The EIS documents should be made available in CDRom format, however, a quantity of hard copy documents should also be produced. The document should be made available for viewing over the Internet. Further advice on arrangements for public review will be provided closer to the date.

While every attempt has been made to ensure that this ToR addresses all the major issues associated with the proposal, they are not necessarily exhaustive and should be interpreted as excluding from consideration matters deemed to be significant but not incorporated in them or matters (currently unforeseen) that emerge as important or significant from environmental studies, or otherwise, during the course of preparation of the EIS.

2. EIS Overview

The EIS needs to include:

1. Executive Summary
2. Table of Contents
3. Introduction, providing a clear and specific description of the Proposal and EIS process, including construction and operational aspects
4. Proposal Justification including discussion of alternatives and demonstration of need and demand
5. Planning and approvals framework
6. Description of existing physical, biological and social environmental features
7. Assessment of the likely impact of the proposal on the existing features, including proposed mitigation measures;
8. Details of public involvement and consultation programs, including a list of advisory agencies consulted or otherwise involved
9. Conclusion and recommendations
10. Supporting information including References and bibliography; Glossary, abbreviations and units used in the text
11. Appendices, including the finalised ToR, technical studies and results.
12. An outline of the proposed Environmental Management Plan (EMP) for construction and operation, with the ability for the EMP to exist as a stand alone document

3. EIS Executive Summary

The EIS should include a concise Executive Summary of the matters discussed in the main body of the document, to allow the reader to obtain a clear understanding of the proposal and its environmental implications. The Executive Summary should generally follow the format of the EIS and should enable the reader to quickly gain a general understanding of:

- The proposal;
- The legislation under which the proposal is to be assessed
- Natural environmental values of the lease area;
- Potential environmental impacts;
- Proposed environmental protection measures and safeguards;
- Community attitudes;
- Stakeholder engagement; and
- Environmental Management and Monitoring Procedures.

This section is to be prepared in a format which allows it to be separated from the body of the main EIS. It should be sufficiently comprehensive so that it can be read as a stand-alone document. The writing style is to be aimed at a level understood by a general reader.

Maps and figures should be included to the extent that they clarify matters raised in the text.

4. Introduction

The Introduction to the EIS should provide:

- Details of the proponent and any joint venture partners
- A clear definition of the proposal and its objectives
- A clear definition of the study area and regional setting for the proposal (physical, biological, social and built environment), with maps to illustrate as appropriate
- A brief explanation of the scope, structure, process and legislative basis for the EIS.
- A brief description of studies/surveys/consultations (including the identification of baseline data collection requirements) conducted in developing the proposal and preparing the EIS.
- A description of the public notification requirements for the Proposal and the means by which public submissions may be made.

4.1 Project Definition

This section should describe the proposal in sufficient detail to allow the reader to gain an understanding of all stages of the proposal, and assist in determining environmental impacts associated with the proposal.

The description should include the use of aerial photographs, maps, figures and diagrams (with a scale), where appropriate. Reference should be made to detailed technical information in appendices, where relevant.

4.1.1 The Site

A brief overview of the project site should be presented, showing existing natural and human made features (including existing infrastructure and improvements) and relevant named locations. Maps should be included as necessary to illustrate the site.

Site context should also be discussed in terms of distances from nearby towns and urban centres and other key locations of the region.

4.1.2 Land Tenure

Land tenure of the site should be described, including any conditions on leases and other relevant information.

Describe the Native Title status of the site.

4.1.3 Overall Development

A description of the overall concept and development plans should be provided, including details on the following matters, with appropriate illustrations:

- The overall concept plan;

- The proposed Master Plan layout described in words and plans, illustrating all the components;
- Expected resident and visitor population including day visitors and overnight stays;
- Accessibility and transportation systems and networks, including roads, footpaths, cycle paths, buggy paths and equestrian paths;
- Provisions for visually and mobility impaired people;
- Landscaping and reinstatement of disturbed areas;
- Details of fuels and other chemicals stored and/or used including quantity, chemical characteristics and classifications and storage requirements;
- Methods for protecting environmental values within the overall development site and surrounding areas;
- Provision of infrastructure and essential services, including anticipated demand for infrastructure and essential services (including water, power, roads, telecommunications, waste) during construction and operation;
- Provision of community infrastructure and services in the public and private sectors, including commercial facilities, recreational, education and health services;
- Potential revenue (direct and indirect) to investors, developers, contractors, local and State governments and other parties from construction and operation;
- Development and construction schedule;
- Anticipated direct employment opportunities during construction and operation;
- Construction techniques and issues;
- Decommissioning and rehabilitation
- Estimates of operations staff (permanent and temporary and dependants), contractors, movements, travel arrangements, composition, expected sources and local availability of employees.

4.1.4 Residential Development

A description of the concept and development plans for the Residential Development component should be provided, including details on the following matters, with appropriate illustrations:

- The proposed layout of the residential development components, described in words and plans;
- Specific characteristics and attributes of the residential and associated open space precincts, including:
  - Proposed facilities, buildings and other constructed features, including identification of those available for public access;
  - Building parameters and restrictions, architectural and urban design features, natural hazard design parameters;
  - Capacity and/or proposed densities;

- Access and parking;
- Crime Prevention Through Urban Design measures
- Proposed land tenure of each precinct.

4.1.5 Hotel

Specific characteristics and attributes of the hotel including:

- Proposed hotel facilities, building type and other constructed features, including identification of those available for public access;
- Building parameters and restrictions, such as height, architectural and urban design features, natural hazard design parameters;
- Capacity (for example, type and number of rooms);
- Hours of operation;
- Access and parking;
- Proposed land tenure and/or management of the hotel;

4.1.6 Golf Course

Specific characteristics and attributes of the golf course, including:

- Construction earthworks and ongoing maintenance requirements;
- Building parameters and restrictions, architectural and urban design features and role of the proposed club house, natural hazard design parameters
- Hours of operation (where relevant)
- Proposed management and membership structure
- Golf course operation, including irrigation, pest management and fertilisation.

4.1.7 Town and Village Centres

Specific characteristics and attributes of the commercial components, including:

- Intended role of and relationship between the town and village centres;
- Proposed facilities, buildings and other constructed features, including identification of those available for public access;
- Proposed gross floor area and tenancy mix;
- Building parameters and restrictions, architectural and urban design features, natural hazard design parameters;
- Hours of operation (where relevant);
- Crime Prevention Through Urban Design measures
- Access and parking; and
- Proposed land tenure and/or management of each centre.

4.1.8 Education Campus

The design, construction and operation of the Education Campus should be discussed, including:

- Location and layout of the campus;
- Likely range of activities to be carried out;
- Organisations involved in activities, links with similar facilities elsewhere in Australia and internationally;
- Description of the Education Campus, including:
  - Proposed facilities, buildings and other constructed features, including identification of those available for public access
  - Building parameters and restrictions, architectural and urban design features, natural hazard design parameters
  - Capacity
  - Hours of operation
  - Access and parking
  - Proposed land tenure
  - Access for mobility and visually impaired people
  - Landscaping and reinstatement of disturbed areas
- Methods for protecting environmental values within the Campus and surrounding areas
- Decommissioning and rehabilitation
- Estimates of operations staff (permanent and temporary and dependants), contractors, movements, travel arrangements, composition, expected sources and local availability of employees.

4.2 Infrastructure and Essential Services

Describe and discuss each for construction and operation:

- Water supply, including source, distribution and anticipated demand and provisions for ongoing management and maintenance and demand management
- Electrical power supply, including source/generation and anticipated demand and provisions for ongoing management and maintenance
- Wastewater collection, treatment and disposal, including estimated quality and quantity of wastewater generated
- Telecommunications including means of supply and anticipated demand
- Solid waste generation, including estimated quantity and likely composition
- Solid waste management including reduction, reuse, recycling, treatment and disposal
- Hazardous waste generation, including estimated quantity and likely composition

- Hazardous waste management including reduction, reuse, recycling and treatment and disposal
- Access to the island, including links with regional arterial roads and bridge connecting the Island with the mainland
- Access within the island including road designs and cross sections, intended traffic levels, road surfaces
- Road network and traffic management including provisions for ongoing management and maintenance
- Drainage and stormwater management including provisions for ongoing management and maintenance
- Management of parks, public open space and public facilities such as picnic areas, car parks and beach access
- Management of weeds and pests, including biting insects.

4.3 Construction Requirements

This section should describe the construction of each component of the Proposal and associated facilities, including:

- Size, source and control of the construction workforce, accommodation and safety requirements
- Transport infrastructure requirements for construction and transportation/ material logistics
- Materials fabrication works (eg concrete batching plants), details of air, water and waste emissions
- Construction standards, techniques, and Project management, including construction staging, if appropriate
- The sources, quantities, transport and storage of construction materials on and off-site.
- The nature, scale and timings for earthworks, including any borrow pit or quarry requirements (and the potential to disturb acid sulfate soils)
- The nature, scale and timings for vegetation clearance, with cross-references to the vegetation types
- Any near shore operations, including need for dredging, and construction of any marine support facilities
- An outline of overall environmental site management arrangements (dust and other air emissions, noise, runoff, erosion, earth stabilisation, aquifer dewatering, acid sulfate soils, spills, fire, disposal of wastes both on and off the island, effluent, heritage and cultural sites, emergencies, rehabilitation of construction areas)
- The quantity of freshwater required for construction purposes and the sources from which this water will be obtained

- Estimates of construction workers (permanent and temporary and dependants), contractors, movements, travel arrangements and composition, expected sources and local availability of employees.

5. Project Justification

This section should discuss all components of the Proposal in the context of regional and local development and market potential, and the existence of similar developments at these levels.

Discussion needs to include identification and assessment of alternatives as well as demonstration of need from a social and economic perspective and demand from a market perspective.

5.1 Assessment of Alternatives

The assessment of alternatives needs to demonstrate that the Hummock Hill Island location for the proposed residential community is a suitable location for a development of this type considering the major costs and benefits, including environmental and social costs and benefits and the local and regional scale.

The EIS should outline the basis for selection of the Hummock Hill Island location. It should describe any feasible alternatives to the Project, as well as the alternative of not proceeding with the Project. These alternatives should be discussed in sufficient detail to make clear the reasons for pursuing the Hummock Hill Island option.

Alternatives considered may include:

- The 'no project' option;
- Alternative master planning and site arrangements;
- Larger or smaller scale development;
- Alternatives for infrastructure and essential service provision, including the range of options considered for access, water, electricity, and waste management.

The reasons for choice of the preferred option should be explained, including a comparison of the adverse and beneficial effects (both to the environment and community) used as a basis for selection, and compliance with government policy and with the principles and objectives of ecologically sustainable development.

5.2 Demonstration of Need and Demand

The demonstration of need and demand should be a comprehensive assessment including:

- An assessment of the demographic profile for the region and locally, provides the basis for arguing need based on community characteristics
- Estimated population and growth trends including age profiles
- Building investment (lot creation, take up rates and dwelling unit approvals)
- Labour force, employment (by occupation and income)
- Any other economic indicators to indicate support for the development
- Educational needs

- Relevance of the proposed educational facility to the locality and region and demonstration that the facility is complementary to other educational opportunities in Queensland and does not duplicate educational opportunities that could be more efficiently provided at other educational facilities.
- Describe site in regional context – proximity to major centres, transport facilities – airports, train stations, road access – include review of similar residential developments and associated facilities in the surrounding area and if possible make comment on their success
- Describe the local context – role (size, facilities and services – including shopping, banking and community services, recreation facilities etc).

