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SHUTE HARBOUR
MARINA

Report on
Matters of National Environmental Significance

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Shute Harbour Marina Development Pty Ltd

Cardno (Qld) Pty Ltd

ABN 57 051 074 992

Level 11 Green Square North Tower

515 St Paul's Terrace

Fortitude Valley Qld 4006

Locked Bag 4006 Fortitude Valley

Queensland 4006 Australia

Telephone: 07 3369 9822

Facsimile: 07 3369 9722

International: +61 7 3369 9822

cardno@cardno.com.au

www.cardno.com.au

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Version	Date	Author		Reviewer	
		Name	Initials	Name	Initials
1	31 July 2008	Monica Campbell	MC	John Delaney	JD
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SHUTE HARBOUR MARINA RESORT

REPORT ON

MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

APPENDICES

EXECUTIVE SUMMARY

This report has been prepared in accordance with the Terms of Reference for an Environmental Impact Statement for the Shute Harbour Marina Resort (formerly known as the Shute Harbour Marina Development), produced by the Coordinator General, Queensland Government, May 2007.

The Shute Harbour Marina Resort (or action) was referred to the then Commonwealth Department of Environment and Heritage (DEH) on the 17th of July 2006 for the Minister to determine whether Commonwealth approval is required for the action. A Decision Notice was issued on the 27th of July 2006 notifying that the proposal is a controlled action (i.e. requires Commonwealth approval) pursuant to Part 3, Division 1, of the *Environment Protection and Biodiversity Conservation Act 1999*. The controlling provisions were determined to be:

- Sections 12 and 15A (World Heritage);
- Sections 18 and 18A (Listed threatened species and communities);
- Sections 20 and 20A (Listed migratory species); and
- Sections 23 and 24A (Marine environment).

More specifically the Shute Harbour Marina Resort has the potential to affect the following Matters of National Environmental Significance ("Matters of NES"):

1. the Great Barrier Reef World Heritage Area (GBRWHA);
2. known and potential habitat for a diversity of listed threatened wildlife species; and
3. known and potential habitat for a diversity of migratory species listed under international agreements, including:
    - appendices to the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals) for which Australia is a Range State under the Convention;
    - the Agreement between the Government of Australia and the Government of the Peoples Republic of China for the Protection of Migratory Birds and their Environment (CAMBA);
    - the Agreement between the Government of Japan and the Government of Australia for the Protection of Migratory Birds and Birds in Danger of Extinction and their Environment (JAMBA); and
    - the Bilateral Agreement between the Government of Australia and the Republic of Korea for the Protection of Migratory Birds and their environment (ROKAMBA) .

The impact of loss of terrestrial and marine habitat will be mitigated and compensated through offsets and habitat gains as detailed in Section 2.5.3 of this report. Potential impacts on the above listed Matters of NES that may result from the Shute Harbour Marina Resort include:

- major landform adjustment including the excavation of the marina basin to a depth of -5.2m AHD, the creation of an isthmus (approximately 5.7ha) along the western boundary of the marina, construction of breakwaters along the marina's southern boundary and dredging of a marine navigational channel;
- direct physical impacts on seagrass communities, macroalgal communities, mudflat habitats, coral communities and fringing mangrove and saltmarsh vegetation as a consequence of the excavation of the marina basin and dredging of a marine navigational channel;

- direct physical impacts on fringing mangrove and saltmarsh vegetation as a consequence of the clearance of marine vegetation and associated development works;
- reclamation of tidal land for the purposes of constructing an integrated marina development including commercial, tourism and managed resort accommodation precincts (including internal roads and infrastructure) and supplementary 3 storey car park; and
- impacts upon Shute Bay and the Great Barrier Reef World Heritage Area, and marine fauna associated with maintenance dredging of the navigation channel and alterations to the patterns of usage of Shute Bay that will result from the establishment of the Shute Harbour Marina Resort.

The likelihood that the proposed Shute Harbour Marina Resort (SHMR) would have a *significant impact* upon Matters of NES was assessed against the relevant criteria contained within the *EPBC Act* Policy Statement 1.1 – Significant Impact Guidelines. The results of this assessment generally indicate that the proposed SHMR will not have a *significant impact* on Matters of NES that occur within and adjacent to the site. This assessment is based on the anticipated effectiveness of a number of environmental impact mitigation and management measures that are proposed as part of the SHMR, including:

- a Construction Environmental Management Plan (CEMP) which provides mechanisms in which environmental performance of the Shute Harbour Marina construction works can be measured and if required, provides procedures for identifying and implementing corrective actions;
- a Acid Sulfate Soils Management Plan (ASSMP) that has been designed to ensure that no significant adverse impacts on the receiving environment occur as a result of the disturbance of actual or potential acid sulfate soils;
- a Marina Site Based Management Plan (Marina SBMP) for various Environmentally Relevant Activities (ERAs), associated with the Shute Harbour Marina, and provides an overarching framework for best practice environmental management for other ERAs that may be undertaken within the Shute Harbour Marina;
- a Storm Water Management Plan (SWMP), provides details for the stormwater quality and quantity management of the proposed Shute Harbour Marina prior to discharge entering Shute Bay;
- a Waste Management Plan (WMP) to ensure the Shute Harbour Marina Resort does not adversely impact on the surrounding environment in terms of waster handling, storage and disposal; and
- a Marine Megafauna Impact Assessment and Management Plan (Marine Megafauna MP) which provides an assessment of the potential impacts of the SHMR on marine megafauna species and outlines management requirements aimed at ensuring the proposed development has minimal impact on marine megafauna.

The SHMR development also recognises the cultural importance of the GBRWHA to communities of Aboriginal or Torres Strait Islander origin. In this respect it is submitted that the SHMR development would not have a significant impact on the cultural heritage values of the GBRWHA. This assessment is based on an analysis of the following documents that form part of the SHMR EIS:

- *Indigenous Cultural Heritage Investigation, Shute Harbour Marina Development Project, Shute Bay, Whitsunday Shire*, prepared by Northern Archaeology Consultancies Pty Ltd and presented as Appendix S1 to the SHMR EIS;
- a Cultural Heritage Management Plan (CHMP), presented as Appendix S2 to the SHMR EIS; and

- *Cultural Heritage Management Plan – Shute Harbour Marina Development EIS Consultation Report*, prepared by the Hornery Institute and presented as Appendix S3 to the SHMR EIS.

The above reporting describes initial concerns were raised following consultation with Traditional Owners for the site (the Gia and Ngaro/Gia people) regarding the impact of the development on the region's cultural heritage. These concerns primarily related to the potential impact of the proposed development on culturally significant flora and fauna, the potential to uncover archaeological findings and the involvement of cultural representatives in the construction phase of the development. Through a consultative process a Cultural Heritage Management Plan (CHMP) was developed that addresses these issues and demonstrates the high level of support for the project by the respondent parties.

The CHMP and the associated report that details the process by which it was achieved is a component of the EIS and has used the guiding principles and rationale of COAG's Overcoming Indigenous Disadvantage – key indicators 2007 report to explore the determinants of net social benefit, which are aligned to the proposed Shute Harbour Marina Development and the Aspirations initiatives agreed to in the CHMP.

The Overcoming Indigenous Disadvantage – key indicators 2007 report, provides a robust 'roadmap' for actioning change to address disadvantage and contribute to 'closing the social, economic, environmental and wellbeing gap' between Indigenous and non-Indigenous Australians.

While the SHMR does not address all indicators of disadvantage for Gia and Ngaro/Gia communities, it is closely aligned to three of the four headline indicators. This alignment is demonstrated through the potential positive impact on Gia and Ngaro peoples through the opportunity to:

- participate in and share economic prosperity and cultural tourism opportunities;
- support the intrinsic benefits of governance and culture in community capacity building;
- maintain generational celebration and learning of cultural heritage traditions, language and expression;
- contribute to functional and resilient families and communities, and
- provide generational 'care for country, while showcasing Indigenous pride and knowledge to local, regional and international tourists.

It is therefore strongly asserted that the CHMP will contribute to positive long term outcomes for at least two Indigenous peoples – the Gia and Ngaro communities at a local community level.

The CHMP has been signed by the Gia and Ngaro/Gia people and the proponents. The CHMP has been approved and registered by the Department of Natural Resources and Water in April 2008.

The net impact of the Shute Harbour Marina Resort upon Matters of NES will also be reduced by:

- the surrender of vegetated land to the north of Proserpine-Shute Harbour Road to public ownership, for potential incorporation into the adjoining Conway National Park;
- creation of a "Reef Conservation Fund", which will complement the Commonwealth Government's Reef Rescue Plan, that will contribute to the ongoing sustainability of

the coral reef including providing coral and sea grass friendly moorings on the reef as well as education and awareness initiatives;

- protection of the water quality of Shute Bay by providing appropriate sewage pump-out and refuelling facilities, and polishing of current stormwater runoff from Proserpine-Shute Harbour Road;
- relocation of 57 swing moorings and replace these with environmentally sensitive seagrass moorings;
- education of recreational boaters through an interpretative centre and education extension programs to assist in reducing potential detrimental impacts of recreational boaters on the reef by assisting locals, visitors and the recreational and commercial boating community to understand coastal processes and the marine environment and appropriate boating best practice; and
- the use of structures in the design of the SHMR that will encourage colonisation of marine fauna and fish passage.

It is also recognised that the *EPBC Act* aims to balance the protection of Matters of NES with society's economic and social needs based on the guiding principles of ecologically sustainable development. In this respect it is relevant as part of any assessment of the impact of the development upon Matters of NES to consider the social and economic benefits that would be derived from the proposal. As part of the EIS process, the AEC Group has undertaken a Net Benefit Assessment that provides an analysis of the action in terms of its environmental, social and economic costs and benefits (refer to Appendix G to the EIS). The AEC Group determined that the development would:

- provide a range of community, economic and environmental benefits including increased access and recreational space, employment and additional business activity across a range of industries; and
- contribute to a net, or overall improvement in the environmental conditions throughout the Whitsundays, valued through the increase of ecosystem services values and recreational value of the natural attributes of the Great Barrier Reef maintained as a result of the development.

Given the anticipated low likelihood of any significant impacts occurring on Matters of NES and the environmental, social and economic benefits that would be derived, it is assessed that the action is consistent with the principal objective of the *EPBC Act*.

1. INTRODUCTION

This report on the Commonwealth's *Environment Protection and Biodiversity Conservation Act 1999* ("*EPBC Act*") Matters of National Environmental Significance ("Matters of NES") has been prepared by Cardno (Qld) Pty Ltd on behalf on Shute Harbour Marina Development Pty Ltd ("the Proponent") in respect to the proposed development of the Shute Harbour Marina Resort ("SHMR") on:

- land within the coastal zone and the Great Barrier Reef World Heritage Area (GBRWHA) and Great Barrier Reef Coast Marine Park;
- approximately 29.2 hectares of leasehold land described as Lot 2 on Plan SP117389;
- approximately 0.134 hectares of leasehold land described as Lot 273 on Plan HR1757; and
- adjacent seabed of 15.9 hectares over which a permit to occupy has been granted by the State of Queensland.

Collectively these parcels of land cover an area of approximately 45.2 ha and will be referred to hereafter as "the site", unless specified otherwise. A locality plan of the site is provided as Figure 1.

The proposed Shute Harbour Marina Resort (SHMR) will involve:

- reclamation of tidal land for the purposes of constructing an integrated marina development including commercial, tourism and managed resort accommodation precinct (including internal roads and infrastructure) and supplementary 3 storey car park; and
- construction of a solid breakwater around the southern and eastern (partial) perimeters of the marina;
- dredging of the marina basin to -5.2 metres AHD to accommodate a 669 berth marina;
- dredging of the access channel into the proposed marina; and
- operation of the marina complex.

The SHMR was referred to the then Department of Environment and Heritage (DEH) on the 17th July 2006 for the Minister to determine whether Commonwealth approval is required for the action. A Decision notice was issued on the 27 July 2006 notifying that the proposal is a controlled action (i.e. requires Commonwealth approval) pursuant to Part 3, Division 1, of the *EPBC Act*. The controlling provisions were determined to be:

- Sections 12 and 15A (World Heritage);
- Sections 18 and 18A (Listed threatened species and communities);
- Sections 20 and 20A (Listed migratory species); and
- Sections 23 and 24A (Marine environment).

This report has been prepared in accordance with the Terms of Reference (ToR) for an Environmental Impact Statement (EIS) for the SHMR, produced by the Coordinator General, Queensland Government, May 2007. In this regard, the ToR specifically states that:

'The EIS should provide a stand-alone report that exclusively and fully addresses the issues relevant to the matters of NES that were identified in the 'controlling provisions' when the Proposal was declared a controlled action under Part 3, Division 1 of the EPBC Act. '

This report provides as assessment of the potential impacts of the proposal on Matters of NES as requested within the ToR and draws upon information provided within:

- *Shute Harbour Marina EIS – Aquatic Ecology Report* dated 6th of March 2007, prepared by frc environmental;
- *Shute Harbour Marina Resort EIS – Terrestrial Ecological Assessment* dated 25th of February 2008, prepared by PLACE Environmental;
- *Shute Harbour Marina Resort EIS – Marina Megafauna Impact Assessment and Management Plan,* Final Report dated 28 July 2008, prepared by Natural Solutions Environmental Consultants Pty Ltd;
- *Shute Harbour Marina Resort – Environmental Impact Statement*, dated August 2008, prepared by Cardno (QLD) Pty Ltd; and
- the Department of Environment, Water, Heritage and the Arts (DEWHA) Environment Protection and Biodiversity Conservation Act website:

  http://www.environment.gov.au/epbc/index.html

2. DESCRIPTION OF THE PROPOSED ACTION

2.1 Site Locality

The SHMR ("the action") site is situated on, on Queensland's central coast and is located within the Whitsunday Regional Council Local Government Area. The site is located 10km south-west of Airlie Beach, 35km north-east of the Bruce Highway and a 30 minute or 2 hour drive from the Proserpine and Mackay airport respectively.

The SHMR will be established on land within the coastal zone which encompasses 45.2 hectares of leased land and seabed, the latter under a permit to occupy (the site). The land where development is occurring is described as Lot 2 on SP117389, Mount Rooper, in the Whitsunday Region. Figure 1 provides a locality plan.

The site is:

- traversed by Proserpine-Shute Harbour Road which separates marine, intertidal and foreshore sectors of the site from the balance of Lot 2 on SP117389;
- located to the south of the Conway National Park;
- located to the west of an existing motel and the Shute Harbour Transit Facility; and
- located to the east of a residential dwelling and marina salvage operation.

The site is currently used as a mooring location for recreational boats.

2.2 Proposed Plan of Development

The Master Plan of development for the SHMR is provided as Figure 2. With reference to this figure, the Proponent proposes development of the site for an integrated marina concept that will include the following land uses.

Marina

The proposed marina includes the following design features:

- a marina providing 669 berths (including 193 multi hull berths);
- excavation and dredging of the marina basin to achieve navigation depths to suit the types and sizes of vessels to be accommodated;
- a solid breakwater located at the eastern and southern edges of the site to control and dampen wave action and induce calm conditions within the marina basin;
- floating pontoons supported by driven piles for marina berths accommodating vessels of various sizes ranging from 11 m to 35 m in length and including berths for large catamarans;
- a base for charter boats;
- sullage pump-out facility;
- fuelling berths; and
- all required navigation aids, lights and signage.

Onshore Development

The water edge will be retained with revetment walls. The onshore development will be set at levels to accommodate the tidal range and predicted increases in sea levels due to storm conditions and greenhouse effects.

A summary of the commercial and tourism precincts and proposed infrastructure services is provided below.

Commercial and Tourism Precinct

The proposed commercial and tourism precinct includes the following design features:

- a 4½ tourist resort up to five storeys comprising 96 family suites with underground car parking;
- marina office, amenities and car parking;
- charter boat base comprising a range of charter boat tenancies, administration and amenities; and
- retail.

Managed Resort Accommodation Precinct: Foreshore

The proposed residential precinct includes the following design features:

- high quality residential environment comprising 117 freehold allotments; and
- allotments will accommodate up to three storey dwellings as a maximum height to preserve the landscape character and visual amenity values of the existing site.

Infrastructure Services

The following infrastructure services are included in the development design:

- a full range of site services such as power, water, sewer, stormwater drainage and telecommunications will be provided; and
- a new T-intersection at the entrance on Shute Harbour Road.

National Park Dedications

An important aspect of the proposed SHMR master plan is the restriction of development to the south of Proserpine-Shute Harbour Road. This will enable the conservation of vegetated land and terrestrial wildlife habitat located to the north of Proserpine-Shute Harbour Road. This land, which encompasses and an area of approximately 4 hectares will be returned to the State of Queensland for potential incorporation into the adjoining Conway National Park.

2.3 Environmental Impacts

The majority of the SHMR site is periodically submerged by tidal waters that overflow a narrow wavecut platform, beach and seabed with Mean High Water Springs (MHWS) located at 1.33m AHD. The seabed is sparsely vegetated with *Halophila* ovalis and *Halodule univeris* seagrass. Mangrove communities fringe the shoreline with patches of salt marsh occurring on rocky ground up to the Highest Astronomical Tide (HAT) level located at 2.35m AHD. Beyond this intertidal zone, the land is vacant and vegetated with remnant terrestrial vegetation. This part of the land rises in a gentle slope to Proserpine-Shute Harbour Road. To the north of Proserpine-Shute Harbour Road is an additional area of

vegetated land and wildlife habitat that forms part of the site and the base slopes of the adjoining Conway Range.

The master plan for the SHMR development has been overlaid on the most recent and available aerial photograph as Figure 3. With regard to this figure, the majority of impacts associated with SHMR will relate to the marine and intertidal habitats contained within the site. More specifically, the SHMR will have the following direct physical impacts.