This assessment of the items above will then enable conclusions to be drawn regarding the proposed development, including

- Number of allotments – with reference to lot creation, take up rates of allotments in addition to (new dwelling) building approvals locally and in the region.
- Commercial and retail services
- Educational facility
- The 18 hole golf course – context of region, other similar facilities, end users, proposed management and membership structure.
- Hotel in the context of surrounding facilities – economic need and potential patronage on current trends.

6. Planning and Approvals

6.1 Planning Context

This section should provide a brief explanation of the state, regional and local planning context for the proposed development and the subject site.

At a regional level, statutory instruments, plans, strategies and development policies should be identified, including Miriam Vale Shire [transitional] Planning Scheme and supporting documents.

For each relevant plan, policy, strategy or statutory instrument identified, discuss:

- Restrictions on land use or other matters imposed by the policy, strategy or statutory instrument
- Allowed uses and compatible uses
- Other matters of relevance to the activities proposed in the proposal, for example tourism and infrastructure development strategies.

The EIS should assess compatibility of the development with the overall intent of the Miriam Vale Strategic Plan and provide justification for over-riding the planning scheme. Should the Draft IPA compliant planning scheme be available within the time frames of the environmental assessment, reference should be made to any additional outcomes or intents reflected in the Draft planning scheme.

The following policies of the Wide Bay Burnett Regional Framework for Growth Management should be addressed in the EIS:

- 6.1 Remnant native vegetation
- 6.2 Riparian vegetation
- 6.3 Native wildlife
- 6.5 Fish and fisheries
- 7.1 Places of major environmental and cultural heritage value
- 8.1 Preferred settlement pattern for region
- 8.2 Preferred settlement pattern for region
- 8.4 Residential living opportunities
- 9.2 Road transport facilities
- 10.1 Development sequencing

- 10.2 Regional water supply
- 10.3 Rural community water and sewage
- 11.2 Indigenous local heritage
- 12.1 Community services
- 12.2 Social impacts

In addition, an assessment of the contribution of the proposed Hummock Hill Island development to the outcomes identified in the Central Queensland Regional Growth Management Framework (Central Queensland: A New Millenium) should be provided with particular reference to the following policy areas:

- Land use planning and management (3.1.1)
- Coastal planning and management (3.1.9)
- Existing and emerging industries (3.2.1)
- Tourism (3.2.13)
- Regional identity marketing and promotion (3.4.1)
- Housing (3.4.4)
- Social infrastructure and social planning (3.4.5)
- Individual, family and community vitality (3.4.8)
- Healthy lifestyles (3.4.9)
- Education and training (3.5.1)
- Research and development (3.5.3)

In relation to the RGMFs, assess the potential impact of the proposed development on the commercial centre hierarchy set out in the Central Queensland and Wide Bay Burnett RGMF should be assessed.

An assessment of compliance of the proposed development with the principles and policies of the State Coastal Management Plan should be undertaken, with particular focus on the following policies:

- 2.1.2 Settlement pattern and design

- 2.1.12 Managing water resources
- 2.2.2 Erosion prone areas
- 2.3.1 Future need for access
- 2.3.2 Design of access
- 2.4 Water Quality
- 2.5 Indigenous Traditional Owner cultural resources
- 2.8.1 Areas of state significance (Natural Resources)
- 2.8.2 Coastal wetlands
- 2.8.3 Biodiversity

In addition to the State Coastal Management Plan, the following State Planning Policies should be addressed:

- SPP 1/92 Development and the Conservation of Agricultural Land
- SPP 2/02 Planning and Managing Development Involving Acid Sulfate Soils
- SPP 1/03 Mitigating the Adverse Impacts of Flood, Bushfire and Landslide.

6.2 Approvals

This section should describe and list Commonwealth and State legislation and local policies relevant to the planning, approval, construction and operation of the Proposal. Triggers for the application of each of these should be discussed and relevant approval requirements should be identified.

A brief explanation of the scope and legislative basis for the EIS should be provided, including the role of the EIS in the government's decision-making process and an explanation of the relationship between Part IV of the SDPWOA and the Integrated Development Approvals System of the *Integrated Planning Act 1997* with regard to the Proposal. Brief discussion of the Commonwealth's accreditation of the SDPWOA process, under Section 87(4) of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC) is also required.

Relevant Commonwealth legislation may include, among other things:

- *Environment Protection and Biodiversity Conservation Act 1999;*
- *Native Title Act 1993;*
- *Aboriginal and Torres Strait Islander Heritage Protection Act 1994,*

- *Australian Heritage Commission Act 1975,*
- *Great Barrier Reef Marine Park Act 1975,*
- *Marine Parks Act 1982,*
- *World Heritage Properties Conservation Act 1983,*
- other relevant Commonwealth obligations such as protection of World Heritage, migratory animals (CAMBA, JAMBA and Bonn Convention) and wetlands of international importance (Ramsar).

Relevant State legislation may include, among other things:

- *Aboriginal Cultural Heritage Act 2003*
- *Environmental Protection Act 1994;*
- *Integrated Planning Act 1997;*
- *Vegetation Management Act 1999;*
- *Water Act 2000;*
- *Fisheries Act 1994;*
- *Coastal Management and Protection Act 1995;*
- *Electricity Act 1994;*
- *Forestry Act 1959;*
- *Great Barrier Reef Marine Park Act 1975*
- *Land Act 1994;*
- *Land Protection Act 2002;*
- *Native Title Act 1993;*
- *Nature Conservation Act 1992;*
- *Queensland Heritage Act 1992;*
- *State Development and Public Works Organisation Act 1971*
- *Transport Infrastructure Act 1994;*
- *Workplace Health and Safety Act 1995.*

Existing environmental assessments and approvals should be discussed. These should include the findings of the 1993 Impact Assessment Study (*Hummock Hill Island Residential and Recreational Development Impact Assessment Study*, 1993 and *Hummock Hill Island Project IAS Supplement*, 1995) and the then Queensland Department of Environment Review (*Review of the Impact Assessment Study for Hummock Hill Island Residential and Resort Development*, 1996).

7. Existing Environment

7.1 Overview

The EIS should include a description of the present physical and socio-economic environment in the vicinity of the proposed residential development. Sufficient detail is needed to allow a clear understanding of the likely impacts of the Project (both beneficial and adverse) and to assess the effectiveness of the proposed mitigation measures.

This section should identify the existing environmental values of the area that may be affected by the Project. The EP Act and the Environmental Protection policies define "environmental values". Environmental values should be described by reference to background information and studies that are included as appendices to the EIS.

7.2 Topography, Geology and Soils

Describe:

- geological characteristics of the island;
- location and characteristics of the known mineral resources;
- topographical and geomorphological characteristics;
- broad soil classifications, particularly focussed on erosion potential and potential land irrigation of effluent;
- land capability for various agricultural uses, assessed in accordance with *State Planning Policy 1/92: Development and Conservation of Agricultural Land* and associated guidelines;
- coastal morphology and stability issues;
- potential erosion risk
- potential for acid sulfate soils, assessed in accordance with *State Planning Policy 2/02: Planning and Management Development Involving Acid Sulfate Soils;* and
- potential for existing soil contamination.

7.3 Climate and Natural Hazards

Describe:

- Climate and climatic characteristics (wind speed and direction, seasonal temperatures, humidity, evaporation and rainfall)
- Severe weather conditions such as rain events, high wind events, lightning, cyclones, storm surge and the probability of extreme events
- Earthquake potential.

7.4 Terrestrial Ecosystems

In these ToR, "terrestrial" is taken to include ecosystems on land and freshwater ecosystems extending to the mean High Water mark. Coastal and estuarine ecosystems are to be considered

as marine ecosystems. The need to ensure that the transitional zone between terrestrial and marine ecosystems is properly assessed is highlighted.

Identify and describe any conservation areas, nature reserves or other areas declared for the protection of terrestrial ecosystems located within or adjacent to the study area. Discuss status and management of these areas.

Identify existing terrestrial ecosystems within the study area, including:

- Identification and description of ecological communities using the Regional Ecosystem classification established under the *Vegetation Management Act 1995*;
- Identification and description of habitat value of each community or Regional Ecosystem;
- Identification and description of rare and endangered species, including conservation status, distribution, population viability and habitat requirements;
- Discussion of the condition of remnant vegetation including extent of regrowth and presence of weeds.
- Identification of migratory species;
- Identification and description of unusual assemblages, associations and other noteworthy features;
- Assessment of local and regional representation of communities identified;
- Assessment of biodiversity and conservation significance; and
- Identification of data on mosquitoes and biting insects which may pose a health risk to human inhabitants.

Identify and describe any potential groundwater dependent ecosystems.

Study of existing terrestrial ecosystems may be based on previous studies and literature reviews, review of relevant databases and additional field surveys, as necessary, to supplement existing information. Describe methodologies used for data collection.

7.5 Coastal and Marine Ecosystems

In these TOR, coastal and marine ecosystems include coastal and estuarine ecosystems seaward of the mean High Water mark. The need to ensure that the transitional zone between terrestrial and marine ecosystems is properly assessed is highlighted.

Identify and describe any conservation areas, nature reserves or other areas declared for the protection of coastal and marine ecosystems located within or adjacent to the study area. Discuss status and management of these areas.

Describe existing marine and coastal ecosystems within and immediately adjacent to the study area, including:

- Identification and description of ecological communities;
- Identification and description of habitat value of each community;

- Potential for rare, endangered or migratory species to occur in identified habitats.

Study of existing coastal and marine ecosystems may be based on previous studies and literature reviews and review of relevant databases. Additional field surveys may be necessary for any areas of direct disturbance.

7.6 Surface Waters

For the purposes of this ToR, surface waters include fresh and brackish streams, estuaries and other enclosed waters. Describe existing surface waters, including:

- Water quality
- Water quality objectives
- Existing contaminant sources
- Hydraulic characteristics, flows and tidal influences
- Catchment and storm water runoff characteristics
- Current users of surface waters.

7.7 Marine Waters

For the purposes of this ToR, marine waters refer to open areas of salt water. Describe existing marine waters, including:

- Water quality
- Water quality objectives
- Flow regimes
- Existing contaminant sources.

7.8 Groundwater

Describe existing groundwater conditions within the vicinity of the Proposal including:

- Groundwater quality
- Aquifer yield and recharge characteristics
- Other aquifer characteristics, including depth to groundwater
- Likely interactions between groundwaters and surface waters and groundwaters and marine waters
- Existing users of groundwater within the study area
- Existing sources of groundwater contamination or other existing impacts on groundwater.

Additional groundwater sampling may be required if any direct use of groundwater is proposed.

7.9 Coastal Processes and Coastal Hazards

Describe the coastal processes and conditions experienced on Hummock Hill Island including:

- Beaches and dune systems and identify those that provide protection from inland erosion;

- Coastal wetlands;
- Storm tide flooding, cyclones and associated processes (mapping of storm tide hazard area);
- Erosion prone areas.

7.10 Land Use Planning

Describe existing land uses on and adjacent to Hummock Hill Island. Include uses of coastal and marine areas. Describe the land tenure over any areas likely to be directly or indirectly affected by the proposal. Describe any areas declared for the protection of natural resources including ecological and mineral resources.

7.11 Visual Environment

Describe and characterise the existing visual environment and landscape values of the region, with particular attention to Hummock Hill Island.

Identify the viewshed of Hummock Hill Island from land and sea. Identify and describe viewers likely to be viewing the island from various locations within the viewshed.

7.12 Cultural Heritage

7.12.1 Aboriginal Cultural Heritage

Identify and describe any cultural heritage values associated with any locations within the study area. Values may include:

- Artefacts of Indigenous origin
- Other evidence of Indigenous settlement and/or activities.

Identification of cultural heritage values should include review of literature and existing studies of the area as well as additional survey work to supplement existing information if required. Representative Indigenous groups should be consulted and involved in the study in accordance with the procedures set out in the *Aboriginal Cultural Heritage Act 2003*.

The significance of sites, artefacts and other features should be evaluated on the basis of:

- Integrity
- Representativeness (local, regional, State)
- Scientific/historical importance
- Importance to traditional owners.

7.12.2 European Cultural Heritage

Identify and describe any cultural heritage values associated with any locations within the study area. Values may include:

- Artefacts or other evidence of early European settlement of the area
- Valuable features associated with more recent use of the land.

Identification of cultural heritage values should include review of literature and existing studies of the area as well as additional survey work to supplement existing information if required.

The significance of sites, artefacts and other features should be evaluated on the basis of:

- Integrity
- Representativeness (local, regional, State)
- Scientific/historical importance.

7.13 Social

7.13.1 Demographic Profile

Prepare a demographic profile of the region including:

- Population and population growth
- Age and gender structure
- Workforce characteristics and employment levels
- Income and other lifestyle characteristics.

Demographic statistics should be broken down by local government area (Miriam Vale and Calliope Shires and Gladstone City). The Queensland state average should be provided for comparison.

Prepare a brief summary of the local and regional economic structure including the main industrial and commercial activities.

Identify and describe community services, facilities and infrastructure in the region and assess the adequacy of such services to meet existing community demands.

7.13.2 Affected Stakeholders

Identify and briefly describe stakeholder groups likely to be affected directly or indirectly by the Proposal, including those using the area for recreational, tourism, research, scientific and educational purposes.

Future inhabitants, visitors and employees on Hummock Hill Island should also be included as stakeholder groups.

7.14 Waste Management Services

Identify existing public and private waste management services and facilities available in the region, including:

- Waste reuse and recycling services
- Waste treatment facilities
- Waste disposal facilities

- Waste collection and transport facilities.

7.15 Air Quality and Noise

Describe the existing noise environment in the study area in terms of:

- Existing noise and vibration sources
- Estimated background noise and vibration levels
- Identify sensitive receptors (humans and other animals).

Describe the existing air quality within the Study area and surrounding areas including:

- Existing sources of air pollution
- Estimate ambient air quality characteristics
- Identify sensitive receptors (humans and other animals).

7.16 Infrastructure and Services

Roads and Traffic

The existing local and regional road network should be described. Capacity of roads and intersections should be identified. Traffic generation nodes should be identified.

Existing traffic levels on local and regional roads should be described. Traffic volumes should be broken down into vehicle types (for example, cars, light trucks, heavy trucks).

Other Transportation Infrastructure

Airport, port and rail infrastructure should be described in terms of location, capacity and other relevant features. Shipping routes and recreational boat access points should also be identified.

Power

Existing power generation facilities and transmission and distribution networks should be described and mapped at the local and regional level. Description should include:

- Location
- Capacity.

Telecommunications

Existing telecommunications networks including mobile phone and broadband in the locality and region should be described in terms of location and capacity.

Water Supply

Existing water supply infrastructure should be described at the local and regional level. Discussion should include Awoonga Dam and existing fresh water distribution infrastructure.

8. Impact Assessment and Mitigation

8.1 Topography, Geology and Soils

Discuss impacts of the Proposal on the existing environment as described in **Item 7.2,** including:

- Potential for contaminated land and/or potential acid sulphate soils to be disturbed during construction, including management of the existing (disused) cattle dip located near the northern headland
- Potential for land contamination to affect proposed land uses
- Potential for land contamination to occur as a result of the proposed development
- Acceptability of wastewater irrigation
- Loss of or sterilisation of Good Quality Agricultural Land and other agricultural resources
- Loss of or sterilisation of mineral resources
- Erosion potential
- Landslip potential
- Impacts to landforms and coastal, marine and seabed geomorphology

Make recommendations to mitigate potential adverse impacts.

8.2 Climate and Natural Hazards

Discuss potential for climatic conditions and natural hazards to impact upon the Proposal and proposed measures to ensure safety of humans, structures and other facilities on the island. Discuss potential for extreme climatic conditions to lead to spills and leaks of chemicals or other damage to the environment as a result of the presence of the proposed development. Discuss the extent to which weather conditions may enhance or detract from the Proposal.

8.3 Terrestrial Ecosystems

Identify activities to be conducted during construction and operation that may directly or indirectly affect terrestrial ecosystems or individual species. Activities should include, but not be limited to land clearing, effects on water quality and surface water flows, effects on groundwater, bush fire, pest species, domestic animals and noise and light disturbance. Both construction and operation aspects of these activities should be assessed.

Assess impacts of identified activities on:

- Ecological communities and habitat including those within and adjacent to the development
- Groundwater dependent ecosystems
- Individual species
- Rare and endangered species (State and Commonwealth), including an assessment of the extent to which the species' viability and conservation status may be affected as a result of the Proposal
- Biodiversity

- Status and management principles of identified conservation areas.

Assess potential for mosquitoes and other biting insects to pose a health problem to human inhabitants of Hummock Hill Island.

Discuss any cumulative impacts on terrestrial ecosystems, taking into account other land clearing and development activities in the region.

Make recommendations to mitigate potential adverse impacts and provide for ongoing management of potential impacts on terrestrial conservation values.

8.4 Coastal and Marine Ecosystems

Identify activities to be conducted during construction and operation that may directly or indirectly affect coastal and marine ecosystems or individual species. Activities should include (but not be limited to) land clearing and construction works, effects on water quality and freshwater flows, effects on groundwater, weed and pest animals, domestic animals, human access to beach areas and noise and light disturbance.

Assess impacts of identified activities on:

- Ecological communities and habitat
- Individual species
- Rare, endangered and migratory species (State and Commonwealth listed), including an assessment of the extent to which the species' viability and conservation status may be directly or indirectly affected as a result of the Proposal.
- Biodiversity
- Recreational and commercial fisheries
- Status and management principles of identified conservation areas.

Discuss any cumulative impacts on marine ecosystems taking into consideration the effects of other developments and activities in the region.

Make recommendations to mitigate potential adverse impacts and provide for ongoing management of impacts on coastal and marine ecosystems.

8.5 World Heritage Area

Provide an assessment of the potential impact of the proposed development on the World Heritage values of the Great Barrier Reef World Heritage Area.

8.6 Surface Waters

Identify and assess impacts on surface waters including:

- Degradation of water quality through sediment release or release of contaminants (link with erosion control issues discussed in **Item 7.6**) during construction and operation. Include

routine, non-routine and accidental releases from all developed areas including the golf course.

- Changes in surface water runoff characteristics including quality and quantity of flows into coastal ecosystems.
- Changes in freshwater input to estuaries and nearshore coastal waters.
- Effects on current water users.
- Cumulative impacts of releases to surface waters as a result of the Proposal in conjunction with other existing impacts on surface water quality and flow.

Make recommendations to mitigate potential adverse impacts.

8.7 Marine Waters

Identify and assess impacts on marine waters including:

- Degradation of marine water quality through sediment release or release of contaminants (link with erosion control issues discussed in **Item 7.7**) during construction and operation. Include routine, non-routine and accidental releases;
- Changes to flow regimes; and
- Cumulative impacts of releases to marine waters as a result of the Proposal in conjunction with other existing impacts on marine water quality.

Make recommendations to mitigate potential adverse impacts.

8.8 Groundwater

Identify and assess impacts on groundwaters including:

- Degradation of water quality including saltwater intrusion
- Mobilisation of existing saline groundwaters
- Impacts on any groundwater dependent ecosystems
- Changes to aquifer yield, recharge or other characteristics
- Changes to the nature of interactions between aquifers and surface or marine waters
- Effects on existing groundwater users
- Cumulative impacts of impacts associated with the Proposal in conjunction with existing impacts on aquifers.

Make recommendations to mitigate potential adverse impacts.

8.9 Coastal Processes and Coastal Hazards

Describe the potential impacts caused by the Proposal, in accordance with the State Coastal Management Plan, including careful consideration of the potential impacts of climate change including sea level rise and storm tide inundation and existing areas affected by coastal hazards. Describe impact on coastal processes from built structures such as boat ramp(s), bridge or any

other works in the coastal zone. Discuss any development within or adjacent to the Erosion Prone Zone.

Make recommendations regarding areas to be retained undeveloped and excluded from the master plan development area, where relevant.

Make recommendations to mitigate adverse impacts identified.

8.10 Land Use and Tenure

Describe the potential impacts caused by any short, medium and long-term changes, interruption, alteration or curtailment of land uses and activities due to operation of the Proposal, including changes affecting local communities, traditional uses, recreational uses, primary production, commercial fishing, tourism, mining and extractive industry.

Identify and examine potential conflicts between the Proposal and plans, policies, strategies and statutory controls. Propose measures to resolve these conflicts.

Make recommendations to minimise conflicts with adjacent land uses.

8.11 Visual Environment

Present photomontages or artist's impressions of the proposed developments on Hummock Hill Island from several viewing locations on land and at sea.

Discuss the changes to the visual environment as a result of the Proposal, and in particular, changes to views from the World Heritage Area.

Make recommendations to mitigate adverse impacts identified.

8.12 Cultural Heritage

Identify and assess direct and indirect impacts of the Proposal on cultural sites, artefacts and other features. Assessment should cover construction and operation phases of the Proposal. Assessment should include an assessment of cumulative impacts.

The views of Indigenous people concerning the proposal should also be documented.

Prepare an outline Cultural Heritage Management Plan for the Proposal in accordance with the requirements of Part 7 the *Cultural Heritage Act 2003*.

Make recommendations as appropriate to mitigate impacts on cultural heritage.

8.13 Social Environment

Identify and assess impacts on social and socio-economic features including (but not limited to):

- Demographic profile
- Workforce and employment opportunities

- Availability of and access to community services, facilities and infrastructure (medical, dental, other health services, emergency health services, education, child care, emergency services)
- Educational opportunities
- Changes in access to land and sea areas
- Lifestyle and activities, including issues associated with remoteness from existing activity centres.
- Recreational opportunities and access to beach foreshores and public open space.
- Health and safety (including potential impacts associated with biting insects)

Assess the range of impacts on each of the stakeholder groups identified in **Item 7.14.2**. Include assessment of cumulative impacts. Include any impacts relating to increased demand for community facilities and infrastructure (eg schools, hospitals, emergency services) and identify where new and upgraded facilities and infrastructure may need to be brought forward.

Make recommendations to enhance benefits and mitigate adverse impacts identified.