1. The construction of the marina basin will result in the loss of approximately:
    i) 14.68 ha of seagrass habitat (i.e. approximately 10% and 0.000028% of that recorded in Shute Bay and the GBRWHA respectively);
    ii) 34 ha of macro-algae beds; and
    iii) 10 small coral colonies.
2. The establishment of the urban area between the marina basin and Proserpine-Shute Harbour Road will necessitate the clearance of approximately 1.84 ha of fringing mangrove vegetation (i.e. approximately 1.34% and 0.00001% of that recorded in Shute Bay and the GBRWHA respectively).
3. The construction of an access roadway to the commercial/residential precinct will necessitate the loss of approximately 0.15 ha of terrestrial vegetation identified as supporting two *Not Of Concern* Regional Ecosystems (i.e. RE 8.12.5 and RE 8.12.14).
4. A further 0.79 ha of non-remnant vegetation will be disturbed for the purposes of establishing the commercial/residential precinct and access roadway.

A number of impacts associated with operational phase of the SHMR have also been identified as described below.

1. The marina development has the potential to increase traffic along the Proserpine–Shute Harbour Road, which may inturn increase incidence of vehicle-related mortality of native fauna species. Of particular relevance to this assessment are potential impacts on the listed Proserpine rock wallaby, which is known to occur in the area and regularly cross Proserpine–Shute Harbour Road at a point approximately 4km to the west of the site.
2. A number of human impacts associated with the operational phase of the development will have potential impacts on species of marine mega-fauna known to occur in the area. More specifically, impacts on marine fauna may include:
    i) an increase in the incidence of injury and mortality as a result of boat strike;
    ii) an increase in frequency and magnitude of boating disturbance of important behaviour and life-cycle processes of marine mega-fauna such as feeding, courtship, mating and reproduction;
    iii) degradation of marine habitats associated with inappropriately managed refuelling and sewerage pump-out operations;
    iv) an increase in marine debris (i.e. pollution of the marine environment by human generated objects) resulting in increased marine mega-fauna mortality through ingestion and entanglement; and
    v) an increased likelihood of marine pests being introduced to Shute Bay and GBRWHA through inappropriate management of ballast waters and hull cleaning operations.
3. Other indirect effects that may result from the SHMR include:
    i) an overall decrease in the environmental values of coastal waters during the construction and operational phases of the development;

ii) increased levels of human activity and associated alterations in ambient environmental conditions (e.g. elevated light and noise levels); and

iii) altered hydrodynamics and consequently altered patterns of sediment deposition and erosion.

Notwithstanding the above, it is recognised that the SHMR development is proposed in response to increased recreational and commercial, primarily tourism related, boating activity in the Whitsunday region. As such it is acknowledged in this assessment that the SHMR development will not cause any significant overall increase in boating activity in the Whitsunday locality, although it may result in a localised increase in boating activity in the immediate vicinity of Shute Bay.

2.4 Environmental Benefits

As part of the EIS process, the AEC Group has undertaken a Net Benefit Assessment to provide an analysis of the proposed SHMR in terms of its Net Benefit for the State of Queensland (refer to SHMR EIS, Appendix G). The AEC Group determined that the development would provide a net environmental benefit through sensitive design and construction, as well as initiatives such as the "Reef Conservation Fund", creating a funding stream to proactively enable the installation of environmentally public friendly moorings on the reef which will prevent anchor damage by visiting boats, as well as supporting greater environmental awareness of marina users through the planned cultural and interpretive centres within the marina office(s). Some of the key environmental benefits of the SHMR are summarised below.

1. Maritime Infrastructure - the provision of infrastructure that is required for the sustainable management the existing, and anticipated future increases in, levels of recreational and commercial boating activity on the Whitsunday region of the GBRWHA. In this respect the SHMR development will provide a secure harbourage with modern waste management, refuelling and maintenance facilities.
2. Relocation of Existing Swing Moorings - the proposed marina and access channel will necessitate the relocation of approximately 57 swing-moorings. These moorings currently impact on the seabed through chronic physical disturbance caused by chain dragging as the vessel responds to changing winds and tides. The relocation of these swing moorings and their replacement with sea grass friendly "ezyrider" type moorings will enable approximately 950 m^2 of seagrass to re-establish following the completion of the marina development in 2011, allowing a more stable and productive benthic community to develop.
3. Increased Habitat from Development of Breakwater - the fixed breakwater component of the marina development will provide 1.8 km of habitat capable of accommodating different aquatic species, such as mangrove jack, a common sport fish species in the region.
4. Establishment of Mangrove Habitat along Western Fringe - the SHMR will create an area of approximately 0.93 ha of land along the western side of the development site that is expected to be colonised by mangrove communities. This mangrove habitat will provide some ecosystem value, in particular in terms of increased habitat for aquatic species, increased organic matter for nutrient cycling and erosion prevention.
5. Maintenance of GBRWHA – as part of the SHMR development the Proponent will develop a "Reef Conservation Fund" established as a charitable fund, which will be used for the development of environmentally friendly swing moorings. The preservation of these areas will assist in maintaining key ecosystem functions such as habitat for aquatic species, food production and providing organic matter for nutrient cycling. This initiative of the SHMR is consistent with and will complement the Commonwealth Government's "Reef Rescue Plan" which is designed to "… help protect one of the

world's great natural wonders, while benefiting local conservation and Indigenous groups, agricultural production and tourism, fishing and aquaculture industries."

6. Enhancement of the values of Conway National Park - the provision of land adjacent to the Conway National Park will enhance the ecological values of the park while minimising the potential for adverse edge effects associated with the SHMR.

2.5 Impact Mitigation and Management Strategies

2.5.1 Overview

Impact mitigation and management strategies for the SHMR have been based on the results and recommendations of a range of technical studies that were commissioned to inform the design, construction and operational management of the proposed development.

Design phase

The Proponent has invested considerable effort in the determination and mitigation of impacts through good environmental, economic and planning design.

In this regard, the Proponent has undertaken the following works:

- determining the need for the development at Shute Bay from social and economic perspectives;
- undertaking environmental assessment for all facets of the project so that the project can be amended to reduce its impact through the design;
- investigating alternatives to the current design to mitigate impacts and obtain improved outcomes for the developer, the community and the environment;
- designing the marina complex to prevent adverse impacts to coastal resources (including coastal processes) and their values;
- investigating and identify any potential serious or irreversible threats to the environment including any potential hazards and risks;
- developing management plans and outcome measures to mitigate recognisable impacts and risks; and
- developing a monitoring and auditing program for the life of the project to determine if performance objectives are been met and to detect any unforeseen impacts that require corrective action.

Construction phase

This phase of the SHMR presents the highest risk to the environment due to the nature of the development and its location. The Proponent is aware of this and as such has contributed significant resources to determining methods, processes and procedures to mitigate potential impacts as far as practical within the constraints of the design and economic feasibility.

The following impact mitigation strategies are proposed as part of the construction phase of the SHMR:

- staging construction to prevent the release of potentially contaminated water to the GBRWHA and thereby adversely affecting the aquatic ecology;
- the implementation of a Construction Environmental Management Plan (CEMP), which is presented as Appendix U1 of the SHMR EIS, to manage and mitigate

potential environmental impacts associated with the construction phase of development; and

- the conduct of regular monitoring and auditing of the site and the activities throughout the construction phase and implementing corrective actions necessary as a result of these monitoring and auditing programs.

Operational management

The operational phase of the SHMR will involve a range of potential impacts that need management and mitigation. Management strategies that will be implemented during the operational phase of the SHMR are as follows.

1. Waste reception facilities for general refuse, bilage waste and other waste that are normally generated by activities at a marina will be provided and impacts from unlawful discharges will be mitigated through management strategies such as bunding, cut off valves and other safety devices.
2. Refueling facilities will be provided as part of this marina development and will be developed and managed in accordance with Australian Standard 1940-2004 and other relevant standards.
3. A Marina Site Based Management Plan (Marina SBMP) has been developed for the marina operations which include such activities as managed mooring and boating, refueling, waste management and maintenance dredging. This Marina SBMP will be developed to protect surrounding significant conservation areas.
4. Educational opportunities will be developed to promote the environmental values and sensitivities of the region, the necessity to protect and manage these values and ensure that people develop an understanding of the area and it's regional, national and international significance.

2.5.2 Environmental management

The SHMR EIS provides details concerning a range of environmental management and monitoring programs that are to be implemented to ensure the appropriate mitigation of potentially adverse environmental impacts associated with various aspects of the SHMR, including impacts of relevance to Matters of NES. A summary of the content and objectives of these various programs is provided in Table 1.

Table 1 SHMR Environmental Management and Monitoring Programs

Program Title, Author and Location	Content and Objectives
SHMR Construction Environmental Management Plan (CEMP). Prepared by Cardno (Qld) Pty Ltd and presented as Appendix U1 of the SHMR EIS.	The CEMP was prepared to provide assurance that the recommendations made in the SHMR EIS technical investigations will be implemented during the construction of the development to avoid potential environmental impacts. Topics addressed in the CEMP include: • Community Awareness. • Earthworks Management. • Dredging. • Erosion and Sediment Control. • Water Quality. • Acid Sulfate Soil Management. • Aquatic and Terrestrial Ecology. • Marine Megafauna. • Air Quality.

Program Title, Author and Location	Content and Objectives
	• Noise and Vibration. • Waste Management. • Dangerous and Hazardous Materials. • Cultural Heritage Management • Traffic (including Navigation). • Visual Amenity. The CEMP is considered a dynamic document which will be continually reviewed to ensure detailed design investigations are reflected in construction methodology and management techniques and ensure compliance with any relevant conditions imposed by the approval process.
SHMR Acid Sulfate Soil Management Plan (ASSMP). Prepared by Cardno (Qld) Pty Ltd and presented as Appendix I3 of the SHMR EIS.	The Acid Sulfate Soil Management Plan has been prepared to ensure no significant adverse impact on the sensitive receiving environment occurs as a result of acid sulfate soil disturbance. Through this Acid Sulfate Soil Management Plan, should environmental harm be caused or threatened, the operator can demonstrate that all reasonable and practicable measures have been taken to comply with relevant conditions of approval and the general environmental duty. This ASSMP has been prepared with reference to the following guidelines. • *Queensland Acid Sulfate Soil Technical Manual – Soil Management Guidelines*, Version 3.8 (Queensland Government, November 2002). • Queensland Government State Planning Policy 2/02 Version 2– *Planning and Managing Development involving Acid Sulfate Soils* (SPP 2/02). • *Instructions for the Treatment and Management of Acid Sulfate Soils* (Queensland Government, July 2001). • *Acid Sulfate Soils Management Plans for Queensland* (Dear et al, June 2000). • *Guidelines for Sampling and Analysis of Lowland Acid Sulfate Soils in Queensland* (CR Ahern, MR Ahern and B Powel, October 1998).
SHMR Marina Site Based Management Plan (Marina SBMP). Prepared by Cardno (Qld) Pty Ltd and presented as Appendix U3 of the SHMR EIS.	The purpose of the Marina SBMP is to demonstrate the environmental commitment by the Proponent to carry out their activities in accordance with a structured program that: • sets the environmental objectives or standards to be achieved over time; • identifies the potential environmental harm and extraordinary factors that may cause environmental harm resulting from routine operations and establishes and documents measures to avoid and/or manage this harm as far as practicable; • ensure all persons carrying out the activity are aware of environmental risks, and are trained in the measures and contingency plans to deal with them; • implements monitoring of environmental performance to ensure the effectiveness of the measures and contingency plans;

Program Title, Author and Location	Content and Objectives
	• assists the communication of environmental information throughout the organisation and to the administering authorities; and • provides for continual improvement.
SHMR Waste Management Plan (WMP). Prepared by Cardno (Qld) Pty Ltd and presented as Appendix U2 of the SHMR EIS.	This report outlines the waste management strategies recommended for the SHMR. The report identifies opportunities for waste minimisation and addresses waste disposal options, waste storage, collection and transport.
SHMR Stormwater Management Strategy (SMS). Prepared by Cardno Lawson Treloar Pty Ltd and presented as Appendix N of the SHMR EIS.	This report has been completed to support the Environmental Impact Study (EIS) and provides details for the stormwater quality and quantity management. This report specifies the recommended Environmental Values (EVs) and Water Quality Objectives (WQOs) for the site and details conceptual stormwater quality treatment measures to ensure appropriate pollutant levels are achieved from the site runoff, including environmental monitoring for long-term management of coastal waters.
Marine Megafauna Impact Assessment and Management Plan. Prepared by Natural Solutions Pty Ltd and presented as Appendix P2 of the SHMR EIS.	The Marine Megafauna MP provides an assessment of the potential impacts of the SHMR on marine megafauna species and outlines management requirements aimed at ensuring the proposed development has minimal impact on marine megafauna.

2.5.3 Habitat offsets and gains

The SHMR will necessitate the loss of terrestrial and marine habitat as detailed in Section 2.3. The impact of this loss will be mitigated and compensated through a range of offsets and habitat gains that are described below.

Terrestrial Habitat

The SHMR will result in the displacement of approximately 0.15 ha of remnant woodland and open forest communities (i.e. RE 8.12.5 and RE 8.12.14) that are well represented within the adjoining Conway National Park. To compensate for the loss of this habitat, vegetated land to the north of Proserpine – Shute Harbour Road (i.e. approximately 5ha) will be surrendered to the State for potential inclusion as part of the Conway National Park.

This area is characterised by slopes, ridgelines and gullies that support suitable habitat for *EPBC Act* listed threatened fauna species such as the Striped-tailed delma (*Delma labialis*), the Northern quoll (*Dasyurus hallucatus*) and the Proserpine rock wallaby (*Petrogale persephone*). In addition, this vegetation adjoins extensive areas of similar habitat contained within Conway National Park and therefore contributes to the connectivity and habitat values of this protected area.

Marine Colonisation of Artificial Structures

Construction of the SHMR will result in a mosaic of habitats associated with pontoons, piles and other intertidal and subtidal structures (and of course boats) which may provide substrate for many species of algae, hard and soft corals, sponges, ascidians and a variety of other marine invertebrate fauna. This in turn is expected to provide shelter and food for a variety of fishes and other fauna and a degree of shade important in attracting fish species.

Evidence from existing scientific studies that demonstrates that the total abundance of fishes increases with an increase in rugosity (structural complexity) and degree of

fouling is provided in the Aquatic Ecology report prepared by FRC environmental (refer Appendix P1 of the EIS). Furthermore, comparative studies have shown that natural and artificial habitats may support a similar level of fish species richness, although different (but often overlapping) assemblages may occur.

As such, the mosaic of marine habitats associated with SHMR is considered to offset the loss of existing marine habitat that will occur as result of construction of the marina.

Seagrass Gain

A gain in seagrass and macroalgal communities is predicted to occur as result of the SHMR (refer SHMR EIS, Appendix P1, Section 13). This anticipated increase in sea grass and macroalgae communities is attributed to the removal of a number of swing moorings that currently impact on the seabed through chronic physical disturbance as the vessel responds to changing winds and tides. The removal (or decommissioning) of swing moorings and their replacement with an environmentally friendly "ezyrider" mooring, or equivalent, will enable seagrass to re-establish (at these moorings beyond the development footprint) and a more stable and productive benthic community to develop.

Fish Friendly Structures

The SHMR design incorporates fish friendly structures to increase the habitat complexity within the marina footprint, including:

- sloping sides on structures will increase surface area;
- irregular submerged surfaces (rough, textured, etc) provide more habitats than homogenous structures such as solid vertical steel and concrete sheets;
- sinuous, or meandering, structures are preferable to straight lines, which provide less surface area and fewer habitats; and
- floating, moored fish-attracting devices.

The Queensland Department of Primary Industries and Fisheries Guideline for Fish Friendly Structures has been considered in the design, construction and operational stages of the SHMR proposal.

Reef Funding Model

As part of the SHMR it is proposed to establish a "Reef Conservation Fund", through a contribution from the sale of marina berths and an annual levy, to support management strategies for the protection and conservation of the wider region, specifically within the GBRWHA. Some $1M will be raised from berth sales with an ongoing funding stream of approximately $150,000 annually. This initiative of the SHMR is consistent with and will complement the Commonwealth Governments "Reef Rescue Plan" which is designed to "… help protect one of the world's great natural wonders, while benefiting local conservation and Indigenous groups, agricultural production and tourism, fishing and aquaculture industries."

Whilst it is recognised that there is currently no formal EPBC Act Environmental Offset Policy in place, the Australian Government is increasingly considering environmental offsets as part of its process of taking a decision on whether to approve proposed actions under the *EPBC Act*. In this respect the habitat offsets measures described above are consistent with this emerging approach to development planning and assessment.

3. DESCRIPTION OF THE AFFECTED ENVIRONMENT

The SHMR site is partially located within the GBRWHA and Great Barrier Reef Coast Marine Park and adjoins the Conway National Park. The location of the SHMR in relation to these environmentally sensitive areas is provided as Figure 4 with the key features summarised below.

1. The majority of terrestrial lands within and adjacent to the SHMR are identified as supporting remnant vegetation pursuant to the current Certified Regional Ecosystem (RE) Map. The REs that occur within the site locality all have a *Not Of Concern* status pursuant to the *Vegetation Management Act 1999*.
2. The marine and intertidal sectors of the site are contained within the GBRWHA and Great Barrier Reef Coast Marine Park.

More detailed descriptions of the terrestrial and marine environments of the site locality are presented below.

3.1 Terrestrial Environment

As part of the SHMR EIS, a comprehensive terrestrial flora and fauna assessment was undertaken by Place Environmental (Place) to document the terrestrial flora and fauna present within and adjacent to the SHMR site. The report is attached as Appendix Q to the EIS and a summary of the findings of that assessment is provided below.

The terrestrial sector of the SHMR site comprises an area of approximately 5 ha, the majority of which lies between Proserpine-Shute Harbour Road and Conway National Park. The vegetation within this area varies according to topography, but mainly consists of low open woodland with a grassy ground storey or an open eucalypt forest with some rainforest species contained within the understorey. Most of the vegetation communities of the site, with the exception of terrestrial vegetation closest to Proserpine-Shute Harbour Road and the former quarry site are relatively undisturbed and have good ecological value and function.

A detailed floral inventory of the site recorded a total of:

- 64 families of native Australian and exotic flora;
- 145 genera of native Australian flora and 22 genera of exotic flora (with 4 genera across both distinctions); and
- 172 species of native Australian flora and 24 exotic species of flora.

Of the terrestrial flora species identified on the site none are:

- threatened species subject to the provisions of State or Commonwealth legislation; or
- at, or outside of, the limits of their known geographic range.

Field surveys conducted by Place identified 25 weeds species at the SHMR site. Of these one is a declared weed (Captain Cook tree) listed as Class 3 under the *Land Protection (Pest and Stock Route Management) Act 2002*. All other weeds on the site can be considered environmental weeds.

The fauna survey completed by Place identified a total of 41 species of terrestrial fauna as being present at the site, based on remote observation or detection of non-specific signs, comprising of:

- 7 species (3 families) of reptiles;

- 25 species (14 families) of birds; and
- 9 species (8 families) of mammals.

Despite targeted surveys for species of conservation significance (threatened, rare or migratory) there were no confirmed sightings of threatened fauna species during the fauna survey assessment. Based on previous observations of the species in the site locality and the presence of suitable habitat either on or immediately adjacent to the site it is considered that the site locality has the potential to be utilised by several *EPBC Act* listed terrestrial species, including:

- threatened species such as the Striped-tailed delma (*Delma labialis*), the northern quoll (*Dasyurus hallucatus*) and the Proserpine rock wallaby (*Petrogale persephone*); and
- migratory species such as the Mongolian plover (*Charadrius mongolus*), Eastern curlew (*Numenius madagascariensis*). Little curlew (*Numenius minutes*), Rainbow bee-eater (*Merops ornatus*) and Black-faced monarch (*Monarcha melanopsis*).

3.2 Marine Environment

As part of the SHMR EIS two comprehensive assessments of different aspects of the marine environment of the site locality were completed and are documented in:

- *Aquatic Ecology Report* (March 2007), prepared by FRC Environmental and presented in Appendix P1 of the SHMR EIS; and
- *Marina Mega Fauna Impact Assessment and Management Plan* (July 2008), prepared by Natural Solutions Environmental Consultants Pty Ltd and presented as Appendix P2 of the SHMR EIS.

The ecological values and features recognised within the marine environment of Shute Bay can be summarised as follows.

1. Shute Bay is characterised by highly variable seagrass communities which include species such as *Halodule uninervis, Halodule ovalis and Zostera Muelleri.* However within and adjacent to the proposed marina footprint, predominantly bare substrate exists with patches of sparse to moderate seagrass as shown on Figure 4. Seagrass communities within the development footprint and immediately surrounding this area are indicative of a frequently disturbed environment (i.e. predominantly from wind and wave action). The distribution, density and community structure of seagrasses within the bay have varied significantly over the past two decades.
2. Mangrove communities within Shute Bay are dominated by the red mangrove (*Rhizophora stylosa*) with lower abundances of the grey mangrove (*Avicennia marina*), river mangrove (*Aegiceras corniculatum*), myrtle mangrove (*Osbornia octodonta*), blind-your-eye mangrove (*Excoecaria agallocha*), mangrove apple (*Sonneratia alba*) and yellow mangrove (*Ceriops tagal*). The mangroves on the western and southern sides of Shute Bay cover a significantly greater area than those within the east of the proposed development area.
3. Mixed macroalgae communities were found throughout much of subtidal sections of Shute Bay significantly overlapping seagrass distribution. Within the development footprint approximately 34 ha of mixed macroalgae communities were surveyed. Within areas predicted to be affected by the dredge plume there exists approximately 9.06 ha of low cover (<20%) mixed macroalgae communities and 3.41 ha of *Hypnea sp*. dominated communities.
4. Coral communities form an extensive spit that partially encloses the bay's southern entrance. Coral cover on the spit is highest on the seaward side, where tidal flushing is greatest bringing food and clear water to the community. The relative abundance of each hard coral genus is typical of inshore coral communities in the Whitsunday

region, with sediment tolerant genera such as *Goniopora*, *Porites* and *Turbinaria* dominating. Within the development footprint approximately 10 coral colonies were recorded covering less than 2% of the substrate.

5. The mosaic of unvegetated soft substrate, rocky substrates, mangroves, seagrasses and algal communities that occur within Shute Bay provide a diversity of habitat resources for a range of marine fauna including benthic invertebrates, fishes and marine megafauna.
6. *EPBC Act* listed marine mega-fauna considered likely to occur in the Whitsunday locality include:
    - threatened species such as the Loggerhead turtle (*Caretta carreta*), Pacific Ridley turtle (*Lepidochelys olivacea*), Green turtle (*Chelonia mydas*), Leatherback turtle (*Dermochelys coriacea*), Hawksbill turtle (*Eretmochelys imbricata*), Flatback turtle (*Natator depressus*) and Humpback whale (*Megaptera novaeangliae*); and
    - migratory species such as the Dugong (*Dugong dugon*), Irrawaddy dolphin (*Orcaella brevirostris*), Indo-Pacific humpback dolphin (*Sousa chinensis*) and Saltwater crocodile (*Crocodylus porosus*).

The marine environment of the site and adjoining locality also forms part of the GBRWHA and is an area subject to high level of human usage, primarily for recreational boating and fishing activities.

4. MATTERS OF NES SIGNIFICANT IMPACT ASSESSMENT

The *EPBC Act* requires that a person must receive Commonwealth approval for any action that has, will have, or is likely to have a significant impact on matters of national environmental significance. Matters of NES that are recognised by the *EPBC Act* and which can act as a trigger for the Commonwealth assessment and approval process include:

- World Heritage properties;
- National Heritage Places;
- Ramsar wetlands of international significance;
- Nationally threatened species and communities;
- Migratory species protected under international agreements;
- Nuclear actions, including uranium mining; and
- The Commonwealth Marine Environment.

Matters of NES recognised by the *EPBC Act* that occur within and adjacent to land and water to be affected by the proposed SHMR development include:

1. the GBRWHA;
2. known and potential habitat for a listed threatened species; and
3. known and potential habitat for migratory species listed under international agreements, including:
    - appendices to the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals) for which Australia is a Range State under the Convention;
    - the Agreement between the Government of Australia and the Government of the Peoples Republic of China for the Protection of Migratory Birds and their Environment (CAMBA);
    - the Agreement between the Government of Japan and the Government of Australia for the Protection of Migratory Birds and Birds in Danger of Extinction and their Environment (JAMBA); and
    - the Bilateral Agreement between the Government of Australia and the Republic of Korea for the Protection of Migratory Birds and their environment (ROKAMBA).
4. Commonwealth Marine Environment, which encompass the Australian Waters beyond Queensland state waters.

The potential for the SHMR development to have a significant impact upon the above Matters of NES has been recognised, leading to the SHMR being classified *controlled action* pursuant to Part 3, Division 1, of the *EPBC Act*. That decision was made based on limited information concerning the precise form of, and environmental management arrangements for, the SHMR development.

The subsequent sections of this report provide:

1. a more detailed description of each of the above Matters of NES that would be potentially affected by the SHMR development;
2. an assessment of the likelihood that the SHMR development will have a significant impact on the relevant Matters of NES, in the presence of the proposed impact

avoidance, mitigation and management strategies that form part of the SHMR proposal; and

3. in instances where it is determined that an unavoidable significant impact is likely to occur, an analysis of the magnitude, duration and scale of the impact(s) is provided.

4.1 World Heritage Properties

4.1.1 Recognised values

The majority of the SHMR site occurs within the GBRWHA. The GBRWHA was one of Australia's first World Heritage Area (WHA) and is the world's largest listed WHA extending over 2,000km in length and covering an area of 35 Million ha. It was inscribed in 1981 for the following outstanding natural universal values:

- as an outstanding example representing the major stages in the earth's evolutionary history;
- as an outstanding example representing significant ongoing ecological and biological processes;
- as an example of superlative natural phenomena; and
- containing important and significant habitats for in situ conservation of biological diversity.

The GBRWHA contains coral reefs, seagrass meadows, mangroves, soft bottom communities and island communities. It provides nesting grounds for the endangered green and loggerhead turtles and is a breeding ground for humpback whales. The islands and cays support several hundred bird species and some breeding colonies. The GBRWHA is also culturally significant containing numerous important archaeological sites of Aboriginal or Torres Strait Islander origin. The area contains numerous shipwrecks and historic ruins and lighthouses.

Approximately 98% of the GBRWHA is within the Great Barrier Reef Marine Park (GBRMP) with the remainder being Queensland waters and islands. The intertidal and sub-tidal sectors of the SHMR site are located within Queensland waters and are therefore not contained within the boundaries of the GBRMP. However they are contained within the boundaries of the Queensland Great Barrier Reef Coast Marine Park (GBRCoastMP), which provides a complementary set of management arrangements for sectors of the GBRWHA that are located within Queensland waters. The purposes of both the GBRMP and the GBRCoastMP are to provide for the preservation of the GBRWHA's outstanding biodiversity whilst providing for reasonable use of the area for recreational, cultural and commercial purposes. The GBRCoastMP complements the GBRMP through adopting similar zone objectives. The GBRCoastMP Zoning Plan and the GBRMP Zoning Plan, in conjunction with other management mechanisms, aim to protect and conserve the biodiversity of the Great Barrier Reef ecosystem within a network of highly protected zones, while providing opportunities for the ecologically sustainable use of and access to the Great Barrier Reef by current and future generations.

The SHMR site is partially located within a Habitat Protection Zone pursuant to the GBRCoastMP Zoning Plan.

The World Heritage Values of the GBRWHA are summarised in Table 2 below.

Table 2 World Heritage Values of the Great Barrier Reef

World Heritage Criterion	World Heritage Values
(IX) Outstanding examples of on-going evolution	World Heritage Values ascribed to the Great Barrier Reef include, but are not limited to the following: • the heterogeneity and interconnectivity of the reef assemblage; • evidence of the dispersion and evolution of hard corals and associated flora and fauna; • 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, • the integrity of the inter-connections between reef and island networks in terms of dispersion, recruitment, and the subsequent gene flow of many taxa; and • feeding and/or breeding grounds for international migratory seabirds, cetaceans and sea turtles.
(VII) Contains superlative natural phenomena	World Heritage Values ascribed to the Great Barrier Reef include, but are not limited to the following: • the vast extent of the reef and island systems which produces an unparalleled aerial vista; • 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.
(VIII) Outstanding examples of stages of earth's history	World Heritage Values ascribed to the Great Barrier Reef include, but are not limited to the following: • reef morphologies reflecting historical and on-going geomorphic and oceanographic processes; • 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; and • record of sea level changes reflected in distribution of continental island flora and fauna.
(X) Important habitats for conservation of biological diversity.	World Heritage Values ascribed to the Great Barrier Reef include, but are not limited to the following: • over 2900 coral reefs (covering 20 055km2) which are structurally and ecologically complex; • 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

World Heritage Criterion	World Heritage Values
	populations of green sea turtles and Hawksbill turtles; and • coral cays with 300-350 plant species in 2 distinct floristic regions; • sea grass beds (over 5000 km^2) comprising 15 species, 2 endemic; and • mangroves (over 2070km2) including 37 species.

It is also recognised that the GBRWHA is also of cultural importance, containing many middens and other archaeological sites of Aboriginal or Torres Strait Islander origin.

A more comprehensive description of the World Heritage values of the Great Barrier Reef is presented in Appendix A and is available on-line at:
http://www.environment.gov.au/heritage/places/world/great-barrier-reef/index.html

4.1.2 Significant Impact Assessment

Several aspects of the SHMR development have the potential to impact both directly and indirectly upon the ecological character of the GBRWHA. Aspects of the SHMR development that will have a direct impact upon the existing character of the GBRWHA include:

- reclamation of tidal land for the purposes of constructing an integrated marina development including commercial, tourism and managed resort accommodation precinct (including internal roads and infrastructure) and supplementary 3 storey car park; and
- construction of a solid breakwater;
- dredging of the marina basin to -5.2m AHD to accommodate a 669 berth marina;
- dredging of the access channel into the proposed marina; and
- operation of the marina complex that will cater for current and future demands for infrastructure to support sustainable recreational boating activity within the Whitsunday region.

Table 3 provides a further assessment of the potential for significant impacts to occur to the values of the GBRWHA as a result of the SHMR proceeding in accordance with the various impact avoidance, mitigation and management strategies detailed in Section 2.5 herein. Significant impact criteria for World Heritage Properties considered in this assessment are derived from the *EPBC Act* Policy Statement 1.1 - Significant Impact Guidelines (May 2006).

Table 3 Assessment in respect of the *EPBC Act* Significant Impact Criteria for World Heritage Properties

Significant Impact Criteria	Assessment
The action should not result in one or more of the World Heritage values to be lost.	<u>Localised physical modifications to GBRWHA as a consequence of the SHMR development.</u> The nature and scale of these modifications is not considered to be such that there would be a loss of, or any substantial degradation or damage to, of one or more of the World Heritage Values of the Great Barrier Reef that are summarised in Table 2. This assessment is based on the facts that the disturbance footprint: • comprises a less than 0.0001% of the extent of the GBRWHA;
The action should not result in one or more of the World Heritage values to be degraded or damaged.	
The action should not result in one or more of the World Heritage	

Significant Impact Criteria	Assessment
values to be notably altered, modified, obscured or diminished.	• is located in an area where similar facilities currently form part of the fabric of the GBRWHA in this locality; • supports relatively low levels of mangrove, seagrass and corals density and diversity; • provides limited habitat resources for migrating whales, dolphins, dugong, whale sharks, sea turtles, seabirds and concentrations of large fish; • currently contains existing swing-moorings that have contributed to the degradation of sea grass communities will be removed and replaced with low-impact structures that will facilitate seagrass establishment, thus resulting in a gain of seagrass habitat; and • a diversity of habitats will be created within the marina that have the potential to support a variety of fish assemblages. In addition to the above, the SHMR will be constructed and operated under the guidance of management plans that have been prepared to ensure that any localised damage or modification of the locality's environmental values are minimised. <u>Environmental Management and Monitoring Linkages</u> The following SHMR environmental management and monitoring programs, and the specific sections/elements noted, are designed to ensure the construction and operational phases of the SHMR do not result in one or more of the World Heritage Values being lost or substantially damaged, modified or diminished. <u>Construction Environmental Management Plan (CEMP)</u>: • Element 2 – Earthworks Management; • Element 3 – Dredging Management; • Element 4 – Erosion and Sedimentation Control; • Element 5 – Water Quality; • Element 6 – Acid sulphate Soils; • Element 7 – Aquatic and Terrestrial Ecology; • Element 8 – Marine Megafauna; • Element 11 – Waste Management; • Element 12 – Dangerous and Hazardous Materials; and • Element 14 – Traffic (including Navigation) <u>Acid Sulphate Soil Management Plan (ASSMP):</u> • Section 5 – Management Framework; • Section 6 – Responsibility of the Contractor; and • Section 8 – Acid Sulphate Soil Treatment and Management. <u>Marina Site Based Management Plan (Marina SBMP):</u> • Section 3 – Policy • Section 4 – Non-compliance • Section 5 - Environmental Management: o 5.1 - Air Quality; o 5.2 – Noise Emission Control; o 5.4 – Water Quality; o 5.5 – Dredge Spoil Management; o 5.6 – Waste Management; o 5.7 – Flora and Fauna Management; and

Significant Impact Criteria	Assessment
	o 5.8 – Dangerous and Hazardous Substances; • Section 6 – Environmental Emergencies • Section 7 – Environmental Training; and • Section 8 – Education. <u>Waste Management Plan (WMP):</u> • Section 2 – Waste Management Strategies; • Section 3 – Waste Streams; • Section 4 – Potential Impacts and Mitigation Measures; and • Section 5 – Waste Management Plan. <u>Storm Water Management Plan (SWMP):</u> • Section 5 – Environmental Values and Water Quality Objectives; • Section 7- Storm Water Management Options; • Section 9 – Maintenance Plans; and • Section 10 – Water Quality Monitoring Program.

In respect of the potential impact of the SHMR development upon the GBRWHA's cultural values it is noted that an indigenous cultural heritage study as specified under the *Australian Cultural Heritage Act* (ACH Act) was conducted by Northern Archaeology Consultancies Pty Ltd and in conjunction with the Gia and Ngaro/Gia Aboriginal Parties. This report entitled *Indigenous Cultural Heritage Investigation, Shute Harbour Marina Development Project, Shute Bay, Whitsunday Shire* (the Cultural Heritage Investigation), is presented as Appendix S1 of the SHMR EIS. A Cultural Heritage Management Plan (CHMP) has also been prepared between all parties, and is presented as Appendix S2 to the SHMR EIS. The preparation of the CHMP involved a program of consultation with the Gia and Ngaro/Gia Aboriginal Parties, as documented in Appendix S3 of the SHMR EIS which presents a report prepared by the Hornery Institute entitled *Cultural Heritage Management Plan – Shute Harbour Marina Development EIS Consultation Report*.

In conclusion, given the localised extent of direct physical impacts and the anticipated effect of environmental management and monitoring programs that form part of the SHMR development, any impacts associated with the SHMR development would not notably degrade, damage or diminish any of the GBRWHA's values.

4.1.3 Implications of likely significant impacts

As detailed in Section 4.1.2, the SHMR development is not likely to have a significant impact on the values GBRWHA. Anticipated adverse impacts on the values of the GBRWHA are expected to be localised and of limited magnitude and unlikely to result in any notable degradation, damage or diminishment of the recognised values of the GBRWHA.

4.2 Threatened Species – Terrestrial

4.2.1 Recognised values

Based on field observations and a review of the Qld Environmental Protection Agency's Wildlife Online database (the EPA Database) and the Commonwealth DEWHA EPBC Protected Matters Search Tool (the DEWHA Database), for a 10km search radius from the centre of the site, the locality of SHMR development has the potential to support the following species of threatened terrestrial fauna and flora.

Threatened flora, a total of four (4) species being:

- the *Vulnerable Leucopogon cuspidatus*;
- the *Vulnerable Medicosma obovata*;
- the *Vulnerable Ozothamnus eriocephalus*; and
- the *Vulnerable Cymbopogon obtectus*.

Threatened mammals, a total of four (4) species being:

- the *Endangered* Northern quoll (*Dasyurus hallucatus);*
- the *Endangered* Proserpine rock-wallaby (*Petrogale persephone*);
- the *Vulnerable* Spectacled flying-fox (*Pteropus conspicullatus*); and
- the *Vulnerable* Water mouse (*Xeromys myoides*).