8.14 Hazard and Risk

8.14.1 Identification of Hazards

Likely hazards associated with the construction and operation with each component of the should be identified. These should include:

- Natural hazards and disasters such as storm surge, bush fire
- Accidents and incidents such as traffic accidents, crimes against persons or properties, house fires.
- Spills, leaks and explosions associated with chemical transport, handling and storage activities

An analysis should also be made of the location and sensitivity of receptors that may be exposed to hazards. These may include:

- Humans (residents, tourists, visitors, employees at the facility, observers) on Hummock Hill Island and other locations within the vicinity
- Animals in the marine or terrestrial environment, in particular rare and endangered species
- Natural resource conservation areas and ecosystems
- Air and sea traffic
- Communications facilities and networks.

Note that occupational health and safety issues are outside the scope of these ToR.

8.14.2 Risk Management Strategies

Details should be provided of proposed risk management strategies to minimise risk exposure for each of the hazards identified. These should include (but not be limited to):

- Storage and handling requirements for dangerous goods
- Emergency management and response plans and provision of emergency services
- Ability of existing emergency services to provide prompt and efficient response to emergencies and need for upgraded services to provide adequate risk management.

8.14.3 Risk Assessment

A risk assessment methodology should be developed to allow proper examination of the risk of exposure of sensitive receptors to the hazards identified. A qualitative risk assessment methodology may be used for some aspects of the risk assessment.

Risk assessment methodology and underlying data and assumptions should be transparently documented and examples and comparisons should be made which will allow the general reader to understand the nature and magnitude of the risks involved.

The assessment of risk associated with the identified hazards should take into account the risk management strategies identified in **Item 8.41.2**. The risk assessment study should also consider cumulative risk contours from any existing non-natural hazards not directly related to the Proposal.

Detailed technical studies should be included as appendices.

Where unacceptable levels of risk are identified, develop further strategies to reduce risk to acceptable levels.

8.15 Waste Management Services

8.15.1 Predicted Waste Generation

Identify all solid, liquid, hazardous and other wastes expected to be generated during construction and operation. For each waste stream, document:

- Source and location
- Physical and chemical characteristics
- Estimated quantity
- Special storage and management requirements
- Options for waste management, based on the waste management hierarchy (reduce, reuse, recycle, treat, dispose)
- Preferred waste management option
- Fallback waste management option.

8.15.2 Waste Management

Describe the waste management facilities required to provide an adequate level of service to protect community and ecosystem health. Waste management should be discussed in the context of the Waste Management Hierarchy.

The following matters should be specifically addressed:

- Provision of waste collection and/or transfer stations and ultimate disposal of waste.
- Treatment systems for wastewater
- Disposal of treated wastewater, including an outline management plan for effluent irrigation.

For wastewater treatment and management, compliance with the following policies and guidelines should be included:

- Guidelines for the Use and Disposal of Greywater in Unsewered Areas (DLGP 2003).
- On-site Sewerage Code (DLGP, November 2003)
- On-site Sewerage Systems Guidelines for Effluent Quality (DLGP, January 2004)
- Queensland Guidelines for the Safe Use of Recycled Water (EPA, Public Consultation Draft).

8.15.3 Waste Impacts

Identify and describe potential environmental and socio-economic impacts associated with preferred and fallback waste management options for each waste stream.

Identify potential environmental impacts associated with accidental release of any waste materials during storage, handling or transport.

Include discussion of potential impacts of waste management under normal and abnormal operating conditions on water quality and coastal and aquatic ecosystems under Sections 8.4, 8.5, 8.7 and 8.8. Discuss potential impacts of irrigation of wastewater on soils under Section 8.1.

Make recommendations to mitigate adverse impacts.

8.16 Air Quality and Noise

Identify sources of air pollution (including dust) during construction and operation. Discuss the effects caused by direct and indirect pollution (including greenhouse gases) on ambient air quality and sensitive receptors.

Discuss any cumulative impacts, especially in relation to existing air quality conditions in the Gladstone airshed.

Identify and characterise noise sources associated with the construction and operation of the development. Identify and characterise any sources of vibration.

Discuss impacts of predicted noise levels on existing sensitive receptors as identified in **Item 7.18**. Assess impacts of predicted noise levels on future residents, visitors and other inhabitants of Hummock Hill Island and the surrounding area.

Make recommendations to mitigate potential adverse impacts.

8.17 Infrastructure and Services

Identify and assess impacts of the Proposal on infrastructure as identified. Impact assessment should include:

- The effects of increased demand on infrastructure and essential services
- The need for upgrade of services
- The potential for services to existing users to be affected by the proposal.

The following specific infrastructure issues should be addressed:

- Road networks, and relationship to regional road networks and commercial centres
- Parking requirements, particularly if the proposed commercial centre generates visitors from outside the immediate development footprint
- Provision of public transport
- Availability of water supply including an agreement in principle from a water supply authority to provide water to the proposed development.
- Household and community level water management and water balance, including unusually dry periods
- Adequacy of water supply to allow for private swimming pools, public and private garden maintenance and other water intensive uses.

Where options for infrastructure and services exist, these should be presented, together with the rationale for selecting the preferred option.

Assess cumulative impacts of the Proposal, taking into consideration other developments in the area which may also impact on infrastructure.

Make recommendations to mitigate adverse impacts.

9. Public Involvement and Consultation

This section should describe consultation and assessments undertaken in the course of proposal formulation and preparation of the EIS with:

- Commonwealth and State government agencies;
- Local government;
- Non-government organisations;
- Community groups;
- Individuals; and
- Other stakeholders identified.

This section should record;

- Consultation activities undertaken with the range of stakeholders;
- Outcomes of consultation in terms of response to the proposal, comments and suggestions from stakeholders;
- Means by which concerns and comments raised by stakeholders during consultation are addressed in the EIS; and
- Framework for ongoing consultation activities.

10. Conclusion and Recommendations

The conclusion should present a concise summary of the key findings of the studies undertaken. This should form a statement of the positive and negative impacts of the Proposal on the physical, natural and socio-economic environment.

A summary of all recommendations made in the EIS should be provided, with recommendations presented for design, construction and ongoing operation of the Proposal. The summary should be in the form of commitments from the Proponent.

11. Supporting Information

11.1 References and bibliography

Information cited from other sources in the text should be referenced and full references to these sources provided in the reference list. Other important information sources which may not be directly cited in the document should also be included in the reference list.

11.2 Glossary, abbreviations and units

A glossary defining all technical terms used in the EIS should be provided. Definitions should be in layperson's terms.

A list stating in full all abbreviations and units used in the EIS text should be included.

12. Appendices

Information relevant to the EIS, but not suitable for inclusion in the main text should be included as appendices; for example, detailed technical or statistical information, maps, risk assessment, baseline data and supplementary reports.

A copy of the ToR should also be included and bound into Volume 1 of the EIS.

13. Environmental Management Plans

An outline of the proposed Environmental Management Plans (EMPs) for the Proposal should be included. EMPs should cover all components of the proposed development and associated infrastructure. EMPs should cover detailed design, construction and operation phases of the Proposal.

Environmental management plans (EMPs) should outline the safeguards proposed to prevent damage to the environment or, in the event of unforeseen damages, to rehabilitate the damaged environment. The EIS should draft together all relevant information mentioned in the text, and provide a clear statement of specific commitments that the Proponent will make. It is recognised that the EMPs are unlikely to be finalised documents when the EIS is released, but it is essential that they contain sufficient information to allow an objective assessment of proposed countermeasures.

An outline of any EMPs for the Project should be presented, together with reference to best-practice standards for EMPs. A construction environmental management plan should refer to relevant construction standards, techniques and reference material. Monitoring programs designed to ensure safeguards are being effectively applied and to identify and measure any differences between predicted and actual impacts should be described.

The outline EMPs should generally follow the requirements of AS/NZS ISO 14001:1996 "Environmental Management Systems". The outline EMPs should also be consistent with EPA requirements and guidelines.

The outline EMPs should demonstrate the means by which recommendations of the EIS will be implemented during the design, construction and operation phases. A summary of requirements is shown in **Table 13-1** below.

Table 13-1 EMP Components

EMP Component	Description	Example
Environmental element	The aspect of the environment requiring management consideration	Surface Water
Performance objectives	The target or strategy to be achieved through management	No adverse impacts on freshwater and estuarine ecosystems
Potential impacts	Potential impacts on the environment as identified in the EIS	Release of sediment into surface waters
Management Actions	The actions to be undertaken to achieve the performance objective, including any necessary approvals, applications and consultation	Install erosion control measures
Performance	Criteria against which the implementation of	Comply with ANZECC guidelines for

EMP Component	Description	Example
Indicators	the actions and the level of achievement of the performance objectives will be measured. May include tiered trigger levels to prompt different responses.	aquatic ecosystems
Monitoring	Process of measuring actual performance	Monitor surface waters downstream of construction areas for suspended solids
Responsibility	Responsibility for carrying out management and monitoring actions	Construction Environmental Manager
Reporting	Process and responsibility for reporting monitoring results	Construction Environmental Manager reports to Construction Superintendent weekly using prescribed form.
Corrective Action	Actions to be implemented in the event that non-compliance with performance indicators is detected	Install additional erosion control structures on temporary drains

Appendix E

Existing Environment Description

E1 Land Use and Tenure

E1.1 Development Area

Hummock Hill Island is currently vacant. It has previously been used for grazing, however grazing activities ceased early in the 1990s. There are several fishing shacks on the northern side of the Island which appear to be in use. These have no legal tenure.

The proposed development will take place on Lot 3 on FD841442 over which the proponent holds Special Lease 19/52155.

E1.2 Mining Tenure

There is a current mineral exploration permit (EPM 7164) over much of Hummock Hill Island including part of Lots 3 and other areas of Hummock Hill Island outside the Special Lease as well as other land parcels including Middle Island and areas of Byfield National Park.

An application has also been made for a Mineral Development Licence over much of the island, including much of Lots 1 and 3.

E1.3 Conservation Estate

Hummock Hill Island lies within or adjacent to a number of coastal and marine areas with designated conservation status as listed in Table 7.

Table 7 Conservation Estate

Feature	Location Relative to Hummock Hill Island	Management Implications for Proposal
Great Barrier Reef World Heritage Area	All of Hummock Hill Island is located within the world heritage area which extends to low water mark on the mainland coast and includes most islands of the Great Barrier Reef.	No specific management implications. Location within a World Heritage Area triggers assessment and approval requirements under EPBC Act.
Great Barrier Reef Marine Park	Extends to low water mark around Hummock Hill Island.	General Use Zone. Permits required for structures and discharges.
Great Barrier Reef Coastal Marine Park	Covers the intertidal zone (ie low water mark to high water mark) around Hummock Hill Island.	General Use Zone Permits required for structures and discharges.
Colosseum Inlet Fish Habitat Area	Exclusion zone around existing causeway.	Permits required to disturb Fish Habitat Area including placing structures within.
Rodds Bay Dugong Protection Area	Surrounds Hummock Hill Island.	No specific implications for proposed development. Restrictions on fishing activities.

E2 Water Resources

Hummock Hill Island has no permanent fresh water streams. A number of dams have been created, presumably for stock watering purposes, and continue to store water after rainfall. Only one of these, being located in a saddle between the two main elevated ridgelines, appears to hold permanent water. Water in this dam is of very low salinity. There are no natural lakes or permanent freshwater wetlands. Ephemeral freshwater wetlands occur in the dune swales/vine scrub zones along the northern coastline after rainfall.

A tidal inlet associated with the Boyne Creek estuary effectively divides the island into an east and west portion. There are several other tidal inlets of varying sizes.