Threatened birds, a total of five (5) species being:

- the *Endangered** Southern giant-petrel (*Macronectes giganteus*);
- the *Vulnerable* Red goshawk (*Erythrotriorchis radiatus*);
- the *Vulnerable* Australian painted snipe (*Rostratula australis*);
- the *Vulnerable* Squatter pigeon (*Geophaps scripta scripta*); and
- the *Vulnerable* Kermadec petrel (*Pterodroma neglecta neglecta*).

(note: * - species also listed as a Migratory species pursuant to the *EPBC Act*).

Threatened reptiles, a total of two (2) species being:

- the *Vulnerable* Striped-tailed delma (*Delma labialis*); and
- the *Vulnerable* Yakka skink (*Egernia rugosa*).

A copy of the DEWHA and EPA database searches are provided in Appendix B and Appendix C respectively.

Appendix D provides a profile for each of these species including a summary of relevant details concerning:

- the general ecology of the species including consideration of its critical habitat requirements, feeding and breeding behaviours;
- the distribution and abundance of the species;
- recognised threats to the viability of populations of the species;
- the likelihood of the species utilising areas to be affected by the SHMR development;
- the nature and significance of potential impacts of the SHMR development upon the viability of local populations of the species; and
- impact mitigation measures that are proposed as part of the SHMR development that the species may benefit from.

4.2.2 Significant Impact Assessment

The SHMR has a low probability of adversely affecting threatened terrestrial flora and fauna species that inhabit the site locality. This is primarily a function of the following facts and circumstances:

- that the proposed plan of development concentrates development activities within the intertidal and sub-tidal sectors of the site to the south of Proserpine–Shute Harbour Road that provided limited habitat for terrestrial wildlife species; and
- vegetated land and wildlife habitat to the north of Proserpine – Shute Harbour Road would be surrendered to the State for potential incorporation into the Conway National Park.

As detailed in Appendix D, the majority of threatened terrestrial species that have been recorded within 10km of the SHMR site are unlikely to be affected by the SHMR development. This assessment is based on consideration of the species habitat requirements, likelihood of occurrence within areas to be affected by the SHMR development, sensitivity to adverse impacts that may arise from the SHMR development and the nature of impact avoidance/mitigation measures that are to be implemented as part of the SHMR development.

Based on the information presented above and in Appendix D, an assessment of the likelihood of the SHMR development to have significant impacts upon threatened terrestrial species is provided in Table 4. This assessment is based on the assumption that the SHMR development would be carried out in accordance with the various impact avoidance, mitigation and management strategies detailed in Section 2.5 herein. The significant impact criteria for threatened species considered in this assessment are derived from the *EPBC Act* Policy Statement 1.1 - Significant Impact Guidelines (May 2006).

Table 4 Assessment in respect of the *EPBC Act* Significant Impact Criteria for listed threatened terrestrial species

Significant Impact Criteria	Assessment
The action should not lead to a long-term decrease in the size of a population.	The SHMR development is not likely to cause a long-term decrease in the size of a population of any threatened terrestrial species listed in Section 4.2.1. Most terrestrial species identified Section 4.2.1 are either not likely to occur on the SHMR development site or are very flexible in their habitat use and would use this site only occasionally as foraging area (e.g. Spectacled Flying Fox). The only species to have a high probability of using this site is the Proserpine Rock-wallaby (*Petrogale persephone*). The SHMR Terrestrial Ecology Assessment (PLACE Environmental, 2008) found that potential habitat for this species occurs within the northern sectors of SHMR development site. However, only 0.15ha of potential habitat situated within the Proserpine-Shute Harbour Road Reserve may be cleared. Removal of this vegetation will not affect viable habitat corridors for this species and hence will not lead to a long-term decrease in the size of a population. Furthermore, a large portion of terrestrial habitat to the north of the site is to be surrendered to the State for potential incorporation into the Conway National Park. The potential impacts of road kill on the Proserpine Rock-wallaby will be monitored by the QPWS and the Proponent will establish and maintain a register of Proserpine Rock-wallaby sightings (including any road kills) that occur within and adjacent to the SHMR development.
The action should not reduce the area of occupancy of the species.	The SHMR is not likely to reduce the area of occupancy of any threatened terrestrial species that are known, or considered likely, to occur in the locality. The majority of works will be undertaken within Shute Bay. Section 3.3 of the Terrestrial Ecology Assessment (PLACE, 2008) states that none of the species identified on the site: • are threatened species subject to the provisions of State or Commonwealth legislation; • are at the extent of their geographic range; or • represent an extra-limital extension to a previously known geographic range.

Significant Impact Criteria	Assessment
The action should not fragment an existing population into two or more populations.	The terrestrial habitat types identified on site are well represented adjacent to the site and within the locality and as such the SHMR development is not likely to fragment an existing population of any threatened terrestrial species into two or more populations (PLACE, 2008).
The action should not adversely affect habitat critical to the survival of a species.	The SHMR site does not contain critical habitat identified in a recovery plan for any of the threatened species, nor is any habitat listed on the Register of Critical Habitat maintained by the Minister under the *EPBC Act*. Furthermore, the SHMR is not likely to adversely affect habitat critical to the survival of any of the threatened terrestrial fauna species as the majority of terrestrial habitat situated within the site boundaries will be retained and surrendered to the State for potential incorporation into the adjoining Conway National Park.
The action should not disrupt the breeding cycle of a population.	The SHMR is not likely to disrupt the breeding cycle of a population of any listed threatened terrestrial species.
The action should not modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.	The SHMR is not likely to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that a threatened terrestrial species is likely to decline as the extent terrestrial habitat to be cleared is minimal (i.e. approximately 0.15 ha of terrestrial vegetation identified as supporting two *Not Of Concern* REs would be directly affected by the proposed development). Although some potential foraging habitat for some species (e.g. the Proserpine rock-wallaby) will be cleared south of the Proserpine-Shute Harbour Road, there are more expansive regions of similar or more suitable habitat adjacent to the site which is more likely to be utilised. In particular, the Proserpine Rock-wallaby prefers rocky outcrops, rock piles and cliffs within a microphyll/notophyll semi-deciduous dry vine forest. Furthermore, a large portion of terrestrial habitat to the north of the site is to be surrendered to the State for potential incorporation into the Conway National Park.
The action should not result in invasive species that are harmful to a threatened species becoming established in the species´ habitat.	Section 15 of the SHMR CEMP (Cardno, 2008) outlines tasks and monitoring procedures to be undertaken to minimise invasive species entering the site. As the site is adjoining Conway National Park, all earthmoving equipment arriving at the site must be certified clean of weeds and soil material (washed down prior to arriving at the site) and inspected by the site environmental officer. All vehicles arriving at the site dirty, or only partially clean will be denied entry. It is also noted that the potential for weeds to be introduced into the terrestrial habitats of the site during the construction phase of development is limited due to the fact that the construction site is situated downslope of adjacent areas of terrestrial habitat.
The action should not interfere with the recovery of the species.	The SHMR site does not contain habitat identified in a recovery plan for any of the threatened species, nor is any habitat listed on the Register of Critical Habitat maintained by the Minister under the *EPBC Act*. Hence, the SHMR will not interfere with the recovery of any threatened terrestrial species. In the long-term the SHMR has the capacity to make a positive contribution towards the recovery of populations of several threatened terrestrial species via a combination of habitat retention, habitat enhancement and environmental education. In this respect the proposed surrender of land to the north of Proserpine-Shute Harbour Road to the State for potential incorporation into the Conway National Park is a measure that will make a positive contribution towards the conservation of terrestrial wildlife species.

4.2.3 Implications of likely significant impacts

As detailed in Section 4.2.2, the SHMR development is not likely to have a significant impact on any threatened terrestrial wildlife species.

4.3 Threatened Species – Marine

4.3.1 Recognised values

Based on field observations and a review of the EPA Database and the DEWHA Database, for a 10km search radius from the centre of the site, the locality of SHMR development has the potential to be utilised by nine (9) threatened marine species. These species are:

- the *Endangered** Blue whale (*Balaenoptera musculus*);
- the *Vulnerable** Humpback whale (*Megaptera novaeangliae*);
- the *Vulnerable** Whale shark (*Rhincodon typus*);
- the *Endangered** Loggerhead turtle (*Caretta carreta*);
- the *Endangered** Pacific Ridley turtle (*Lepidochelys olivacea*);
- the *Vulnerable** Green turtle (*Chelonia mydas*);
- the *Vulnerable** Leatherback turtle (*Dermochelys coriacea*);
- the *Vulnerable** Hawksbill turtle (*Eretmochelys imbricata*); and
- the *Vulnerable** Flatback turtle (*Natator depressus*).

(note: * - species also listed as a Migratory species pursuant to the *EPBC Act*).

Appendix D provides a profile for each of these species including a summary of relevant details concerning:

- the general ecology of the species including consideration of its critical habitat requirements, feeding and breeding behaviours;
- the distribution and abundance of the species;
- recognised threats to the viability of populations of the species;
- the likelihood of the species utilising areas to be affected by the SHMR development;
- the nature and significance of potential impacts of the SHMR development upon the viability of local populations of the species; and
- impact mitigation measures that are proposed as part of the SHMR development that the species may benefit from.

4.3.2 Significant Impact Assessment

The establishment and operation of the SHMR has the potential to impact on listed marine fauna species via a number of mechanisms including physical habitat alteration, indirect habitat degradation and direct physical disturbance to marina fauna. In this impact assessment it is recognised that the SHMR development is proposed in response to increased recreational and commercial, primarily tourism related, boating activity in the Whitsunday region. As such it is acknowledged in this assessment that the SHMR development will not cause any significant increase in boating activity in the Whitsunday locality, although it may result in a localised increase in boating activity in the immediate vicinity of Shute Bay.

Table 5 provides a further assessment of the potential for significant impacts to occur to threatened marine species as a result of the SHMR proceeding in accordance with the various impact avoidance, mitigation and management strategies detailed in Section 2.5 herein. Significant impact criteria for threatened marine species considered in this assessment are derived from the *EPBC Act* Policy Statement 1.1 - Significant Impact Guidelines (May 2006).

Table 5 Assessment in respect of the *EPBC Act* Significant Impact Criteria for listed threatened marine species

Significant Impact Criteria	Assessment
The action should not lead to a long-term decrease in the size of a population.	All of the threatened marine species that occur in the locality are species with very large ranges in comparison to the extent of the area that would be directly affected by the SHMR development. As such there are no threatened marine species that have a population that is wholly or substantially reliant upon areas that would be directly affected by the SHMR development. In respect of broader impacts upon the populations of threatened marine fauna, the Marine Megafauna Report (Natural Solutions, 2008) determined that there were several "significant risks" to marine fauna associated with: boating disturbance and boat strike, local habitat/food source loss, oil spills, marine debris and minor incidental sewage discharge. However it was also recognised that effective measures can be actioned to reduce and appropriately manage these risks. As such it is unlikely that the SHMR would either directly or indirectly lead to a long-term decrease in the size of a population of any threatened marine species.
The action should not reduce the area of occupancy of the species.	The direct physical disturbance of the SHMR development will result in a direct loss of approximately 14.59 ha of relatively sparse seagrass, 1.84 ha of fringing mangrove, 35 ha of sparse macroalgal beds and a small number of small coral colonies. The predicted seagrass loss equates to approximately 10% of the seagrass of Shute Bay. However, the constructed marina will provide approximately 1.8km of future breakwater habitat and associated pylons and pontoons (FRC, March 2007). Potentially, disturbance from increased boating activity may cause some individuals to avoid the area but as threatened species are unlikely to reside in the immediate vicinity of the SHMR site, or require it to breed, avoidance of the area would not constitute a significant reduction to the area of occupancy of any species. It is also to noted that the SHMR site is currently used as a mooring site, is in close proximity to the very busy Shute Harbour Transit Terminal and Barge Wharf. It experiences a considerable level of use by existing commercial and recreational boating activities. Whilst the overall level of boating activity in the area may increase in the future, the SHMR development is proposed in response to a demand for appropriate infrastructure to accommodate existing and anticipated increases in boating activity within the region.
The action should not fragment an existing population into two or more populations.	The SHMR site is located on the inter-tidal and sub-tidal flats of Shute Bay. The position and scale of the SHMR development will not result in the fragmentation of any threatened marine fauna populations that inhabit the locality. In this respect it is noted that all of the threatened marine species that occur in the locality: • have very large ranges in comparison to the extent of the area that would be directly affected by the SHMR development; and • are very mobile species with the capacity to navigate around the SHMR development. As such, the SHMR development will not fragment an existing population of any listed threatened marine fauna into two or more populations.

Significant Impact Criteria	Assessment
The action should not adversely affect habitat critical to the survival of a species.	The SHMR site does not contain critical habitat identified in a recovery plan for any of the threatened species; nor is any habitat listed on the Register of Critical Habitat maintained by the Minister under the *EPBC Act*. The SHMR development s not likely to adversely affect habitat critical to the survival of any of the threatened marine species that occur in the locality. In this respect it is noted that: • the marine habitat types (seagrass, fringing mangroves, macroalgal beds and corals) identified on the SHMR site and which will be directly affected by the SHMR development are all well represented within Shute Bay and within the broader Whitsunday region; • Shute Bay is not considered to be of critical or high importance to dugongs and marine turtles, with usage rates of the area being relatively low, possibly due to relatively sparse resources when compared to other areas within the Whitsunday region; • no turtle nesting beaches occur in or near Shute Bay; and • species such as the Humpback whale and the Leatherback turtle are not expected to utilise the shallow waters of Shute Bay.
The action should not disrupt the breeding cycle of a population.	The SHMR site does not contain known breeding habitat for any of the listed threatened marine species. No turtle nesting beaches occur in or near Shute Bay and no major breeding sites occur within the Whitsunday area (Natural Solutions, 2008). The potential for the SHMR development to indirectly disrupt the breeding cycle of a threatened marine species is also considered to be remote. The potential for activity within the confines of the SHMR to disrupt, by way of emission of noise, vibration or light, the breeding of threatened marine species is negligible. Boating and other human activity within the broader Whitsunday locality has a greater potential to result in some interference with breeding marine fauna, however these potential impacts are recognised and managed within the Zoning Plans of the GBRMP and the GBRCoastMP.
The action should not modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.	For the reasons specified above the SHMR development will not modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that any of threatened marine species is likely to decline.
The action should not result in invasive species that are harmful to a threatened species becoming established in the species´ habitat.	The SHMR development would potentially decrease the risk of marine pests being introduced into the locality by recreational boating activity. In this respect it is noted that at present there are limited facilities available in the locality to provide for the appropriate and best practice management of bilge water, which can be a vector for the introduction of marine pests.
The action should not interfere with the recovery of the species.	The Recovery Plan for Marine Turtles in Australia (Environment Australia 2003) identified several potential issues interfering with the recovery of marine turtles in Queensland and elsewhere in Australia. Of these, only one issue, the need to restrict boat speed in areas of important marine turtle habitat, is of importance for this project. Although the proposed SHMR development and access channel are not located near an important marine turtle habitat area, the use of “Vessel Transit Lanes” and speed limits will minimise the risk of boat strikes on large marine vertebrates (including dugongs) occurring within Shute Bay (Marina SBMP; Cardno, 2008). Furthermore, the SHMR site does not contain habitat identified in a recovery plan for any of the threatened species; nor is any habitat listed on the Register of Critical Habitat maintained by the Minister under the *EPBC Act*. Hence, the SHMR will not interfere with the recovery of any threatened terrestrial species. In the long-term the SHMR has the capacity to make a positive contribution

Significant Impact Criteria	Assessment
	towards the recovery of populations of several threatened terrestrial species via a combination of habitat retention, habitat enhancement and environmental education.

4.3.3 Implications of likely significant impacts

As detailed in Section 4.3.2, the SHMR development is not likely to have a significant impact on any threatened marine species. Anticipated adverse impacts to threatened marine species associated with the SHMR development will be of limited magnitude, localised extent and/or appropriately mitigated via implementation of the various management plans that are proposed as part of the SHMR development.

4.4 Migratory Species – Terrestrial

4.4.1 Recognised values

Based on field observations and a review of the EPA Database and the DEWHA Database, for a 10km search radius from the centre of the site, the locality of the SHMR development has the potential to be utilised by seventeen (17) migratory terrestrial, including freshwater wetland dependent, species. These listed terrestrial migratory species are:

- *White-Bellied Sea-Eagle (Haliaeetus leucogaster);*
- White-throated Needletail *(Hirundapus caudacutus);*
- Barn Swallow *(Hirundo rustica);*
- Rainbow Bee-eater *(Merops ornatus);*
- Black-faced Monarch *(Monarcha melanopsis);*
- Spectacled Monarch *(Monarcha trivirgatus);*
- Satin Flycatcher *(Myiagra cyanoleuca);*
- Common Sandpiper *(Actitis hypoleucos);*
- Great Egret *(Ardea alba);*
- Cattle Egret *(Ardea ibis);*
- Lesser Sand Plover *(Charadrius mongolus);*
- Latham's Snipe *(Gallinago hardwickii);*
- Bar-tailed Godwit *(Limosa lapponica);*
- Australian Cotton Pygmy-goose *(Nettapus coromandelianus albipennis);*
- Eastern Curlew *(Numenis madagascariensis);*
- Little Curlew *(Numenius minutus);* and
- Terek sandpiper *(Xenus cinereus).*

Appendix D provides a profile for each of these species including a summary of relevant details concerning:

- the general ecology of the species including consideration of its critical habitat requirements, feeding and breeding behaviours;
- the distribution and abundance of the species;
- recognised threats to the viability of populations of the species;

- the likelihood of the species utilising areas to be affected by the SHMR development;
- the nature and significance of potential impacts of the SHMR development upon the viability of local populations of the species; and
- impact mitigation measures that are proposed as part of the SHMR development that the species may benefit from.

4.4.2 Significant Impact Assessment

Potential impacts of the SHMR development upon listed migratory terrestrial species include:

- direct physical loss or modification of terrestrial habitat associated with the establishment of the SHMR; and
- indirect degradation of the habitat values of adjacent areas associated with the presence and operation of the SHMR development.