Average annual rainfall at Gladstone is 918 mm (35 years of record) and at Bustard Head is 1155 mm year (102 years of record). Rainfall is higher during summer months with average December rainfall at Bustard Head being 196 mm compared to 35 mm in September.

Shallow unconfined groundwater aquifers exist in the sands overlying granodiorite at the eastern and western ends of the island. Groundwater flows are towards the coast. Saline intrusion of these aquifers occurs with salinity levels increasing towards the coast. The groundwater can be considered to be moderately to highly saline in areas adjacent to the coastline. Potable water extraction from these aquifers would require careful management to ensure that sustainable limits were not exceeded and saltwater intrusion is not increased.

E3 Terrestrial Ecosystem

E3.1 Vegetation

The eastern and western ends of the island are dominated by parallel beach ridge vegetation and a mosaic of melaleuca and eucalypt species. Sand dune zones have been somewhat modified by pastoral activities, especially at the eastern and western ends of the island, however native vegetation is considered to remain in good condition. A stand of Littoral Vine Forest in the central northern dune area may also have particular conservation significance due to its good condition and the scarcity of vine forest remnants in the central Queensland area.

The southern side of the island is characterised by an extensive intertidal zone includes mangrove, salt marsh and seagrass communities. The central portion of the island is characterised by a coastal grey ironbark woodland with similar characteristics to vegetation communities found on similar geology in the mainland being a mosaic of eucalyptus woodland/ open forest types, poplar box, E tereticornis and iron bark woodland. An interesting feature is a stand of poplar box, a species which is normally found further inland. Burning and clearing for pastoral activities have disturbed vegetation in this zone and it is probably the least significant habitat zone on the island from a conservation view point.

Littoral scrub and strand vegetation dominates the northern coast of the island.

Weed invasion has occurred, particularly with prickly pear infestations in grazed areas and lantana, thistle and burr in some locations.

Regional ecosystem mapping was undertaken in June 2005. Results are listed in Table 8 and conservation status of the Regional Ecosystems are shown in Figure 14.

Table 8 Regional Ecosystems of Hummock Hill Island

Regional Ecosystem	Description	Conservation Status
12.1.1	*Casuarina glauca* ± *Melaleuca quinquenervia* ± mangroves open-forest. Occurs on margins of Quaternary estuarine deposits.	Of concern
12.1.2	Saltpan vegetation comprising *Sporobolus virginicus* grassland and samphire herbland. Grasses including *Zoysia micrantha* sometimes present in upper portions of tidal flats. Includes saline or brackish sedgelands. Occurs on Quaternary estuarine deposits and marine plains/tidal flats.	Not of concern
12.1.3	Mangrove shrubland to low closed forest. Occurs on Quaternary estuarine deposits.	Not of concern
12.2.2	Microphyll/notophyll vine forest. Occurs on Quaternary coastal dunes and beaches.	Endangered
12.2.7	*Melaleuca quinquenervia* open-forest to woodland. Occurs on Quaternary coastal dunes and seasonally waterlogged sand plains usually fringing drainage system behind beach ridge plains or on old dunes, swales and sandy coastal creek levees.	Of concern
12.2.11	Woodland to open-forest species include *Corymbia tessellaris*, *Eucalyptus tereticornis*, *Callitris columellaris*, *Petalostigma pubescens*, *Corymbia intermedia* or *C. clarksoniana*, *E. exserta*, *Livistona decipiens*, *Planchonia careya*, *Leptospermum neglectum*, *Acacia julifera*. *Melaleuca dealbata* and *Eucalyptus tereticornis* in swales. Occurs on Quaternary coastal beach ridges and swales.	Not of concern
12.2.14	Strand and fore dune complex comprising *Spinifex sericeus* grassland *Allocasuarina equisetifolia* woodland/open-forest. Occurs mostly on frontal dunes and beaches but can occur on exposed parts of dunes further inland.	Not of concern
12.2.11/14	as for 12.2.11 and 12.2.14 above	Not of concern
12.3.3	*Eucalyptus tereticornis* open-forest to woodland. Occurs on broad Quaternary alluvial plains where rainfall is usually less than 1000mm/y.	Endangered

Regional Ecosystem	Description	Conservation Status
12.3.10	*Eucalyptus populnea* ± *E. tereticornis* grassy woodland/tall woodland ± patches of *Acacia harpophylla* and *Melaleuca bracteata*. Occurs on Quaternary alluvial plains.	Endangered
12.12.7	*Eucalyptus crebra* grassy woodland. Occurs on Mesozoic to Proterozoic igneous rocks.	Not of concern
12.12.8	*Eucalyptus melanophloia*, usually with *E. crebra* ± *Corymbia erythrophloia* grassy woodland. Occurs on Mesozoic to Proterozoic igneous rocks.	Of concern
12.12.12	*Eucalyptus tereticornis*, *E. crebra* (sometimes *E. siderophloia*) woodland. Occurs on Mesozoic to Proterozoic igneous rocks, especially granite lowlands and basins.	Of concern
12.12.28	*Eucalyptus moluccana* ± *E. crebra*, *Corymbia citriodora* open-forest or woodland. Occurs on broad ridges and lower slopes on Mesozoic to Proterozoic igneous rocks.	Of concern

E3.2 Fauna

As expected, the range and diversity of bird species on Hummock Hill Island is similar to that found on nearby island and mainland coastal locations. The southern end of Hummock Hill is a significant high tide roosting site for migratory waders.

Ground dwelling fauna is scarcer and less diverse, reflecting the fact that Hummock Hill Island is cut off from the mainland at all but the lowest tides, when waters in Boyne Channel may be shallow enough for larger animals to traverse. Mammals include the Eastern Grey Kangaroo, several gliders, flying fox, bats and introduced rodents.

Scratches on trees observed in February 2005 were likely to be from goanna and small arboreal mammals.

Reptiles appear to be relatively uncommon.

Midges and mosquitoes are associated with coastal wetlands, particularly on the southern side of the island.

Dogs, horses and cattle were introduced to Hummock Hill Island during its use for grazing, however these have not been observed recently. Rats, house mice and cane toads have also been introduced to Hummock Hill Island.

Table 9 shows a summary of mammals and reptiles identified in previous surveys on Hummock Hill Island.

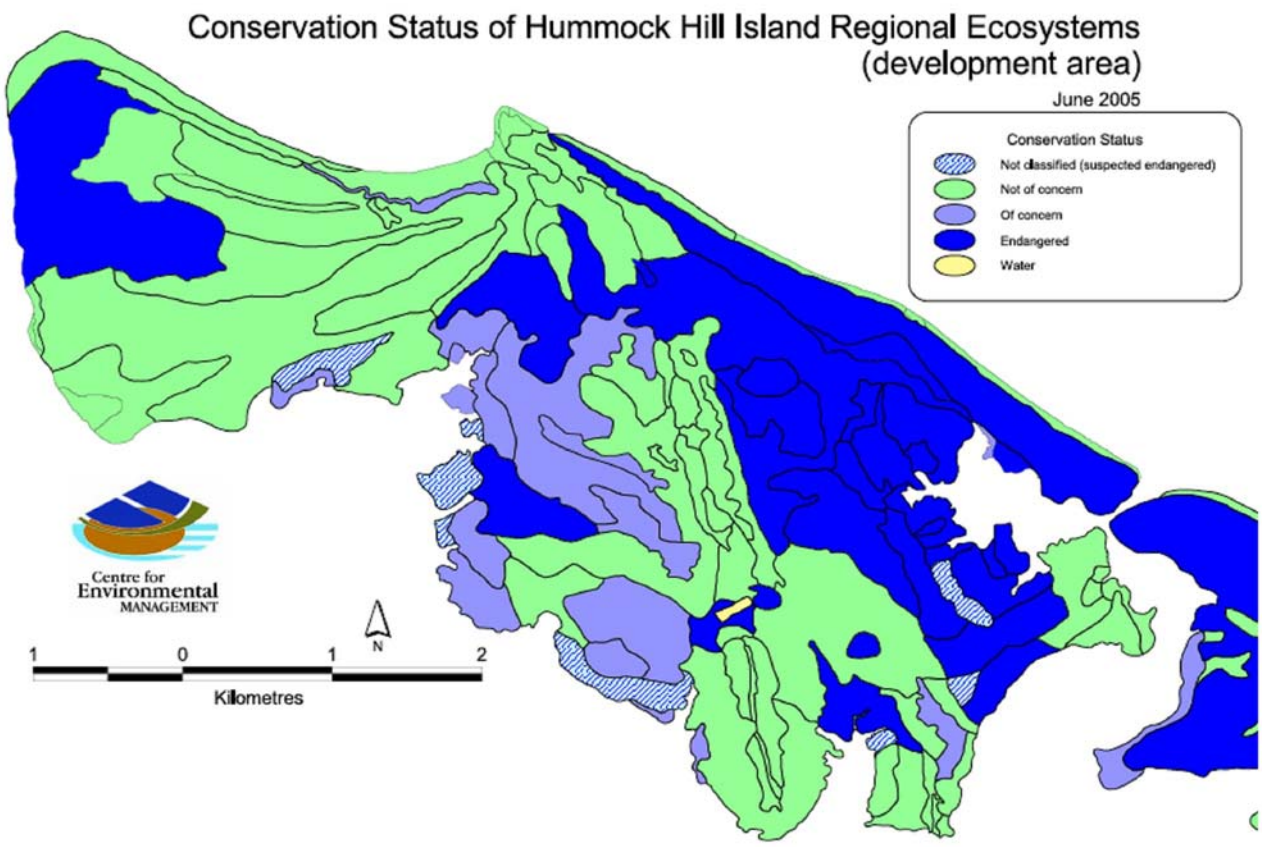

Figure 14: Conservation Status of Regional Ecosystems

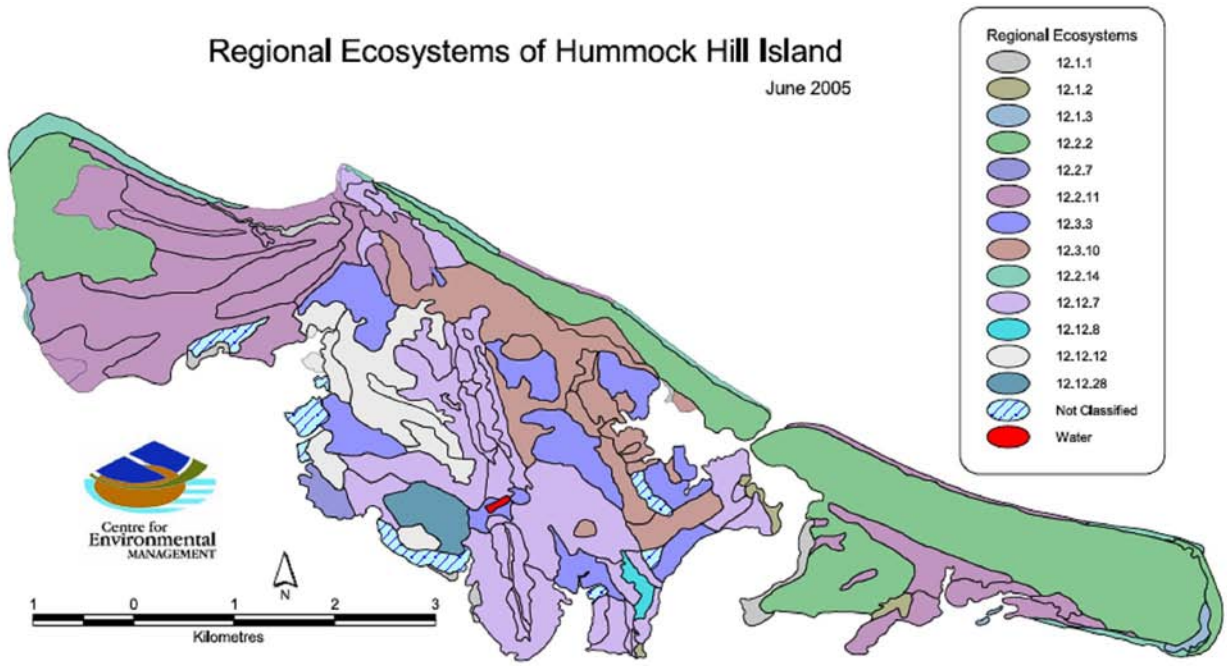

Figure 16: Regional Ecosystems of Hummock Hill Island

Table 9 Mammals and Reptiles Identified on Hummock Hill Island

Scientific Name	Comments	Common Name	Habitat
Tachyglossus aculeatus	Observed	Echidna	Eucalypt/grassland
Isoudon macrourus	Expected (1)	Northern Brown Bandicoot	Eucalypt/grassland
Petaurus norfolcensis	Observed	Squirrel Glider	Eucalypt/grassland
P. breviceps	Observed	Sugar Glider	Eucalypt/grassland
Trichosucus vulpecula	Expected	Common Bushtail Possum	Eucalypt/grassland
Macropus giganteus	Observed	Eastern Grey Kangaroo	Eucalypt/grassland
Wallabia bicolour	Expected	Swamp Wallaby	Eucalypt/grassland/paperbark swamp
Nystimene robinsonii	Observed	Queensland Tube-nosed Bat	Littoral vine scrub
Pteropus scapulatus	Tentative identification	Little Red Flying Flox	Eucalypt/grassland
Rattus fuscipes	Observed	Bush Rat	Disturbed land
Mus musculus	Introduced	House Mouse	Eucalypt/grassland
Canis familiaris	Introduced	Dog	
Equus caballus	Introduced	Horse	
Bos indicus	Introduced	Cattle	
Bufo marinus	Introduced	Cane Toad	
	Observed	Gecko	
Amphiboluris barbatus	Observed	Bearded Dragon	Eucalypt/grassland
Varanus goldii	Observed	Sand Monitor	Littoral vine scrub
Ctenotus robustus			
		Fence skink	Eucalypt/grassland
Dendrelaphus punctulatus	Observed	Common tree snake	Eucalypt/grassland
Pseudechis porphyriacus	Observed	Red Bellied Black Snake	Eucalypt/grassland

(1) expected based on a 1989 survey of Curtis Island (Kershaw 1989 in AGC Woodward Clyde 1993)

E3.3 Species of Conservation Significance

Two bird species have been observed on Hummock Hill Island that are listed under the Queensland Nature Conservation Act 1993:

- Eastern Curlew *Numenius madagascarensis*, listed as rare
- Beach Stone Curlew *Burhinus neglectus/Esacus neglectus*, listed as vulnerable.

Both of these are migratory wader birds which frequent estuarine and beach habitat, typically foraging in intertidal areas.

Table 10 shows species listed under the *Environmental Protection and Biodiversity Conservation Act 1999* that have been observed on Hummock Hill Island. All of these birds are fairly common in Eastern Australia, with many common across Australia. All have been observed in urban and non-urban habitats throughout their range (Birds Australia Atlas and Birdata). Birds Australia Atlas shows sightings of all of these birds in Gladstone, Tannum Sands/Boyne Island and Seventeen Seventy. All except the Southern Boobook are coastal birds.

Table 10 EPBC Listed Species Identified on Hummock Hill Island

Species name	Common Name	EPBC Status
Haliaeetus leucogaster	White-bellied Sea-Eagle	Migratory, Listed marine species
Hirundapus caudacatus	White-throated Needletail, Spine-tailed Swift	Migratory, Listed marine species
Merops ornatus	Rainbow Bee-eater	Listed marine species – overfly marine area
Calidris acuminata	Sharp-tailed sandpiper	Migratory
Charadrius mongolus	Mongolian Plover or Lesser Sand Plover	Migratory
Ninox novaeseelandiae	Southern Boobook	Migratory
Pandian haliaetus	Osprey	Migratory
Tringa hypoleucos	Common Sandpiper	Migratory

E4 Coastal and Aquatic Ecosystem

E4.1 Habitat

An extensive intertidal zone extends along the southern, eastern and western coastlines of Hummock Hill Island to the mainland coast. With the exception of the exclusion zone around the Boyne Channel causeway, this entire area is included in the Colosseum Inlet Fish Habitat Area. The area is also listed in the Directory of Important

Wetlands although it is not a Ramsar wetland. Hummock Hill Island lies entirely within the Rodds Bay Dugong Protected Area.

Coastal and marine habitats surrounding Hummock Hill Island are broadly described as follows:

- Intertidal mangrove and salt pan along the southern and southeastern coastlines of Hummock Hill Island as well as along much of the mainland coast. A mangrove lined tidal inlet effectively divides Hummock Hill Island into an eastern and western portion.
- Some areas of intertidal mudflats as well as extensive subtidal mudflats in the between the southern and south eastern coast of Hummock Hill Island and the mainland.
- A narrow sandy channel with depths up to 20 m along the western edge of the island between Hummock Hill Island and Wild Cattle Island.
- Sandy beaches and subtidal areas along the northern (exposed) side of Hummock Hill Island with a rocky headland at Tiber Point.
- Some offshore rocky reef north of Hummock Hill Island.
- Seagrasses have not been observed in close proximity to Hummock Hill Island, including in the subtidal muddy substrate Boyne Channel area. Seagrasses are reported further south of Pig Island and also north/north east of Hummock Hill Island. The potential for seasonal and annual fluctuation in seagrass cover is acknowledged.
- There are no coral reef communities in the immediate vicinity of Hummock Hill Island although coral reefs do occur to the southeast near Rodd's Peninsula.

E4.2 Species

Hummock Hill Island is not known as a turtle-nesting site but turtles are expected to occur in the immediate area and the northern beaches on the island are similar to other beaches in the region turtles are known to nest.

Although Hummock Hill Island is located within Rodds Bay Dugong Protection Area there is minimal seagrass habitat in the immediate vicinity. Dugongs have not been observed in the vicinity of Hummock Hill Island, however a comprehensive survey has not been carried out.

Sea birds, including waders, herons, cormorants and oyster catchers are expected to be common users of the shallow marine areas. Migratory waders such as the Easter Curlew and Godwits have been observed in small numbers on the tidal flats of the island.

E5 Geology and Soils

E5.1 Geology

Hummock Hill Island comprises part of the northeasterly margin of the Miriam Vale granodiorite, which is a large granitic batholith from the Permium-Triassic period. The Shoalwater Formation also outcrops on Hummock Hill Island, and comprises quartz arenite, mudstone, quartz-muscovite-biotite schist and gneiss.

The unit gives rise to shallow acid yellow-mottled duplex soils.

Holocene beach ridges less than 6000 years old are also found on Hummock Hill Island and are characterised by low relief and are separated by inter-ridge depressions. The sediment consists of fine-grained quartz sand, coarse sand at depth and minor organic rich silt with disseminated heavy mineral sands.

The Department of Natural Resources and Mines identifies the mineral sands resource as being “small”, consisting of between 5,000 and 5,000,000 tonnes.

E5.2 Soils

The following broad soil units were identified on the island in a 1993 study (Raymag) and confirmed in field work undertaken in September/October 2005:

- Lithosols on the steeper slopes and crest of the main range and some outcrops at lower elevations. These soils typically support an Eucalypt open woodland dominated by narrow leafed Ironbark and Pink Bloodwood and a grassy understorey;
- Solodics on the undulating plains below the main range. These soils typically support Eucalypt Open Woodland;
- Red earth, on a small area east of the headland on the north shore. These soils generally support dense grassland with mixed regrowth of Moreton Bay Ash, Acacias and Bloodwoods;
- Siliceous sands in the dune areas. These sands support a littoral vine scrub and Eucalypt and Melaleuca woodland; and
- Marine sediments in intertidal areas.

Acid sulphate soils may occur in low-lying areas, particularly on the southern side of the island, for example in the vicinity of the existing causeway/proposed bride. Typically, acid sulfate soils are present in areas of holocene sediments below 5m AHD, however they may occur at higher elevations as well.

Significant soil contamination is not expected to have occurred on the island based on the type of activities carried out in the past. A cattle dip is located on the ocean side of the island, near the former homestead. The area does not appear to have been decommissioned or decontaminated. Recent testing (November 2005) shows that contaminant levels are quite low.

Several empty drums were also observed in the vicinity of the homestead but have probably not lead to significant contamination as the quantities appear to be low. The

site is not included on the Contaminated Land Register or the Environmental Management Register as held by the Queensland EPA.

E5.3 Good Quality Agricultural Land

An assessment of the agricultural suitability of soils was undertaken as part of the Hummock Hill Island – Residential and Recreational Development Impact Assessment Study (1993). The assessment used classifications that have since been replaced by the State Planning Policy 1/92 Development and the Conservation of Agricultural Land. The study determined that the site contained the following pastoral suitability divisions:

- Main Range Landform – Class VII having severe limitation of slope erosion potential and soil depth.
- Undulating Plains – Class VI has impeded subsoil drainage and high salinity. There is a small areas of red soils (Class III) with moderate limitations for agricultural cultivation due to issues such as salt spray and available moisture.
- Dunal landform – Class VI due to limitations of moisture, low soil fertility, flooding and wetness.

The island has been used primarily for cattle grazing under a pastoral lease with very limited lucerne cultivation in the early years of European settlement. The site is currently not in use.

E6 Topography and Landform

Four distinct topographical units have been identified on Hummock Hill Island.

- The Main Range unit consists of a line of low rocky hills, which run approximately north-south across the centre of the island. Hummock Hill is the highest point, with an elevation of 135 m AHD. The slopes of the foothills are steep and concave, and decrease rapidly in slope with distance from the main range, where they merge into the adjacent plains. Rock outcrops or occurs at shallow depth or as scree with an increasing depth of weathering further downslope in this area. Gully erosion in the Gum Topped Box and Poplar Box Open Forest has occurred.
- Undulating Plains overlie granodiorite bedrock at the base of the Main Range unit. These areas are well drained with decomposed rock near the surface. The Undulating Plains merge into the dunes and intertidal areas.
- Tidal areas comprising mangrove and mudflats.
- Dunal area extends from the undulating plains to the west, north and east coasts of the island, merging into coastal beaches. The frontal dune system is stabilised by coastal vegetation such as sand Spinifex and dune couch.

E7 Visual Amenity

Hummock Hill Island presents a blend of natural scenery and rural (pastoral) scenery. It is largely undeveloped and is part of a larger setting that is renowned for its natural beauty. It lies at the southern end of the Great Barrier Reef World Heritage Area. Aesthetic characteristics are one of the values for which the GBRWHA has been designated.

Sensitive receptors with respect to development on the Island are limited. The island is visible to boat traffic, however close up views are likely to be at least partly screened by vegetation. Views from the mainland are restricted both by topography and lack of public access to the mainland coastline.