In respect of these issues it is noted that there would be no significant loss of habitat for terrestrial migratory species as a consequence of the SHMR development, with the majority of existing habitat being retained and surrendered to the State for potential incorporation into the Conway National Park. The direct loss of habitat for migratory terrestrial species would be limited to the removal of approximately 2 ha of shoreline vegetation, perching and foraging habitat and the loss of some forage habitat for the White-bellied sea-eagle.

Indirect impacts upon migratory terrestrial species could be anticipated from the increased level of human activity at the site. In this resect the SHMR development will generate a range of activities that will alter the ambient environmental conditions of the locality and which may impact upon the utilisation of adjacent areas by migratory terrestrial species. However it is relevant to note that the locality of the SHMR is not a pristine environment and is currently subject to various forms of human induced disturbance associated with the Proserpine-Shute Harbour Road, an existing motel, residential dwellings, the Shute Harbour Transit Facility and a marina salvage operation.

Table 6 provides a further assessment of the potential for significant impacts to occur to migratory terrestrial species as a result of the SHMR proceeding in accordance with the various impact avoidance, mitigation and management strategies detailed in Section 2.5 herein. Significant impact criteria for migratory terrestrial species considered in this assessment are derived from the *EPBC Act* Policy Statement 1.1 - Significant Impact Guidelines (May 2006).

Table 6 Assessment in respect of the *EPBC Act* Significant Impact Criteria for terrestrial migratory species.

Significant Impact Criteria	Assessment
The action should not substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species.	The SHMR development will not modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory terrestrial species. In this respect: • all of the migratory terrestrial species that potentially utilise the locality are mobile bird species whose habitat resource base would not become fragmented by the SHMR development; • the SHMR development would not result in any alteration to the fire regimes that characterise the site locality; • the SHMR development would result in some localised alterations to the nutrient and hydrological cycles of Shute Bay; and • the SHMR development would result in the destruction of some areas of foraging habitat for migratory terrestrial species.

Significant Impact Criteria	Assessment
	However the areas of habitat for migratory terrestrial species that would be affected by the SHMR development do not contain nor constitute an important area of habitat for any of the potentially affected migratory terrestrial species. With the relevant *EPBC Act* definition of 'important habitat' for a migratory species being: a) habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species; and/or b) habitat that is of critical importance to the species at particular life-cycle stages; and/or c) habitat utilised by a migratory species which is at the limit of the species range; and/or d) habitat within an area where the species is declining.
The action should not result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species.	The SHMR development will not result in an invasive species that is harmful to the migratory terrestrial species becoming established in an area of important habitat for these species. The SHMR development includes provisions for the control of weed and vertebrate pest species that currently occur on the site and which have the potential to degrade the locality's ecological values. Furthermore, Section 15 of the SHMR CEMP (Cardno, 2008) outlines tasks and monitoring procedures to be undertaken to minimise invasive species entering the site. As the site is adjoining Conway National Park, all earthmoving equipment arriving at the site must be certified clean of weeds and soil material (washed down prior to arriving at the site) and inspected by the site environmental officer.
The action should not seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.	The SHMR site and its immediate locality is not utilised by an ecologically significant proportion of the population of any of the terrestrial migratory species. As such the SHMR will not seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.

4.4.3 Implications of likely significant impacts

As detailed in Section 4.4.2, the SHMR development is not likely to have a significant impact on any migratory terrestrial species. Any adverse impacts to migratory terrestrial species associated with the SHMR development will be of limited magnitude, localised extent and/or appropriately mitigated via implementation of the various management plans that are proposed as part of the SHMR development.

4.5 Migratory Species - Marine

4.5.1 Recognised values

Based on field observations and a review of the EPA Database and the DEWHA Database, for a 10 km search radius from the centre of the site, the locality of the SHMR development is known, or considered likely, to be utilised by eighteen (18) migratory marine species. Ten (10) of these species are also listed as threatened species and have previously been considered in Sections 4.2 and 4.3 herein. The remaining migratory marine species considered herein are:

- Dugong (*Dugong dugon*);
- Irrawaddy dolphin (*Orcaella brevirostris*)/ Australian snubfin dolphin (*Orcaella heinsohnii*);
- Indo-Pacific humpback dolphin (*Sousa chinensis*);
- Bryde's whale (*Balaenoptera edeni*);

- Killer whale (*Orcinus orca*);
- Saltwater crocodile (*Crocodylus porosus*);
- Little tern (*Sterna albifrons*);
- Bridled Tern (*Sterna anaethetus*); and
- Black-naped tern (*Sterna sumatrana*).

Appendix D provides a profile for each of these species including a summary of relevant details concerning:

- the general ecology of the species including consideration of its critical habitat requirements, feeding and breeding behaviours;
- the distribution and abundance of the species;
- recognised threats to the viability of populations of the species;
- the likelihood of the species utilising areas to be affected by the SHMR development;
- the nature and significance of potential impacts of the SHMR development upon the viability of local populations of the species; and
- impact mitigation measures that are proposed as part of the SHMR development that the species may benefit from.

4.5.2 Significant Impact Assessment

Potential impacts of the SHMR development upon listed migratory marine species include:

- direct physical loss or modification of marine habitat associated with the establishment of the SHMR; and
- indirect degradation of the habitat values of adjacent areas associated with the presence and operation of the SHMR development.

Table 7 provides a further assessment of the potential for significant impacts to occur to migratory marine species as a result of the SHMR proceeding in accordance with the various impact avoidance, mitigation and management strategies detailed in Section 2.5 herein. Significant impact criteria for migratory marine species considered in this assessment are derived from the *EPBC Act* Policy Statement 1.1 - Significant Impact Guidelines (May 2006).

Table 7 Assessment in respect of *EPBC Act* Significant Impact Criteria for migratory marine species

Significant Impact Criteria	Assessment
The action should not substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species.	The locality of the SHMR site is not known to contain any important breeding or roosting sites for any migratory marine species. However some of the listed migratory marine species may use the seagrass beds and coastal waters within and adjacent to SHMR site as foraging habitat. The SHMR development will result in the loss and modification of some areas of habitat for migratory marine species, including localised alterations to existing nutrient and hydrological cycles. However these effects would be relatively localised and areas of habitat for migratory marine species that would be affected by the SHMR development do not contain nor constitute an important area of habitat for any of the potentially affected migratory marine species. With the relevant *EPBC Act* definition of 'important habitat' for a migratory species being:

Significant Impact Criteria	Assessment
	a) habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species; and/or b) habitat that is of critical importance to the species at particular life-cycle stages; and/or c) habitat utilised by a migratory species which is at the limit of the species range; and/or d) habitat within an area where the species is declining.
The action should not result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species.	The potential for construction and operation of the SHMR to result in the establishment of invasive marine species in the area has been recognised and appropriate provisions have been made to mitigate and manage this potential. In this respect the SHMR marina will be maintained in accordance with the requirements of the aquatic ecosystems technical reports to ensure appropriate levels of pest control are established and maintained (Marina SBMP; Cardno, 2008). The SHMR development would potentially decrease the risk of marine pests being introduced into the locality by recreational boating activity. In this respect it is noted that at present there are limited facilities available in the locality to provide for the appropriate and best practice management of bilge water, which can be a vector for the introduction of marine pests. The SHMR development will provide such facilities.
The action should not seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.	The marine environment of the SHMR site is not an important breeding, feeding, migration or resting habitat for any of the listed migratory marine species. Hence, the SHMR development will not seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of any population of a migratory marine species.

4.5.3 Implications of likely significant impacts

As detailed in Section 4.5.2, the SHMR development is not likely to have a significant impact on any migratory marine species. Any adverse impacts to migratory marine species associated with the SHMR development will be of limited magnitude, localised extent and/or appropriately mitigated via implementation of the various management plans that are proposed as part of the SHMR development.

4.6 Commonwealth Marine Environment

4.6.1 Recognised values

The Commonwealth Marine Environment is any part of the sea, including the waters, seabed, and airspace, within Australia's exclusive economic zone and/or over the continental shelf of Australia, that is not State or Northern Territory waters.

4.6.2 Significant Impact Assessment

The potential impacts of the SHMR development upon the Commonwealth Marine Environment are related to direct impacts upon the seabed of the site. In this respect the SHMR development will not involve any direct modifications to or development works within the Commonwealth Marine Environment.

The SHMR development has the potential to indirectly affect that part of the Commonwealth Marine Environment that is located outside of the State coastal waters of

Queensland, which extend to a distance of approximately 3 nautical miles from the coastline. However, due to the distance that exists between the site and the limit of State coastal waters, and for the reasons specified in Sections 4.1 to 4.5 herein, no significant impacts are anticipated to occur to the Commonwealth Marine Environment.

Table 8 provides a further assessment of the potential for significant impacts to occur to the Commonwealth Marine Environment as a result of the SHMR proceeding in accordance with the various impact avoidance, mitigation and management strategies detailed in Section 2.5 herein. Significant impact criteria for the Commonwealth Marine Environment considered in this assessment are derived from the *EPBC Act* Policy Statement 1.1 - Significant Impact Guidelines (May 2006).

Table 8 Assessment in respect of the *EPBC Act* Significant Impact Criteria for the Commonwealth Marine Environment

Significant Impact Criteria	Assessment
The action should not result in a known or potential pest species becoming established in the Commonwealth marine area.	The potential for construction and operation of the SHMR to result in the establishment of invasive marine species in the Commonwealth Marine Environment has been recognised and appropriate provisions have been made to mitigate and manage this potential. In this respect the SHMR marina will be maintained in accordance with the requirements of the aquatic ecosystems technical reports to ensure appropriate levels of pest control are established and maintained (Marina SBMP; Cardno, 2008). The SHMR development would potentially decrease the risk of marine pests being introduced into the locality by recreational boating activity. In this respect it is noted that at present there are limited facilities available in the locality to provide for the appropriate and best practice management of bilge water, which can be a vector for the introduction of marine pests. The SHMR development will provide such facilities.
The action should not modify, destroy, fragment, isolate, or disturb an important or substantial area of habitat such that an adverse impact on marine ecosystem functioning or integrity in a Commonwealth marine area results.	The SHMR development will involve the modification of approximately 45 hectares of seabed that is located approximately 3 nautical miles from the Commonwealth Marine Environment. The ecosystems that will be impacted upon by the proposed development are well represented within adjacent sectors of Shute Bay and the wider Whitsunday locality, and as such the SHMR development would not have a substantial adverse impact on the ecosystem functioning or integrity of adjacent areas of the Commonwealth Marine Environment.
The action should not have a substantial adverse effect on a population of marine species or cetacean including its life cycle (e.g. breeding, feeding, migration behaviour, life expectancy) and spatial distribution.	For the reasons specified in Section 4.3 and Section 4.5 herein, the SHMR development is not likely to have any substantial adverse effect on a population of marine species or cetacean including its life cycle (e.g. breeding, feeding, migration behaviour, life expectancy) and spatial distribution.
The action should not result in a substantial change in air quality or water quality (including temperature) which may adversely impact on biodiversity, ecological integrity, social amenity or human health.	The potential for the SHMR development to result in alterations to the water qualities of the marine environment has been recognised and appropriate management regimes are proposed to avoid, mitigate and manage that potential (refer Table 1). In the presence of these strategies, it is considered that the magnitude and scale of any alterations to the qualities of the marine environment that result from the SHMR development would not adversely impact on biodiversity, ecological integrity, social amenity or human health.
The action should not result in persistent organic chemicals, heavy metals,	The potential for the SHMR development to result in the release and accumulation of harmful chemicals into the marine environment has been recognised and appropriate management regimes are proposed to avoid,

Significant Impact Criteria	Assessment
or other potentially harmful chemicals accumulating in the marine environment such that biodiversity, ecological integrity, social amenity or human health may be adversely affected.	mitigate and manage that potential. Specifically in this respect reference is made to the following: Construction Environmental Management Plan (CEMP): • Element 5 – Water Quality; • Element 6 – Acid sulphate Soils; and • Element 12 – Dangerous and Hazardous Materials. Acid Sulphate Soil Management Plan (ASSMP): • Section 8 – Acid Sulphate Soil Treatment and Management. Marina Site Based Management Plan (Marina SBMP): • Section 5 - Environmental Management: o 5.4 – Water Quality; o 5.5 – Dredge Spoil Management; o 5.6 – Waste Management; and o 5.8 – Dangerous and Hazardous Substances; • Section 6 – Environmental Emergencies; • Section 7 – Environmental Training; and • Section 8 – Education. Waste Management Plan (WMP): • Section 4 – Potential Impacts and Mitigation Measures; and • Section 5 – Waste Management Plan.
The action should not have a substantial adverse impact on heritage values of the Commonwealth marine area, including damage or destruction of an historic shipwreck.	The SHMR development will not have an adverse impact upon the cultural heritage values of the Commonwealth Marine Environment. In this respect it is noted that the cultural heritage survey presented as Appendix S1 of the SHMR EIS did not identify any areas or aspects of particular heritage significance at the SHMR site.

4.6.3 Implications of likely significant impacts

As detailed in Section 4.6.2, the SHMR development is not likely to have a significant impact on the Commonwealth Marine Environment. Any adverse impacts to the Commonwealth Marine Environment associated with the SHMR development will be of limited magnitude, localised extent and/or appropriately mitigated via implementation of the various management plans that are proposed as part of the SHMR development.

5. CONCLUSIONS

The SHMR development (or action) was referred to the Department of Environment and Heritage (DEH) on the 17th July 2006 for the Minister to determine whether Commonwealth approval is required for the action. A Decision notice was issued on the 27th July 2006 notifying that the proposal is a controlled action (i.e. requires Commonwealth approval) pursuant to Part 3, Division 1, of the *EPBC Act*. The controlling provisions were determined to be:

- Sections 12 and 15A (World Heritage);
- Sections 18 and 18A (Listed threatened species and communities);
- Sections 20 and 20A (Listed migratory species); and
- Sections 23 and 24A (Marine environment).

The potential for the SHMR development to have adverse impacts upon Matters of NES has been recognised and have been subject to detailed technical assessments during the preparation of detailed development plans and the compilation of an Environmental Impact Statement for the SHMR development. As part of this process opportunities to avoid adverse impacts have been identified and taken where possible. Where potential adverse environmental impacts associated with the SHMR development can not be avoided measures have been taken to reduce the magnitude and/or extent of the impacts and to development strategies designed to further mitigate and manage these potential impacts during the construction and operational phases of the development. Details concerning the various impact mitigation and management strategies proposed as part of the SHMR development are provided in Section 2.5 of this report.

Assessments of the likelihood of the proposed SHMR development upon matters of NES have also been carried out and the results of these assessments are summarised in Sections 4.1 to 4.6 herein. These significant impact assessments are generally based on the findings of detailed ecological assessments carried out as part of the SHMR EIS, supplemented by consideration of the anticipated effectiveness of the various impact mitigation and management strategies proposed as part of the SHMR development. The significant impact criteria considered in these assessments were derived from the *EPBC Act* Policy Statement 1.1 - Significant Impact Guidelines (May 2006).

A primary conclusion that can be drawn from these assessments is that anticipated adverse impacts to Matters of NES associated with the SHMR development will be of limited magnitude, localised extent and/or appropriately mitigated via implementation of the various management plans that are proposed as part of the SHMR development.

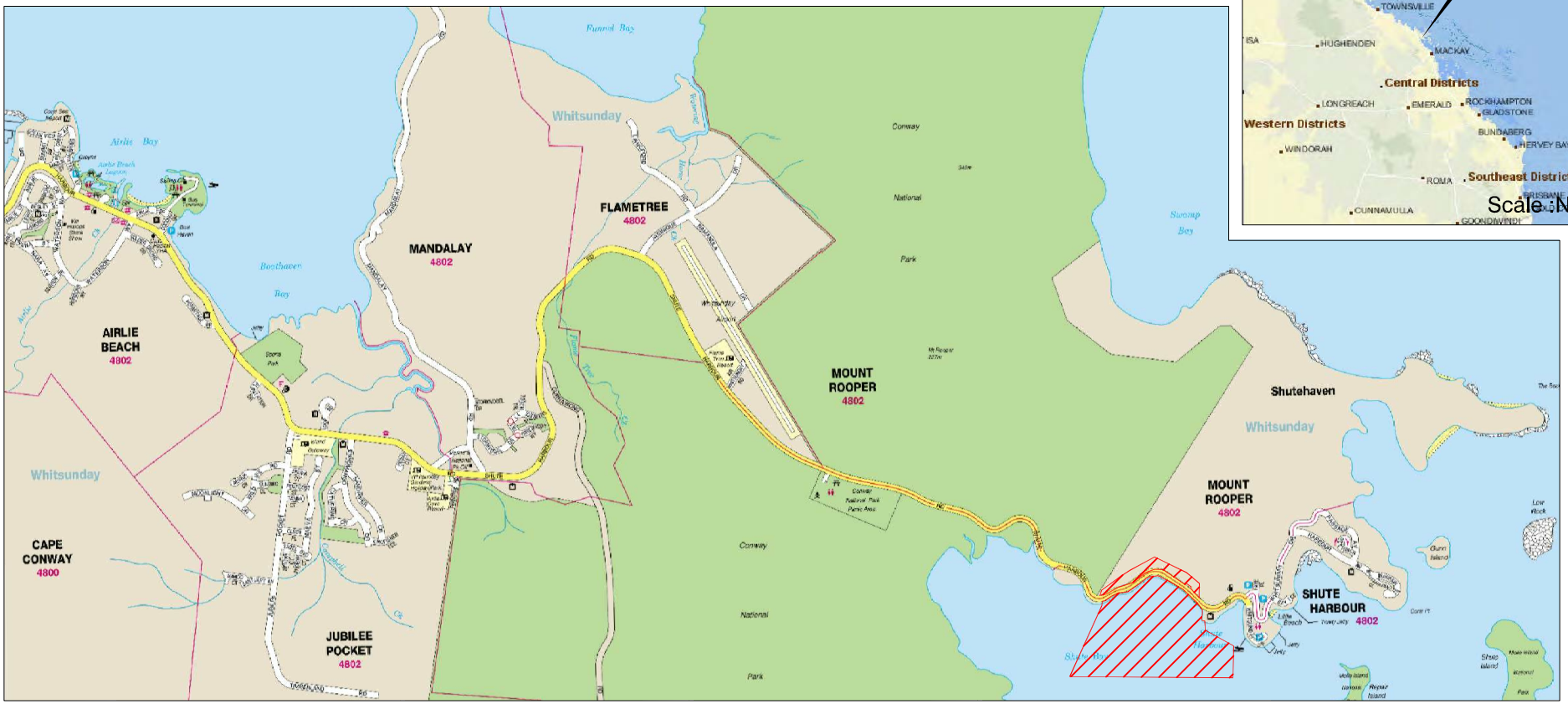
It is also recognised that the *EPBC Act* aims to balance the protection of Matters of NES with society's economic and social needs based on the guiding principles of ecologically sustainable development. In this respect it is relevant as part of any assessment of the impact of the SHMR development upon Matters of NES to consider the social and economic benefits that would be derived from the proposal. As part of the EIS process, the AEC Group has undertaken a Net Benefit Assessment that provides an analysis of the SHMR in terms of its environmental, social and economic costs and benefits (refer to SHMR EIS, Appendix G). The AEC Group determined that the SHMR development would:

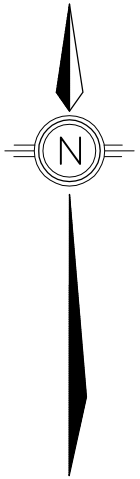
- provide a range of community, economic and environmental benefits including increased access and recreational space, employment and additional business activity across a range of industries; and
- contribute to a net, or overall improvement in the environmental conditions throughout the Whitsundays, valued through the increase of ecosystem services

values and recreational value of the natural attributes of the Great Barrier Reef maintained as a result of the development.

Given the anticipated low likelihood of any significant impacts occurring on Matters of NES and the environmental, social and economic benefits that would be derived, it is assessed that the SHMR development is consistent with the principal objective of the *EPBC Act*.

FIGURES





0.4 0 0.4 0.8 1.2 1.6 2km
1:40,000

Scale 1:40,000(A4)

FIGURE 1
LOCALITY PLAN

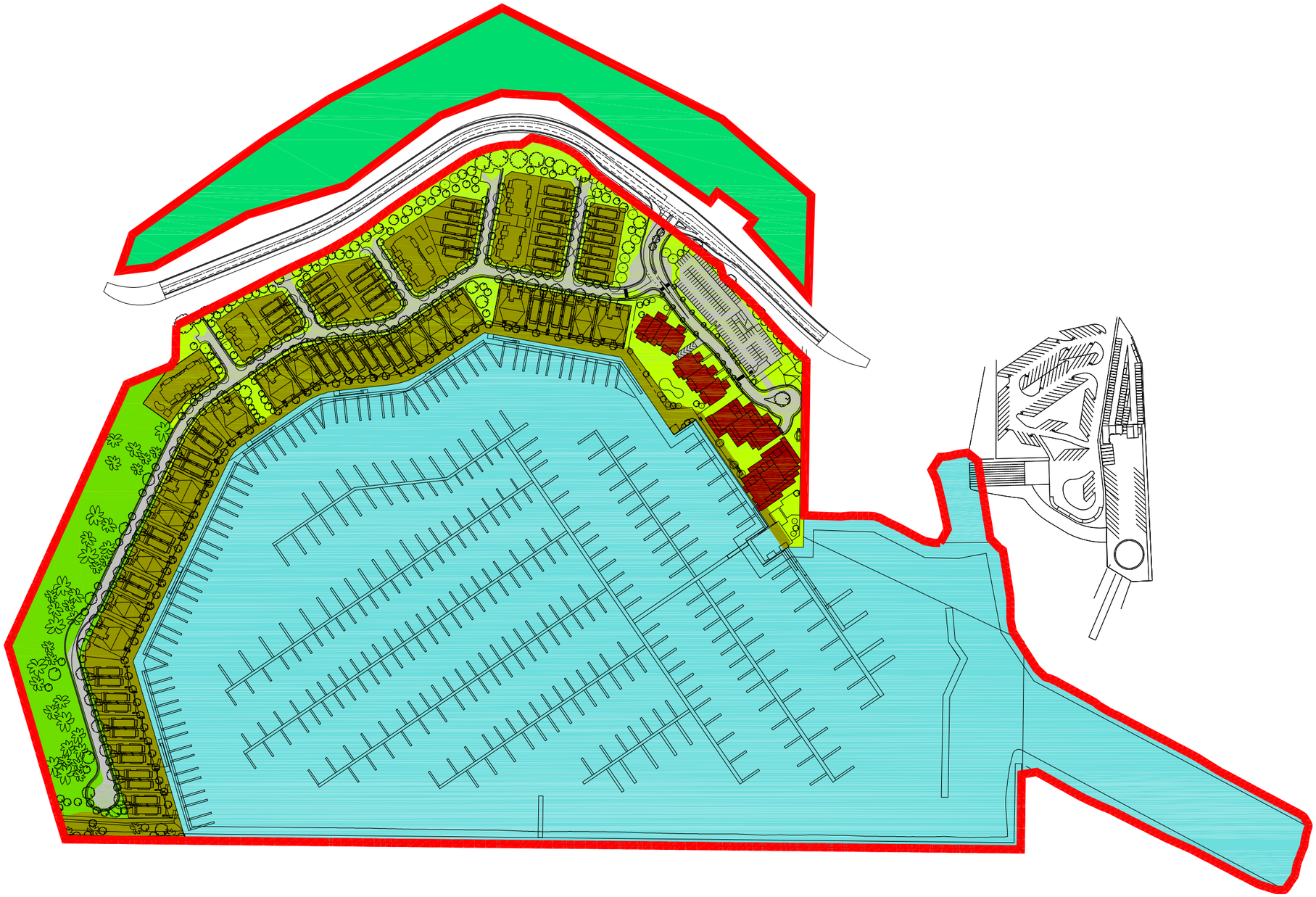
Rev: Orig. Date: 28 July 2008

Project No.: 7800/41

Shute Harbour Marina Development Pty Ltd

CAD FILE: I:\7800-41\ACAD\Matters of NES\Figure 1 - Locality Plan.dwg
XREF's:

PRINT DATE: 01 August, 2008 - 2:43pm



40 0 40 80 120 160 200m
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Scale 1:4,000 (A3)

FIGURE 2
MASTER PLAN

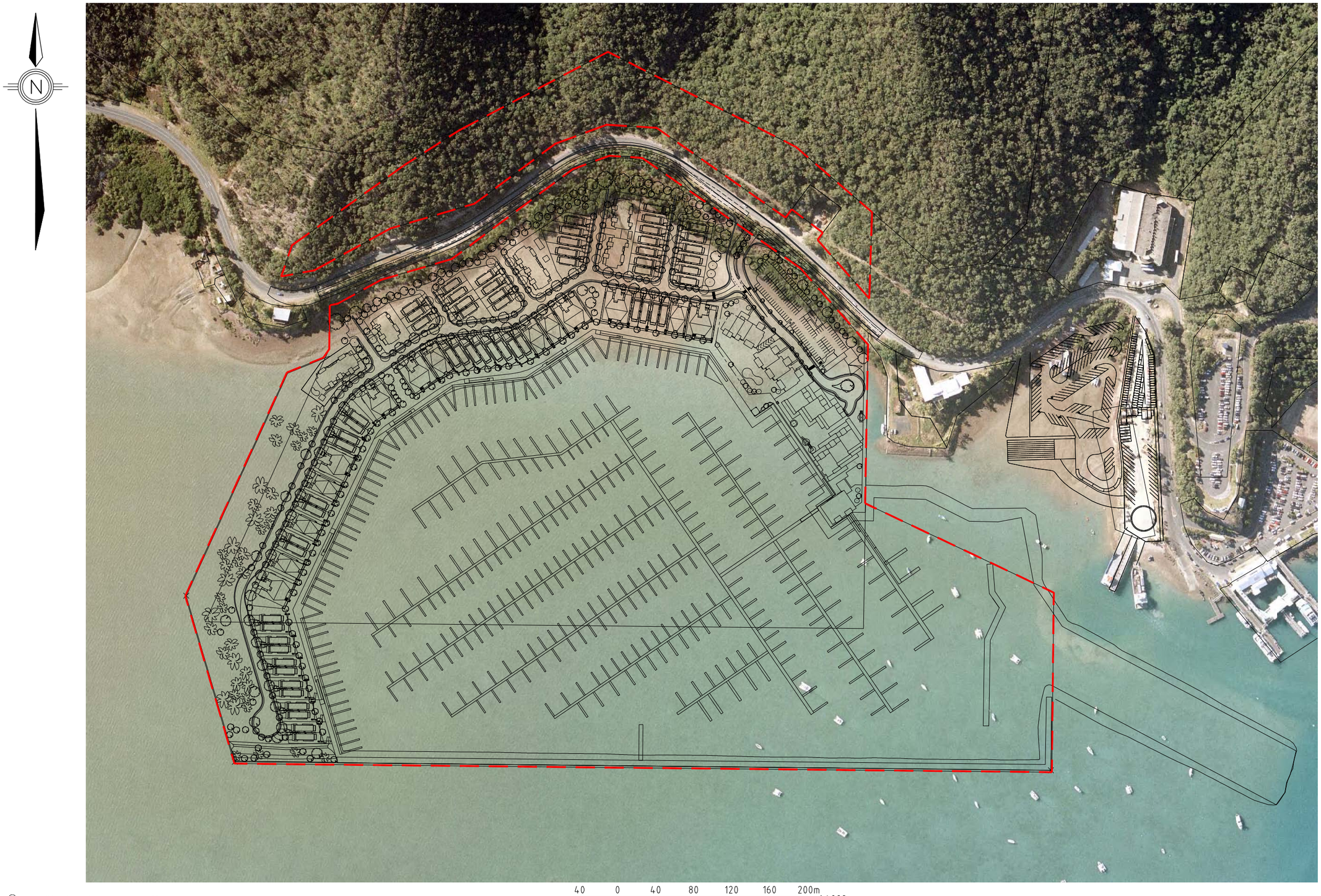
Rev: Orig. Date: 28 July 2008

Project No.: 7800/41

Shute Harbour Marina Development Pty Ltd

CAD FILE: I:\7800-41\ACAD\Matters of NES\Figure 2 - Master Plan.dwg
XREF's: Master Plan July 2008

PRINT DATE: 01 August, 2008 - 2:48pm



Scale 1:4000 (A3)

FIGURE 3

PROPOSED PLAN OF DEVELOPMENT ON AERIAL PHOTOGRAPH

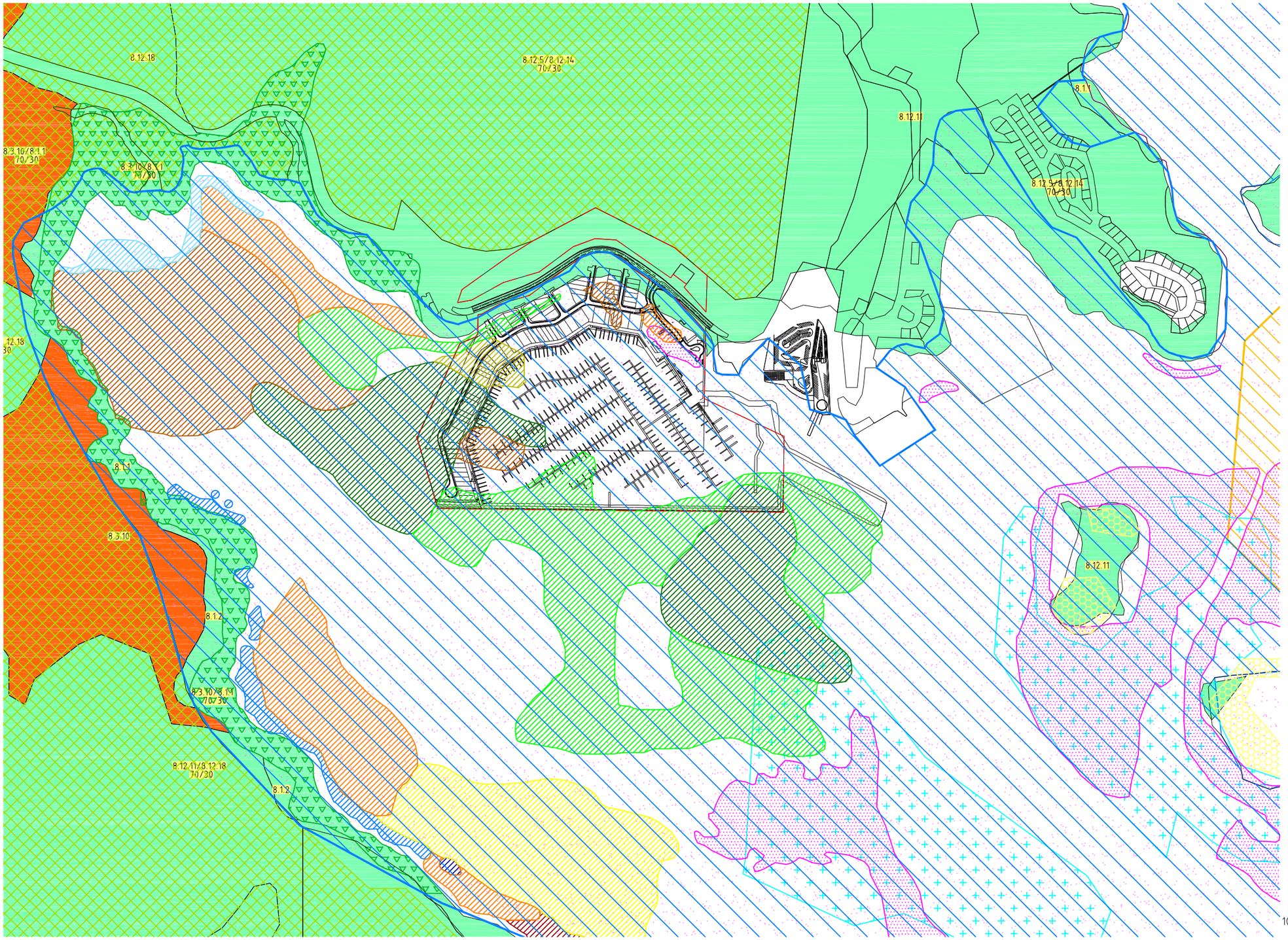
Rev: Orig. Date: 28 July 2008

Project No.: 7800/41

Shute Harbour Marina Development Pty Ltd

CAD FILE: I:\7800-41\ACAD\Matters of NES\Figure 3 - MProposed plan of development on aerial.dwg
XREF's: X-SURV-lease boundaries and Site Boundary; dcdb with aerial; Master Plan July 2008

PRINT DATE: 31 July, 2008 - 8:43am



Legend

Site boundary

Regional Ecosystems

- Of Concern - Dominant
- Not of Concern

Areas of state significance (natural resources)

- Conway National Park
- Significant coastal dune systems
- Coastal wetlands
- Coral reef

*Source: Map No. 5 Environmental Protection Agency Coastal Planning

Great Barrier Reef

- Great Barrier Reef world heritage area

*Source: Coastal Atlas

- Habitat protection zone
- Conservation park zone

*Source: Map No. 5 Environmental Protection Agency Coastal Planning

Coral and seagrass communities 2007

- Coral Dominated Communities
- Sparse *Halodule uninervis*
- Moderate *Halodule uninervis*
- Sparse *Halophila ovalis*
- Moderate *Halodule ovalis*
- Sparse *Zostera muelleri*
- Moderate *Zostera muelleri*
- Dense *Zostera muelleri*
- Sparse mixed seagrass
- Moderate mixed seagrass
- Dense mixed seagrass

*Source: FRC Shute Harbour EIS: Aquatic Ecology Report

N

100 0 100 200 300 400 500m

1:10,000

Map disclaimer: 2003 Regional Ecosystem Map, Date: [25-06-07]. Regional ecosystem linework reproduced at scale greater than 1:100,000, except in designated areas, should be used as a guide only. The positional accuracy of RE data mapped at a scale of 1:100,000 is +/-100 metres. Regional ecosystem mapping reproduced with permission of Environmental Protection Agency [year]. While every care is taken to ensure the accuracy of the Information Product, the Environmental Protection Agency makes no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and disclaims all responsibility and all liability (including without limitation, liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs whichyou might incur as a result of the product being inaccurate or incomplete in any way and for any reason

Natural resources information sourced from *Areas of state significance (natural resources)* Map No. 5, Environmental Protection Agency Coastal Planning.

Social and economic information sourced from *Areas of state significance (social and economic)* Map No. 2, Environmental Protection Agency Coastal Planning.

Scale 1:10,000 (A3)

FIGURE 4
ENVIRONMENTALLY SENSITIVE AREAS

Rev: v.2 Date: 28 July 2008

Project No.: 7800/41

Shute Harbour Marina Development Pty Ltd

CAD FILE: I:\7800-41\ACAD\Matters of NES\Figure 4 - Environmentally sensitive areas.dwg
XREF's: dcdb without aerial; Master Plan July 2008; X-REdata

PRINT DATE: 31 July, 2008 - 10:54am

APPENDIX A

GBRWHA Profile

Place Details

Send Feedback

Great Barrier Reef, Townsville, QLD, Australia

Photographs:	None
List:	World Heritage List
Class:	Natural
Legal Status:	Declared property (30/10/1981)
Place ID:	105060
Place File No:	4/00/192/0001

Statement of Significance:

The Great Barrier Reef, one of Australia's first World Heritage Areas, was inscribed on the World Heritage List in recognition of its outstanding natural universal values:

- as an outstanding example representing the major stages in the earth's evolutionary history;
- as an outstanding example representing significant ongoing ecological and biological processes;
- as an example of superlative natural phenomena; and
- containing important and significant habitats for in situ conservation of biological diversity.

It is the world's largest World Heritage Area extending 2 000 kilometres and covering an area of 35 million hectares on the north-east continental shelf of Australia. Bigger than the entire area of Italy, it is probably the best known marine protected area in the world. The Great Barrier Reef's great diversity reflects the maturity of the ecosystem, which has evolved over hundreds of thousands of years. It is the world's most extensive coral reef system and is one of the world's richest areas in terms of faunal diversity.