Hummock Hill Island is just south of the Boyne Island aluminium smelter, Port of Gladstone and Gladstone industrial area and development associated with these areas is visible from the northern shore of Hummock Hill Island. Views of this area are characterised by large industrial buildings and structures, including chimneys. The shipping lane runs parallel to the coast and at any one time, several large ships are visible from Hummock Hill Island.

E8 Cultural Heritage

An archaeological survey undertaken in 1993 by A.G.C. Woodward Clyde, which identified shell middens and artefact scatters near the causeway on the southern side of the island. A sparse scatter of stone and shell in a dune area on the northern side of the island is also likely to have been a midden. In addition, a stone cairn of unknown origin exists on top of Hummock Hill and has been recorded as a possible Aboriginal stone arrangement.

There are no heritage listed sites on Hummock Hill Island however several sites that may be of European heritage interest exist relating to earlier use of the island for grazing activities.

A walk over survey of the site was conducted by an archaeologist in December 2005 which confirmed the location of these sites and identified some additional sites, including sites of potential European heritage.

E9 Noise and Air Quality

Hummock Hill Island is currently vacant land and there are no significant sources of noise or air pollution on the island or in close proximity.

Industrial activities in Gladstone generate a range of air pollutants, most notably particulate matter, nitrogen oxides and sulfur dioxide. The EPA undertake air quality monitoring at three sites within the Gladstone region to determine the existing air quality and to monitor trends in air quality. The current ambient levels of all major pollutants are generally well below the guidelines. Prevailing winds at Hummock Hill Island are generally towards Gladstone, thus blowing plumes away from the island. In any case, the concentrations of pollutants in the airshed remain relatively low and would disperse prior to a plume reaching Hummock Hill Island.

There are few sensitive noise receptors in the vicinity of the island. Some fishing shacks exist on Wild Cattle Island and the mainland shore of Colosseum Inlet to the east of Hummock Hill Island.

E10 Climate and Natural Hazards

E10.1 Climate

The Gladstone region has a subtropical climate. Summers are wet and hot with average maximum temperatures around 30^{o}C while winters are drier and cooler, with average maximum temperatures around 15-20^{o}C.

Winds in Gladstone are generally from the East and South quarters. Winds tend to shift easterly and strengthen in the afternoon, showing the influence of a sea breeze.

E10.2 Natural Hazards

Cyclonic activity in the region of the Project occurs predominantly between January and March, although the cyclone season encompasses all months between November to April inclusive. The main implications of cyclones are:

- Severe wind velocities. The highest wind velocity recorded at Gladstone is 155 km/hr and at Bustard Head ;
- Extreme rainfall events. The highest daily rainfall recorded at Gladstone is 229 mm and at Bustard Head is 379 mm; and
- Increased tidal effects (storm surge).

Severe flooding is not likely to be a concern on Hummock Hill Island due to the size of catchments on the island. Storm surge has been estimated to be 3.3 to 3.6 m AHD (100 year average recurrence) (Coastal Engineering Solutions October 2005).

The Curtis Coast is noted to have relatively high seismic activity with over 400 earthquakes having been recorded in the Gladstone region. There is currently only one seismograph is located near Gladstone at Awoonga dam.

E11 Social and Economic Environment

E11.1 Demographic Characteristics

Hummock Hill Island is located within the shire of Miriam Vale and is surrounded by the shires of Calliope, Burnett and Kolan. The collective population of these shires was 53,419 in 2001. The Department of Local Government and Planning has projected the growth rate for the area to be 2.4% from 2001 to 2026, compared with 1.5% for the state. The projected population in 2026 is 97,550. The highest growth rate for age groups is in the 65+ group, with a projected growth of 5.7% between 2001 to 2026 for this age group compared with 3.7% for the state.

Hummock Hill Island is situated in the Wide Bay-Burnett Statistical division. This region comprises 22 local government areas, including Miriam Vale Shire and has an estimated population at 30 June 2004 of 244,537 persons. This represents 6.4 per cent of the total Queensland population.

The Wide Bay-Burnett Statistical Division recorded a population growth rate of 1.9% between June 2002 and June 2003, with the fastest growing local government area in the 12 months to June 2003 being Hervey Bay City (5.0%), followed by Miriam Vale

Shire (4.1%). Note however that for Miriam Vale Shire, the actual increase in population in this period was 197 people. The 2004 population of Miriam Vale Shire is estimated at 5,113 persons and is predicted to grow to about 10,000 people in 2026 (OESR).

Population growth rates are shown in Table 11.

Table 11 Population Growth

Location	Estimated Population	Average Annual Growth Rate	
	2004	1998-2003	2002-2003
Miriam Vale SC	5,113	2.9%	4.1% (197 persons)
Calliope SC	16,210	2.0%	2.5% (400 persons)
Gladstone CC	28,503	0.8%	1.7% (492 persons)
Queensland	-	1.9%	2.3%

Table 12 shows age distribution in Miriam Vale and Queensland based on the 2001 census and medium series estimates for 2026. The 15-24 age group in Miriam Vale is significantly lower than the State average, possibly reflecting the lack of tertiary education and training opportunities in Miriam Vale. The forecast is for a significant increase in the 65+ age group, even compared to the State average, by 2026. This may be based on perceived desirability of coastal locations in Miriam Vale for retirement housing.

Table 12 Age Distribution [1]

	0-14	15-24	25-44	45-64	65+	Median Age
Miriam Vale 2001	21.7%	8.6%	26.7%	33.6%	9.4%	41
Queensland 2001	21.3%	14.1%	29.8%	23.2%	11.6%	35
Miriam Vale 2026 [2]	11.8%	5.7%	17.8%	31.2%	33.5%	56
Queensland 2026 [2]	16.4%	12.0%	26.1%	25.5%	20.0%	42

Population Information and Forecasting Unit, DLGP

Based on medium growth series

The above average population growth in Miriam Vale and Calliope Shires probably reflects increased employment opportunities in the Gladstone region, with migrants into the region living in adjacent shires of Calliope and Miriam Vale. Some growth in Miriam Vale is probably also attributable to increased activity at the coastal towns of Agnes Water and 1770, and this may also explain the higher than normal median age if retirees are moving to coastal locations.

E11.2 Socio-economic Characteristics

Hummock Hill Island lies within Miriam Vale Shire Council and the closest urban centres are Miriam Vale and Bororen. The closest city to Hummock Hill Island is Gladstone, about 60 km by road from Hummock Hill Island Tannum Sands/Boyne Island, in Calliope Shire also represents a significant population, employment and activity centre in close proximity to Hummock Hill Island.

The median weekly income for Gladstone is higher than the median income for the state, however the median weekly income for the Miriam Vale shire is well below that of Queensland.

Businesses in the agriculture, forestry and farming industry make up 61.1% of total businesses by industry in the Central Queensland shires of Miriam Vale, Calliope, Burnett and Fitzroy, this is compared with 17.2% average for the state. The three highest employing industries are agriculture, forestry and fishing and retail trade and manufacturing which employ 13.8%, 14% and 14.1% respectively. The majority of workers in the region are trade persons and related workers. According to the 2001 Census the shires had an unemployment rate of 9.7%, which was higher than the state average of 8.2%.

Gladstone has a broad industrial base and a special development area in Calliope Shire has been identified by the Queensland Government to facilitate industrial development in the area. Port of Gladstone is one of the State's largest ports and is one of the world's largest coal export ports with coal brought to Gladstone by rail from mines inland.

Tourism is also a major component of the regional economy. Tourists can access the Great Barrier Reef from Gladstone and other townships in the region. The coastal areas of Miriam Vale also offer beaches and other tourist attractions, currently centred on Agnes Waters and 1770. The majority of tourists visiting the region come from either Brisbane or country areas within Queensland. The most popular form of transport used by visitors to the region is a private vehicle, with the second highest form of transport to the region being by air.

An increasing market for coastal recreational facilities is developing among the inland mining communities of central Queensland. The current upswing in mining activity has resulted in increased employment and increased remuneration in these mining communities.

E12 Infrastructure and Services

E12.1 Transport and Traffic

The Bruce Highway provides the main north-south access route through the Gladstone Region. The Dawson Highway links Gladstone with the central and west regions.

Access to Hummock Hill Island is from Turkey Beach Road, Foreshores Road, and Clarks Drive.

The road network on the island consists of unformed trackswith a rock ford connection to the mainland accessible only at very low tides.

The North Coast Rail Line links Gladstone with Brisbane and Cairns. Stations are at Miriam Vale and Gladstone.

Gladstone has an airport and is also one of Queensland's major sea ports.

E12.2 Power and Telecommunications

While power and telecommunications were provided to the homestead at Tiber Point, these services are probably obsolete, and in any case, would be inadequate to supply the proposed development population.

The nearest major electrical substation is at Boyne. There are high voltage powerlines passing within about 10 km of the site.

E12.3 Water and Wastewater

There is no water supply from the mainland to Hummock Hill Island and fresh surface water supplies on the island are minimal. Awoonga Dam is located about 30 km inland from the island and provides water for industrial uses at Gladstone as well as domestic use in Gladstone City, Calliope Shire and parts of Miriam Vale Shire. Calliope Shire Council has a reservoir at Tannum Sands that has capacity to supply the proposed population at Hummock Hill Island.

The island is not serviced by reticulated sewerage. The only reticulated sewerage system currently in operation in Miriam Vale Shire Council as at Agnes Waters.

E12.4 Waste Management

Miriam Vale Shire operates 3 waste management sites located at 1770, Bororen, and Baffle Creek. Charges apply for the disposal of Building/Commercial/Industrial refuse at these sites. A new regional landfill is proposed to be located in Calliope Shire which will service surrounding shires including Miriam Vale.

Hummock Hill Island is currently outside of the area serviced by household waste collection.

E13 Local and Regional Access

E13.1 Road Access

Hummock Hill Island is located off the coast of Queensland approximately 60km southeast of Gladstone by road.

Vehicular access to the island is achieved from the Bruce Hwy via the Turkey Beach Road turnoff, Foreshores Road and Clarks Road where there is a causeway to the island that allow access at low tide. Turkey Beach Road and parts of Foreshores Road are two lane bitumen roads. The remainder of Foreshores Road is a two lane unsealed road. Clarks Road is a one lane unsealed track in moderate to poor condition. Widening and upgrading of this road can be carried out within the existing road reserve.

Road base material and sand is available from existing quarries within the Gladstone/Calliope region.

Intersections at the Bruce Highway/Turkey Beach Road, Turkey Beach Road/Foreshores Road and Foreshores Road/Clark Road would require upgrading as would the rail crossing immediately after the turn off from Bruce Highway to Turkey Beach Road. The rail crossing is likely to remain at grade but may need improved sight distances and warning signals.

E13.2 Air Access

The nearest air link to the island is Gladstone (60km). Qantas operates 6 flights daily between Gladstone and Brisbane with a travel time of 80 minutes. One of these flights links with points further north.

There is an existing grassed airstrip on the island which is in poor repair and would need to be cleared and regraded to become operational.

E13.3 Rail

The nearest rail link is Miriam Vale Train Station (42km from Hummock Hill Island). Tilt trains run between Brisbane and Miriam Vale 6 times per week. Approximate travel time from Brisbane is 6 hours.