The Great Barrier Reef World Heritage Area contains more than just coral reefs. It also contains extensive areas of seagrass, mangrove, soft bottom communities and island communities. Contrary to popular belief, the reef is not a continuous barrier, but a broken maze of coral reefs and coral cays. It includes some 2 800 individual reefs, of which 760 are fringing reefs. These reefs range in size from less than one hectare to more than 100 000 hectares, and in shape from flat platform reefs to elongated ribbon reefs.

The Great Barrier Reef provides habitats for many diverse forms of marine life. There are an estimated 1 500 species of fish and more than 300 species of hard, reef-building corals. More than 4 000 mollusc species and over 400 species of sponges have been identified.

Other well-represented animal groups include anemones, marine worms, crustaceans (prawns, crabs etc.) and echinoderms (starfish, sea urchins etc.).

The extensive seagrass beds are an important feeding ground for the dugong, a mammal species internationally listed as endangered.

The reef also supports a wide variety of fleshy algae that are heavily grazed by turtles, fish, sea urchins and molluscs.

The reef contains nesting grounds of world significance for the endangered green and loggerhead turtles. It is also a breeding area for humpback whales, which come from the Antarctic to give birth to their young in the warm waters.

The islands and cays support several hundred bird species, many of which have breeding colonies there. Reef herons, osprey, pelicans, frigate birds, sea eagles and shearwaters are among the numerous sea birds that have been recorded.

The World Heritage property is also of cultural importance, containing many middens and other archaeological sites of Aboriginal or Torres Strait Islander origin. Some notable examples occur on Lizard and Hinchinbrook Islands, and on Stanley, Cliff and Clack Islands where there are spectacular galleries of rock paintings.

There are over 30 historic shipwrecks in the area, and on the islands are ruins and operating lighthouses that are of cultural and historical significance.

About 98 per cent of the World Heritage Property is within the Great Barrier Reef Marine Park, the remainder being Queensland waters and islands. The Great Barrier Reef Marine Park was declared in 1975 with the purpose of preserving the area's outstanding biodiversity whilst providing for reasonable use. This has been achieved using a spectrum of zones ranging from General Use Zones to Preservation Zones. In very broad terms, these zones allow ecologically sustainable activities, but all have an overriding conservation objective. Most reasonable activities such as tourism, fishing, boating, diving and research are permitted to occur but are controlled through zoning and management planning to minimise impacts and conflicts with areas of high conservation value and other users.

Today, the great majority of the Marine Park is still relatively pristine when compared with coral reef systems elsewhere in the world. An independent report published in 1997 concluded that the Reef is in good condition and is being managed effectively. These are also the findings of two major workshops to which over 100 scientists and management experts contributed. Both these workshops have now been summarised in the report titled State of the Great Barrier Reef World Heritage Area 1998, released in November 1998.

The Australian Government and State Government have a cooperative and integrated approach to management of the Great Barrier Reef World Heritage Area. The Great Barrier Reef Marine Park Authority (GBRMPA) is the Australian Government agency responsible for overall management, and the Queensland Government, particularly the Queensland Parks and Wildlife Service, provides day-to-day management to the Authority. Integrated management is also assisted by:

- a Commonwealth Act specifically for the Marine Park that, if necessary, provides over-riding powers;
- complementary legislation for most adjoining State waters;
- formal agreements with Queensland, and with various government departments, industry, research institutions and universities; and
- strategic zoning plans and site-specific management plans.

GBRMPA's current work program stems from four issues that have been identified as being critical for achieving adequate protection and management of the Reef in the short to medium term:

- water quality and coastal development;
- fisheries;
- tourism and recreation; and
- conservation, biodiversity and world heritage.

Official Values:

Criterion: (IX) Outstanding examples of on-going evolution

Biologically the Great Barrier Reef supports the most diverse ecosystem known to man 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;
- 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);
- 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 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.

Criterion: (VII) 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.

Criterion: (VIII) 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 055km2;
- 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.

Criterion: (X) Important habitats for conservation of biological diversity

The Great Barrier Reef contains many outstanding examples of important and significant natural habitats for in situ conservation of species of conservation 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

Description:

Includes the world's most extensive stretch of coral reef. The reef system, extending to Papua New Guinea, comprises some 3,400 individual reefs, including 760 fringing reefs, which range in size from under 1ha to over 10,000ha and vary in shape to provide the most spectacular marine scenery on earth. There are approximately 300 coral cays, including 213 unvegetated cays, 43 vegetated cays and 44 low wooded islands. There are also 618 continental islands which were once part of the mainland (GBRMPA, pers. comm., 1995).

The form and structure of the individual reefs show great variety. Two main classes may be defined: platform or patch reefs, resulting from radial growth; and wall reefs, resulting from elongated growth, often in areas of strong water currents. There are also many fringing reefs where the reef growth is established on subtidal rock of the mainland coast or continental islands (Kelleher *et al*., 1989).

Capricorn-Bunker Group National Park (Queensland State) encompasses a terrestrial section and consists of four islands: Fairfax Island, a coral cay consisting of two small islands on an egg-shaped reef; Hoskyn Island similar to Fairfax, though not a cay; Heron Island, sand and broken coral on coral and rock formation; and Lady Musgrave Island, a cay surrounded by extensive coral reefs.

Water circulation is very complex, governed by properties of the Coral Sea, land run-off, evaporation, the south-east trade winds, forced upwellings due to strong tidal currents in narrow reef passages and coastal waters including mangroves. Tides are generally semi-diurnal with diurnal inequality towards the north, becoming almost diurnal in Torres Strait. The maximum tidal range is about 3m along most of the coast, although increasing to 6 to 9m in the Broad Sound area between 21 degrees and 23 degrees S. Water is

vertically well-mixed for most of the year with stratification occurring due to freshwater input during January to April. Freshwater run-off can be very localised and significant physical and biological effects may be expected (Kelleher *et al*., 1989).

History:

The Great Barrier Reef Marine Park Act 1975 provides for the establishment, control, care and development of a Marine Park covering 98.5% of the Great Barrier Reef Region as defined in that Act. Parts of Green Island (1937) and Heron Island (1943) were gazetted as national parks under the State Forests and National Parks Act 1903-1948 (Queensland). Heron-Wistari and Green Island Marine Parks (1974), gazetted under the Forestry Act 1959-1976 (Queensland), were the first Marine Parks on the reef. Areas of the region may be declared as part of the Marine Park and subsequently zoned. In 1976 these powers were transferred to the National Parks and Wildlife Act 1976 and Fisheries Act 1976, respectively. The first section of the Great Barrier Reef Marine Park, the Capricornia Section, was proclaimed in 1979. The Cairns and Cormorant Pass sections were declared as part of the Marine Park in late 1981 and the remainder of the Marine Park in subsequent years. The whole area was inscribed on the World Heritage List in 1981.

Condition and Integrity: Not Available

Location:

About 34,870,000ha, comprising an area bounded by a line which –
(a) commences at the point that, at low water, is the northernmost extremity of Cape York Peninsula, Queensland,:
(b) runs thence easterly along the geodesic to the intersection of parallel of Latitude 10 degrees 41 minutes South with meridian of Longitude 145 degrees East;
(c) runs thence southerly along that meridian to its intersection by the parallel of Latitude 13 degrees South;
(d) runs thence south-easterly along the geodesic to a point of Latitude 15 degrees South Longitude 146 degrees East;
(e) runs thence south-easterly along the geodesic to a point of Latitude 17 degrees 30 minutes South Longitude 147 degrees East;
(f) runs thence south-easterly along the geodesic to a point of Latitude 21 degrees South Longitude 152 degrees 55 minutes East;
(g) runs thence south-easterly along the geodesic to a point of Latitude 24 degrees 30 minutes South Longitude 154 degrees East;
(h) runs thence westerly along the parallel of Latitude 24 degrees 30 minutes South to its intersection by the coastline of Queensland at low water ; and
(i) runs thence generally northerly along that coastline at low water to the point of commencement.

Bibliography:

Driml, S. (1999) **Dollar Values and Trends of Major Direct Uses of the Great Barrier Reef Marine Park**,Great Barrier Reef Marine Park Authority, Townsville, Qld.
Great Barrier Reef Marine Park Authority (1994**) The Great Barrier Reef, Keeping it Great: a 25 year Strategic Plan for the Great Barrier Reef World Heritage Area.**
Lucas, P. H., Webb, T., Valentine, P. S. and Marsh, H. (1997) **The Outstanding Universal Value of the Great Barrier Reef World Heritage Area,** Great Barrier Reef Marine Park Authority, Townsville, Qld.
Wachenfeld, D. R., Oliver, J. K. and Morrissey, J. I. 1998) **State of the Great Barrier Reef World Heritage Area,** Great Barrier Reef Marine Park Authority, Townsville, Qld.

Report Produced: Fri Aug 1 16:34:26 2008

APPENDIX B

EPBC Act Online Protected Matters Search Tool Results

Australian Government
Department of the Environment and Water Resources

Protected Matters Search Tool

You are here: Environment Home > EPBC Act > Search

14 January 2008 13:22

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

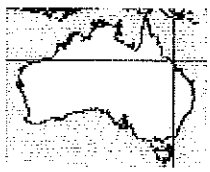
You may wish to print this report for reference before moving to other pages or websites.

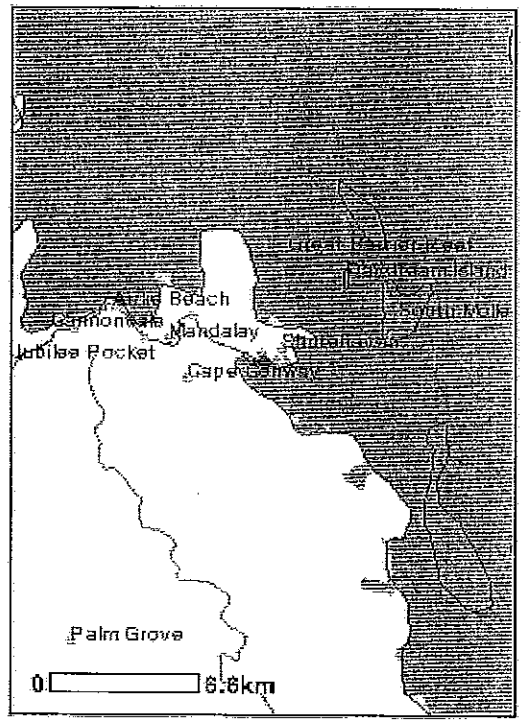
The Australian Natural Resources Atlas at http://www.environment.gov.au/atlas may provide further environmental information relevant to your selected area. Information about the EPBC Act including significance guidelines, forms and application process details can be found at http://www.environment.gov.au/epbc/assessmentsapprovals/index.html

Search Type: Area

Buffer: 10 km

Coordinates: -20.29021,148.77583, -20.28867,148.77934, -20.29063,148.78228, -20.29316,148.78214, -20.2931,148.77597





This map may contain data which are
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(Geoscience Australia)
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Report Contents:

Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance - see http://www.environment.gov.au/epbc/assessmentsapprovals/guidelines/index.html.

World Heritage Properties:	1
National Heritage Places:	1
Wetlands of International Significance: (Ramsar Sites)	None
Commonwealth Marine Areas:	None
Threatened Ecological Communities:	None
Threatened Species:	23
Migratory Species:	34

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place and the heritage values of a place on the Register of the National Estate. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage/index.html.

Please note that the current dataset on Commonwealth land is not complete. Further information on Commonwealth land would need to be obtained from relevant sources including Commonwealth agencies, local agencies, and land tenure maps.

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species. Information on EPBC Act permit requirements and application forms can be found at http://www.environment.gov.au/epbc/permits/index.html.

Commonwealth Lands:	None
Commonwealth Heritage Places:	None
Places on the RNE:	3
Listed Marine Species:	76
Whales and Other Cetaceans:	12
Critical Habitats:	None
Commonwealth Reserves:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	3
Other Commonwealth Reserves:	1
Regional Forest Agreements:	None

Details

Matters of National Environmental Significance

World Heritage Properties [Dataset Information]

Great Barrier Reef QLD

National Heritage Places [Dataset Information]

Great Barrier Reef QLD

Threatened Species [Dataset Information]	Status	Type of Presence
Birds		
Erythrotriorchis radiatus * Red Goshawk	Vulnerable	Species or species habitat likely to occur within area
*Geophaps scripta scripta** Squatter Pigeon (southern)	Vulnerable	Species or species habitat likely to occur within area
Macronectes giganteus * Southern Giant-Petrel	Endangered	Species or species habitat may occur within area
*Pterodroma neglecta neglecta** Kermadec Petrel (western)	Vulnerable	Species or species habitat may occur within area
Rostratula australis * Australian Painted Snipe	Vulnerable	Species or species habitat may occur within area
Mammals		
Balaenoptera musculus * Blue Whale	Endangered	Species or species habitat may occur within area
Dasyurus hallucatus * Northern Quoll	Endangered	Species or species habitat may occur within area
Megaptera novaeangliae * Humpback Whale	Vulnerable	Congregation or aggregation known to occur within area
Petrogale persephone * Proserpine Rock-wallaby	Endangered	Species or species habitat likely to occur within area
Pteropus conspicillatus * Spectacled Flying-fox	Vulnerable	Species or species habitat may occur within area
Xeromys myoides * Water Mouse, False Water Rat	Vulnerable	Species or species habitat known to occur within area
Reptiles		
Caretta caretta *	Endangered	Species or species habitat may

Loggerhead Turtle		occur within area
Chelonia mydas * Green Turtle	Vulnerable	Species or species habitat may occur within area
Delma labialis * Striped-tailed Delma	Vulnerable	Species or species habitat likely to occur within area
Dermochelys coriacea * Leathery Turtle, Leatherback Turtle, Luth	Vulnerable	Species or species habitat may occur within area
Egernia rugosa * Yakka Skink	Vulnerable	Species or species habitat likely to occur within area
Eretmochelys imbricata * Hawksbill Turtle	Vulnerable	Species or species habitat may occur within area
Lepidochelys olivacea * Pacific Ridley, Olive Ridley	Endangered	Species or species habitat may occur within area
Natator depressus * Flatback Turtle	Vulnerable	Breeding likely to occur within area
Sharks		
Rhincodon typus * Whale Shark	Vulnerable	Species or species habitat may occur within area
Plants		
Leucopogon cuspidatus *	Vulnerable	Species or species habitat likely to occur within area
Medicosma obovata *	Vulnerable	Species or species habitat likely to occur within area
Ozothamnus eriocephalus *	Vulnerable	Species or species habitat likely to occur within area
Migratory Species [Dataset Information]	Status	Type of Presence
Migratory Terrestrial Species		
Birds		
Haliaeetus leucogaster White-bellied Sea-Eagle	Migratory	Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail	Migratory	Species or species habitat may occur within area
Hirundo rustica Barn Swallow	Migratory	Species or species habitat may occur within area
Merops ornatus * Rainbow Bee-eater	Migratory	Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch	Migratory	Breeding may occur within area
Monarcha trivirgatus Spectacled Monarch	Migratory	Breeding likely to occur within area
Myiagra cyanoleuca Satin Flycatcher	Migratory	Species or species habitat likely to occur within area
Migratory Wetland Species		
Birds		
Ardea alba Great Egret, White Egret	Migratory	Species or species habitat may occur within area

Ardea ibis Cattle Egret	Migratory	Species or species habitat may occur within area
Gallinago hardwickii * Latham's Snipe, Japanese Snipe	Migratory	Species or species habitat may occur within area
Nettapus coromandelianus albipennis Australian Cotton Pygmy-goose	Migratory	Species or species habitat may occur within area
Numenius minutus Little Curlew, Little Whimbrel	Migratory	Species or species habitat may occur within area
Rostratula benghalensis s. lat. Painted Snipe	Migratory	Species or species habitat may occur within area
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift	Migratory	Species or species habitat may occur within area
Ardea alba Great Egret, White Egret	Migratory	Species or species habitat may occur within area
Ardea ibis Cattle Egret	Migratory	Species or species habitat may occur within area
Macronectes giganteus Southern Giant-Petrel	Migratory	Species or species habitat may occur within area
Sterna albifrons Little Tern	Migratory	Species or species habitat may occur within area
Sterna sumatrana Black-naped Tern	Migratory	Breeding known to occur within area
Migratory Marine Species		
Mammals		
Balaenoptera edeni Bryde's Whale	Migratory	Species or species habitat may occur within area
Balaenoptera musculus * Blue Whale	Migratory	Species or species habitat may occur within area
Dugong dugon Dugong	Migratory	Species or species habitat likely to occur within area
Megaptera novaeangliae * Humpback Whale	Migratory	Congregation or aggregation known to occur within area
Orcaella brevirostris Irrawaddy Dolphin	Migratory	Species or species habitat may occur within area
Orcinus orca Killer Whale, Orca	Migratory	Species or species habitat may occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin	Migratory	Species or species habitat may occur within area
Reptiles		
Caretta caretta * Loggerhead Turtle	Migratory	Species or species habitat may occur within area
Chelonia mydas * Green Turtle	Migratory	Species or species habitat may occur within area
Crocodylus porosus Estuarine Crocodile, Salt-water Crocodile	Migratory	Species or species habitat likely to occur within area

Dermochelys coriacea * Leathery Turtle, Leatherback Turtle, Luth	Migratory	Species or species habitat may occur within area
Eretmochelys imbricata * Hawksbill Turtle	Migratory	Species or species habitat may occur within area
Lepidochelys olivacea * Pacific Ridley, Olive Ridley	Migratory	Species or species habitat may occur within area
Natator depressus * Flatback Turtle	Migratory	Breeding likely to occur within area
Sharks		
Rhincodon typus Whale Shark	Migratory	Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species [Dataset Information]	Status	Type of Presence
Birds		
Anseranas semipalmata Magpie Goose	Listed - overfly marine area	Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift	Listed - overfly marine area	Species or species habitat may occur within area
Ardea alba Great Egret, White Egret	Listed - overfly marine area	Species or species habitat may occur within area
Ardea ibis Cattle Egret	Listed - overfly marine area	Species or species habitat may occur within area
Gallinago hardwickii * Latham's Snipe, Japanese Snipe	Listed - overfly marine area	Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle	Listed	Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail	Listed - overfly marine area	Species or species habitat may occur within area
Hirundo rustica Barn Swallow	Listed - overfly marine area	Species or species habitat may occur within area
Larus novaehollandiae Silver Gull	Listed	Breeding known to occur within area
Macronectes giganteus Southern Giant-Petrel	Listed	Species or species habitat may occur within area
Merops ornatus *	Listed -	Species or species habitat may occur