E13.4 Sea

Hummock Hill Island can be accessed by boat from Gladstone and a number of minor boat launching points along the mainland coast. There are no formal boat landing locations on the Island, however small boats may make safe landing at the causeway in all weather and also on the northern beaches and Colosseum inlet coast when weather permits.

The nearest boat launching ramps are at Tannum Sands and Turkey Beach while small boats may also be launched at Foreshores and Wild Cattle Creek on high tides.

Appendix F

Assessment of Potential Impacts on Great Barrier Reef World Heritage Area Values

Assessment of Potential Effects on World Heritage Values of the Great Barrier Reef World Heritage Area

Criteria	Values	Response
N(I) Outstanding examples of stages of earth's history	The Great Barrier Reef is by far the largest single collection of coral reefs in the world. The World Heritage values of the property include: • 2904 coral reefs covering approximately 20,055km^2; • 300 coral cays and 600 continental islands; • reef morphologies reflecting historical and on-going geomorphic and oceanographic processes; • processes of geological evolution linking islands, cays, reefs and changing sea levels, together with sand barriers, deltaic and associated sand dunes; • record of sea level changes and the complete history of the reef's evolution are recorded in the reef structure; • record of climate history, environmental conditions and processes extending back over several hundred years within old massive corals; • formations such as serpentine rocks of South Percy island, intact and active dune systems, undisturbed tidal sediments and "blue holes"; and • record of sea level changes reflected in distribution of continental island flora and fauna.	The proposed Hummock Hill Island development will not affect the geological and scientific information and examples for which the GBR WHA was prescribed. The geological formation of Hummock Hill Island will not be affected by the proposed development. Other geological features will not be directly or indirectly affected by the proposed development. Coral reef structures and ecosystems will not be affected directly or indirectly. The presence and distribution of flora and fauna on Hummock Hill Island will not be significantly altered. Data and studies undertaken for the proposed development will provide additional information on the distribution and characteristics of ecosystems and species on Hummock Hill Island.
N(II) Outstanding examples of on-going evolution	Biologically the Great Barrier Reef supports the most diverse ecosystem known to [hu]man[s] and its enormous diversity is thought to reflect the maturity of an ecosystem, which has evolved over millions of years on the northeast Continental Shelf of Australia. The World Heritage values include: • the heterogeneity and interconnectivity of the reef assemblage; • size and morphological diversity (elevation ranging from the sea bed to 1142m at Mt. Bowen and a large cross-shelf extent encompass the fullest possible representation of marine environmental processes); • on going processes of accretion and erosion of coral reefs, sand banks and coral cays, erosion and deposition processes along the coastline, river deltas and estuaries and continental islands;	The proposed development on Hummock Hill Island will be designed, constructed and managed to ensure that there are no adverse impacts on coastal and aquatic ecosystems or on the geological and geomorphological characteristics of the region that underlie the ecological diversity of the Great Barrier Reef. Coastal and estuarine processes that shape these habitats will not be affected by the proposed development. Detailed investigations into management of stormwater, wastewater, waste, human access and activities, domestic pets, weeds and other potential impacts on

Criteria	Values	Response

	• extensive Halimeda beds representing active calcification and sediment accretion for over 10 000 years;
	• evidence of the dispersion and evolution of hard corals and associated flora and fauna from the "Indo-West Pacific centre of diversity" along the north-south extent of the reef;
	• inter-connections with the Wet Tropics via the coastal interface and Lord Howe Island via the East Australia current;
	• indigenous temperate species derived from tropical species;
	• living coral colonies (including some of the world's oldest);
	• inshore coral communities of southern reefs;
	• five floristic regions identified for continental islands and two for coral cays;
	• the diversity of flora and fauna, including:
	  • Macroalgae (estimated 400-500 species);
	  Porifera (estimated 1500 species, some endemic, mostly undescribed);
	  Cnidaria: Corals - part of the global centre of coral diversity and including:
	  • hexacorals (70 genera and 350 species, including 10 endemic species);
	  • octocorals (80 genera, number of species not yet estimated);
	  • Tunicata: Ascidians (at least 330 species);
	  • Bryozoa (an estimated 300-500 species, many undescribed);
	  • Crustacea (at least 1330 species from 3 subclasses);
	  • Worms:
	  • Polychaetes (estimated 500 species);
	  • Platyhelminthes: include free-living Tubelleria (number of species not yet estimated), polyclad Tubelleria (up to 300 species) and parasitic helminthes (estimated 1000's of species, most undescribed);
		coastal and aquatic habitats will be undertaken as part of the impact assessment for the proposed development. The outcome of these investigations will be specific proposals and management measures to be put in place to ensure that all potential indirect impacts on areas outside the development footprint can be avoided and managed.
		
		The value of the reef and its diverse habitats and ecosystems as an example of evolutionary processes or species evolution will not be diminished. The wide range of species that exist in the habitats offered by the reef ecosystem will not be diminished.
		
		The proposed development will almost entirely take place within terrestrial zones of the WHA, the only exceptions being the proposed bridge and boat ramps which will affect about 200m of coastline in total. Clearing of about one third of terrestrial ecosystems within the development lease will be required to allow the proposed development to go ahead. Clearing is being limited to terrestrial ecosystems classified by the Queensland State Government as “not of concern”. A significant proportion of not of concern vegetation will also be retained within the development. Flora and fauna surveys of the Development Lease have not indicated a high proportion of listed rare and threatened species, nor any particularly unusual assemblages of species.
		
		Nearby terrestrial islands (Wild Cattle Island) and coastal

Criteria	Values	Response

	• Phytoplankton (a diverse group existing in two broad communities);
	• Mollusca (between 5000-8000 species);
	• Echinodermata (estimated 800 extant species, including many rare taxa and type specimens);
	• fishes (between 1200 and 2000 species from 130 families, with high species diversity and heterogeneity; includes the Whale Shark *Rhynchodon typus*);
	• seabirds (between 1.4 and 1.7 million seabirds breeding on islands);
	• marine reptiles (including 6 sea turtle species, 17 sea snake species, and 1 species of crocodile);
	• marine mammals (including 1 species of dugong (*Dugong dugon*), and 26 species of whales and dolphins);
	• terrestrial flora: see "Habitats: Islands" and;
	• terrestrial fauna, including:
	  • invertebrates (pseudoscorpions, mites, ticks, spiders, centipedes, isopods, phalangids, millipedes, collembolans and 109 families of insects from 20 orders, and large over-wintering aggregations of butterflies); and
	  • vertebrates (including seabirds (see above), reptiles: crocodiles and turtles, 9 snakes and 31 lizards, mammals);
	• the integrity of the inter-connections between reef and island networks in terms of dispersion, recruitment, and the subsequent gene flow of many taxa;
	• processes of dispersal, colonisation and establishment of plant communities within the context of island biogeography (e.g. dispersal of seeds by air, sea and vectors such as birds are examples of dispersion, colonisation and succession);
	• the isolation of certain island populations (e.g. recent speciation evident in two subspecies of the butterfly *Tirumala hamata* and the evolution of
		mainland areas are protected as National Parks, providing protection for examples of terrestrial flora and fauna recognised in the World Heritage listing.
		
		While the northern beaches of Hummock Hill Island appear suitable for turtle breeding and egg laying, there is no evidence that turtles have used these beaches. In any case, the beaches themselves will not be directly impacted by the development, and techniques have been successfully used at other locations to ensure that public access to turtle breeding beaches does not affect breeding, egg laying and egg hatching components of the turtle life cycle.

Criteria	Values	Response
	distinct races of the bird *Zosterops spp);* • remnant vegetation types (hoop pines) and relic species (sponges) on islands. • evidence of morphological and genetic changes in mangrove and seagrass flora across regional scales; and • feeding and/or breeding grounds for international migratory seabirds, cetaceans and sea turtles.	
N(III) Contains superlative natural phenomena	The Great Barrier Reef provides some of the most spectacular scenery on earth and is of exceptional natural beauty. The World Heritage values include: • the vast extent of the reef and island systems which produces an unparalleled aerial vista; • islands ranging from towering forested continental islands complete with freshwater streams, to small coral cays with rainforest and unvegetated sand cays; • coastal and adjacent islands with mangrove systems of exceptional beauty; • the rich variety of landscapes and seascapes including rugged mountains with dense and diverse vegetation and adjacent fringing reefs; • the abundance and diversity of shape, size and colour of marine fauna and flora in the coral reefs; • spectacular breeding colonies of seabirds and great aggregations of over-wintering butterflies; and • migrating whales, dolphins, dugong, whale sharks, sea turtles, seabirds and concentrations of large fish.	The proposed development on Hummock Hill Island will be visible from the air. Hummock Hill Island is visible from a few locations on the mainland and also to boat traffic passing to seaward of the Island. However the island faces the main channel into the port of Gladstone and forms part of the general landscape that is dominated by large industrial structures of Gladstone and Boyne Island as well as large ships using Gladstone Port. Some aspects of the development will be visible in views within and to the world heritage area. The potential visual impacts of the proposed development on viewers from air, sea and land positions will require further assessment so that design measures can be put in place to ensure that views of the development do not detract from the overall landscape character in this part of the World Heritage Area. No other “superlative natural phenomena” are expected to be impacted by the proposed development on Hummock Hill Island.
N(IV) Important habitats for	The Great Barrier Reef contains many outstanding examples of important and significant natural habitats for *in situ* conservation of species of conservation	As discussed above, the proposed development will be designed and constructed to ensure that impacts are

Criteria	Values	Response

conservation of biological diversity	significance, particularly resulting from the latitudinal and cross-shelf completeness of the region.
	The World Heritage values include:
	• habitats for species of conservation significance within the 77 broadscale bioregional associations that have been identified for the property and which include:
	  • over 2900 coral reefs (covering 20 055km2) which are structurally and ecologically complex;
	  • large numbers of islands, including:
	  • 600 continental islands supporting 2195 plant species in 5 distinct floristic regions;
	  • 300 coral cays and sand cays;
	  • seabird and sea turtle rookeries, including breeding populations of green sea turtles and Hawksbill turtles; and
	  • coral cays with 300-350 plant species in 2 distinct floristic regions;
	  • ·seagrass beds (over 5000km2) comprising 15 species, 2 endemic;
	  • mangroves (over 2070km2) including 37 species;
	  • Halimeda banks in the northern region and the unique deep water bed in the central region; and large areas of ecologically complex inter-reefal and lagoonal benthos; and
	  • species of plants and animals of conservation significance
		contained within the development lease. Thus, coastal and aquatic ecosystems, and the individual species within these ecosystems are not expected to be directly or indirectly impacted by the proposed development.
		
		Detailed investigations into human settlement, infrastructure and services to be provided as part of the proposed development will identify the measures required to ensure that adverse impacts on coastal and aquatic ecosystems do not occur as a result of the proposed development.
		
		As discussed above, clearing of about Xxh of terrestrial vegetation will be required. This will not affect any of the identified bioregions of the WHA (Map of bioregions in the GBRWHA - <*http://www.gbrmpa.gov.au/corp_site/key_issues/conservation/rep_areas/documents/bioregions_2001_06.pdf*>)
		
		Hummock Hill Island lies wholly within Bioregion NA3 – High Nutrients Coastal Strip: Terrigenous Mud and high levels of nutrients from adjoining land. Seagrasses in sheltered sites only. Good turtle and dugong feeding habitat. Wet tropical influence for much of the coast [note that the wet tropics region does not extend as far south as Hummock Hill Island].

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