Rainbow Bee-eater	overfly marine area	within area
Monarcha melanopsis Black-faced Monarch	Listed - overfly marine area	Breeding may occur within area
Monarcha trivirgatus Spectacled Monarch	Listed - overfly marine area	Breeding likely to occur within area
Myiagra cyanoleuca Satin Flycatcher	Listed - overfly marine area	Species or species habitat likely to occur within area
Nettapus coromandelianus albipennis Australian Cotton Pygmy-goose	Listed - overfly marine area	Species or species habitat may occur within area
Numenius minutus Little Curlew, Little Whimbrel	Listed - overfly marine area	Species or species habitat may occur within area
Rostratula benghalensis s. lat. Painted Snipe	Listed - overfly marine area	Species or species habitat may occur within area
Sterna albifrons Little Tern	Listed	Species or species habitat may occur within area
Sterna bergii Crested Tern	Listed	Breeding known to occur within area
Sterna sumatrana Black-naped Tern	Listed	Breeding known to occur within area
Mammals		
Dugong dugon Dugong	Listed	Species or species habitat likely to occur within area
Ray-finned fishes		
Acentronura tentaculata Hairy Pygmy Pipehorse	Listed	Species or species habitat may occur within area
Campichthys tryoni Tryon's Pipefish	Listed	Species or species habitat may occur within area
Choeroichthys brachysoma Pacific Short-bodied Pipefish, Short-bodied Pipefish	Listed	Species or species habitat may occur within area
Choeroichthys suillus Pig-snouted Pipefish	Listed	Species or species habitat may occur within area
Corythoichthys amplexus Fijian Banded Pipefish, Brown-banded Pipefish	Listed	Species or species habitat may occur within area
Corythoichthys flavofasciatus Yellow-banded Pipefish, Network Pipefish	Listed	Species or species habitat may occur within area

Corythoichthys intestinalis Australian Messmate Pipefish, Banded Pipefish	Listed	Species or species habitat may occur within area
Corythoichthys ocellatus Orange-spotted Pipefish, Ocellated Pipefish	Listed	Species or species habitat may occur within area
Corythoichthys paxtoni Paxton's Pipefish	Listed	Species or species habitat may occur within area
Corythoichthys schultzi Schultz's Pipefish	Listed	Species or species habitat may occur within area
Cosmocampus darrosanus D'Arros Pipefish	Listed	Species or species habitat may occur within area
Doryrhamphus excisus Indian Blue-stripe Pipefish, Blue-stripe Pipefish	Listed	Species or species habitat may occur within area
Festucalex cinctus Girdled Pipefish	Listed	Species or species habitat may occur within area
Halicampus dunckeri Red-hair Pipefish, Duncker's Pipefish	Listed	Species or species habitat may occur within area
Halicampus grayi Mud Pipefish, Gray's Pipefish	Listed	Species or species habitat may occur within area
Halicampus nitidus Glittering Pipefish	Listed	Species or species habitat may occur within area
Halicampus spinirostris Spiny-snout Pipefish	Listed	Species or species habitat may occur within area
Hippichthys cyanospilos Blue-speckled Pipefish, Blue-spotted Pipefish	Listed	Species or species habitat may occur within area
Hippichthys heptagonus Madura Pipefish, Reticulated Freshwater Pipefish	Listed	Species or species habitat may occur within area
Hippichthys penicillus Beady Pipefish, Steep-nosed Pipefish	Listed	Species or species habitat may occur within area
Hippocampus bargibanti Pygmy Seahorse	Listed	Species or species habitat may occur within area
Hippocampus kuda Spotted Seahorse, Yellow Seahorse	Listed	Species or species habitat may occur within area
Hippocampus planifrons Flat-face Seahorse	Listed	Species or species habitat may occur within area
Hippocampus zebra Zebra Seahorse	Listed	Species or species habitat may occur within area
Micrognathus andersonii Anderson's Pipefish, Shortnose Pipefish	Listed	Species or species habitat may occur within area
Micrognathus brevirostris Thorn-tailed Pipefish	Listed	Species or species habitat may occur within area
Nannocampus pictus Painted Pipefish, Reef Pipefish	Listed	Species or species habitat may occur within area
Solegnathus hardwickii Pipehorse	Listed	Species or species habitat may occur within area
Solenostomus cyanopterus Blue-finned Ghost Pipefish, Robust Ghost Pipefish	Listed	Species or species habitat may occur within area

Solenostomus paradoxus Harlequin Ghost Pipefish, Ornate Ghost Pipefish	Listed	Species or species habitat may occur within area
Syngnathoides biaculeatus Double-ended Pipehorse, Alligator Pipefish	Listed	Species or species habitat may occur within area
Trachyrhamphus bicoarctatus Bend Stick Pipefish, Short-tailed Pipefish	Listed	Species or species habitat may occur within area
Trachyrhamphus longirostris Long-nosed Pipefish, Straight Stick Pipefish	Listed	Species or species habitat may occur within area
Reptiles		
Acalyptophis peronii Horned Seasnake	Listed	Species or species habitat may occur within area
Aipysurus duboisii Dubois' Seasnake	Listed	Species or species habitat may occur within area
Aipysurus eydouxii Spine-tailed Seasnake	Listed	Species or species habitat may occur within area
Aipysurus laevis Olive Seasnake	Listed	Species or species habitat may occur within area
Astrotia stokesii Stokes' Seasnake	Listed	Species or species habitat may occur within area
Caretta caretta * Loggerhead Turtle	Listed	Species or species habitat may occur within area
Chelonia mydas * Green Turtle	Listed	Species or species habitat may occur within area
Crocodylus porosus Estuarine Crocodile, Salt-water Crocodile	Listed	Species or species habitat likely to occur within area
Dermochelys coriacea * Leathery Turtle, Leatherback Turtle, Luth	Listed	Species or species habitat may occur within area
Disteira kingii Spectacled Seasnake	Listed	Species or species habitat may occur within area
Disteira major Olive-headed Seasnake	Listed	Species or species habitat may occur within area
Enhydrina schistosa Beaked Seasnake	Listed	Species or species habitat may occur within area
Eretmochelys imbricata * Hawksbill Turtle	Listed	Species or species habitat may occur within area
Hydrophis elegans Elegant Seasnake	Listed	Species or species habitat may occur within area
Hydrophis mcdowelli	Listed	Species or species habitat may occur within area
Hydrophis ornatus a seasnake	Listed	Species or species habitat may occur within area
Lapemis hardwickii Spine-bellied Seasnake	Listed	Species or species habitat may occur within area
Laticauda colubrina a sea krait	Listed	Species or species habitat may occur within area
Laticauda laticaudata	Listed	Species or species habitat may occur

a sea krait		within area
Lepidochelys olivacea * Pacific Ridley, Olive Ridley	Listed	Species or species habitat may occur within area
Natator depressus * Flatback Turtle	Listed	Breeding likely to occur within area
Pelamis platurus Yellow-bellied Seasnake	Listed	Species or species habitat may occur within area
Whales and Other Cetaceans [Dataset Information]	Status	Type of Presence
Balaenoptera acutorostrata Minke Whale	Cetacean	Species or species habitat may occur within area
Balaenoptera edeni Bryde's Whale	Cetacean	Species or species habitat may occur within area
Balaenoptera musculus * Blue Whale	Cetacean	Species or species habitat may occur within area
Delphinus delphis Common Dolphin	Cetacean	Species or species habitat may occur within area
Grampus griseus Risso's Dolphin, Grampus	Cetacean	Species or species habitat may occur within area
Megaptera novaeangliae * Humpback Whale	Cetacean	Congregation or aggregation known to occur within area
Orcaella brevirostris Irrawaddy Dolphin	Cetacean	Species or species habitat may occur within area
Orcinus orca Killer Whale, Orca	Cetacean	Species or species habitat may occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin	Cetacean	Species or species habitat may occur within area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin	Cetacean	Species or species habitat may occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin	Cetacean	Species or species habitat likely to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin	Cetacean	Species or species habitat may occur within area

Places on the RNE [Dataset Information]
Note that not all Indigenous sites may be listed.

Indigenous

The Horn Site QLD

Natural

Conway Range - Mount Dryander Area QLD

Great Barrier Reef Region QLD

Extra Information

State and Territory Reserves [Dataset Information]

Conway National Park, QLD

Molle Islands National Park, QLD

Townsville/Whitsunday Marine Park, QLD

Other Commonwealth Reserves [Dataset Information]

Great Barrier Reef Marine Park, COM

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the *Environment Protection and Biodiversity Conservation Act 1999*. It holds mapped locations of World Heritage and Register of National Estate properties, Wetlands of International Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under "type of presence". For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

Only selected species covered by the migratory and marine provisions of the Act have been mapped.

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites;
- seals which have only been mapped for breeding sites near the Australian continent.

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Acknowledgments

This database has been compiled from a range of data sources. The Department acknowledges the following custodians who have contributed valuable data and advice:

- New South Wales National Parks and Wildlife Service
- Department of Sustainability and Environment, Victoria
- Department of Primary Industries, Water and Environment, Tasmania
- Department of Environment and Heritage, South Australia Planning SA
- Parks and Wildlife Commission of the Northern Territory
- Environmental Protection Agency, Queensland
- Birds Australia
- Australian Bird and Bat Banding Scheme
- Australian National Wildlife Collection
- Natural history museums of Australia
- Queensland Herbarium
- National Herbarium of NSW
- Royal Botanic Gardens and National Herbarium of Victoria
- Tasmanian Herbarium
- State Herbarium of South Australia
- Northern Territory Herbarium
- Western Australian Herbarium
- Australian National Herbarium, Atherton and Canberra
- University of New England
- Other groups and individuals

ANUCliM Version 1.8, Centre for Resource and Environmental Studies, Australian National University was used extensively for the production of draft maps of species distribution. Environment Australia is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Last updated:

Department of the Environment, Water, Heritage and the Arts
GPO Box 787 Canberra ACT 2601 Australia
Telephone: +61 (0)2 6274 1111

APPENDIX C

Wildlife Online Database Search Results

Queensland Government
Environmental Protection Agency
Queensland Parks and Wildlife Service

Wildlife Online Extract

Search Criteria: Species List for a Specified Point
Species: All
Type: All
Status: All
Records: All
Date: All
Latitude: 20.2908
Longitude: 148.7792
Distance: 10
Email: rebecca.condon@cardno.com.au
Date submitted: Friday 25 Jan 2008 15:43:43
Date extracted: Friday 25 Jan 2008 15:46:02

The number of records retrieved = 1031

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	amphibians	Bufonidae	*Bufo marinus*	cane toad	Y			46/2
animals	amphibians	Hylidae	*Litoria sp.*					1/1
animals	amphibians	Hylidae	*Litoria fallax*	eastern sedgefrog		C		1
animals	amphibians	Hylidae	*Litoria bicolor*	northern sedgefrog		C		1
animals	amphibians	Hylidae	*Litoria nasuta*	striped rocketfrog		C		2
animals	amphibians	Hylidae	*Litoria caerulea*	common green treefrog		C		12
animals	amphibians	Hylidae	*Litoria infrafrenata*	white lipped treefrog		C		3/1
animals	amphibians	Hylidae	*Litoria lesueuri sensu lato*	stony creek frog		C		16/6
animals	amphibians	Hylidae	*Litoria gracilenta*	graceful treefrog		C		2
animals	amphibians	Hylidae	*Litoria rubella*	ruddy treefrog		C		2
animals	amphibians	Hylidae	*Litoria chloris*	orange eyed treefrog		C		4/1
animals	amphibians	Myobatrachidae	*Limnodynastes peronii*	striped marshfrog		C		4
animals	amphibians	Myobatrachidae	*Mixophyes fasciolatus*	great barred frog		C		1
animals	birds	Accipitridae	*Aquila audax*	wedge-tailed eagle		C		30
animals	birds	Accipitridae	*Elanus axillaris*	black-shouldered kite		C		1
animals	birds	Accipitridae	*Accipiter fasciatus*	brown goshawk		C		5
animals	birds	Accipitridae	*Haliaeetus leucogaster*	white-bellied sea-eagle		C		86
animals	birds	Accipitridae	*Accipiter novaehollandiae*	grey goshawk		R		7
animals	birds	Accipitridae	*Hieraaetus morphnoides*	little eagle		C		1
animals	birds	Accipitridae	*Aviceda subcristata*	Pacific baza		C		6
animals	birds	Accipitridae	*Pandion haliaetus*	osprey		C		66
animals	birds	Accipitridae	*Haliastur indus*	brahminy kite		C		47
animals	birds	Accipitridae	*Milvus migrans*	black kite		C		2
animals	birds	Aegothelidae	*Aegotheles cristatus*	Australian owlet-nightjar		C		6
animals	birds	Alcedinidae	*Alcedo azurea*	azure kingfisher		C		7
animals	birds	Alcedinidae	*Alcedo pusilla*	little kingfisher		C		2
animals	birds	Anatidae	*Tadorna radjah*	radjah shelduck		R		1
animals	birds	Anatidae	*Anas superciliosa*	Pacific black duck		C		6
animals	birds	Anatidae	*Dendrocygna eytoni*	plumed whistling-duck		C		2
animals	birds	Anatidae	*Chenonetta jubata*	Australian wood duck		C		1
animals	birds	Anhingidae	*Anhinga melanogaster*	darter		C		10
animals	birds	Apodidae	*Apus pacificus*	fork-tailed swift		C		1
animals	birds	Apodidae	*Hirundapus caudacutus*	white-throated needletail		C		2
animals	birds	Ardeidae	*Ardea alba*	great egret		C		5
animals	birds	Ardeidae	*Egretta garzetta*	little egret		C		3
animals	birds	Ardeidae	*Nycticorax caledonicus*	nankeen night heron		C		7
animals	birds	Ardeidae	*Egretta novaehollandiae*	white-faced heron		C		5
animals	birds	Ardeidae	*Butorides striatus*	striated heron		C		14
animals	birds	Ardeidae	*Ardea intermedia*	intermediate egret		C		3
animals	birds	Ardeidae	*Egretta sacra*	eastern reef egret		C		59
animals	birds	Ardeidae	*Ardea pacifica*	white-necked heron		C		1
animals	birds	Artamidae	*Cracticus quoyi*	black butcherbird		C		48
animals	birds	Artamidae	*Cracticus torquatus*	grey butcherbird		C		2
animals	birds	Artamidae	*Artamus superciliosus*	white-browed woodswallow		C		1
animals	birds	Artamidae	*Cracticus quoyi rufescens*	black butcherbird (coastal north-central Queensland))		C		1

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Artamidae	*Cracticus nigrogularis*	pied butcherbird		C		1
animals	birds	Artamidae	*Artamus leucorynchus*	white-breasted woodswallow		C		29
animals	birds	Artamidae	*Strepera graculina*	pied currawong		C		35
animals	birds	Artamidae	*Artamus personatus*	masked woodswallow		C		1
animals	birds	Burhinidae	*Esacus neglectus*	beach stone-curlew		V		17
animals	birds	Burhinidae	*Burhinus grallarius*	bush stone-curlew		C		22
animals	birds	Cacatuidae	*Cacatua galerita*	sulphur-crested cockatoo		C		86
animals	birds	Cacatuidae	*Calyptorhynchus banksii*	red-tailed black-cockatoo		C		4
animals	birds	Campephagidae	*Coracina lineata*	barred cuckoo-shrike		C		4
animals	birds	Campephagidae	*Coracina tenuirostris*	cicadabird		C		3
animals	birds	Campephagidae	*Coracina novaehollandiae*	black-faced cuckoo-shrike		C		12
animals	birds	Campephagidae	*Coracina papuensis*	white-bellied cuckoo-shrike		C		2
animals	birds	Campephagidae	*Lalage leucomela*	varied triller		C		53
animals	birds	Caprimulgidae	*Caprimulgus macrurus*	large-tailed nightjar		C		5
animals	birds	Centropodidae	*Centropus phasianinus*	pheasant coucal		C		22
animals	birds	Charadriidae	*Vanellus miles*	masked lapwing		C		3
animals	birds	Charadriidae	*Charadrius mongolus*	lesser sand plover		C		1/1
animals	birds	Charadriidae	*Vanellus miles miles*	masked lapwing (northern subspecies)		C		5
animals	birds	Ciconiidae	*Ephippiorhynchus asiaticus*	black-necked stork		R		1
animals	birds	Columbidae	*Columba livia*	rock dove	Y			1
animals	birds	Columbidae	*Geopelia striata*	peaceful dove		C		21
animals	birds	Columbidae	*Columba leucomela*	white-headed pigeon		C		4
animals	birds	Columbidae	*Ptilinopus regina*	rose-crowned fruit-dove		C		25
animals	birds	Columbidae	*Geopelia humeralis*	bar-shouldered dove		C		31
animals	birds	Columbidae	*Ptilinopus magnificus*	wompoo fruit-dove		C		27
animals	birds	Columbidae	*Lopholaimus antarcticus*	topknot pigeon		C		3
animals	birds	Columbidae	*Macropygia amboinensis*	brown cuckoo-dove		C		28
animals	birds	Columbidae	*Ptilinopus superbus*	superb fruit-dove		C		18
animals	birds	Columbidae	*Chalcophaps indica*	emerald dove		C		36
animals	birds	Columbidae	*Phaps chalcoptera*	common bronzewing		C		1
animals	birds	Columbidae	*Ducula bicolor*	pied imperial-pigeon		C		37
animals	birds	Coraciidae	*Eurystomus orientalis*	dollarbird		C		1
animals	birds	Corvidae	*Corvus orru*	Torresian crow		C		28
animals	birds	Cuculidae	*Cuculus pallidus*	pallid cuckoo		C		2
animals	birds	Cuculidae	*Scythrops novaehollandiae*	channel-billed cuckoo		C		4
animals	birds	Cuculidae	*Cacomantis flabelliformis*	fan-tailed cuckoo		C		9
animals	birds	Cuculidae	*Chrysococcyx lucidus*	shining bronze-cuckoo		C		3
animals	birds	Cuculidae	*Chrysococcyx minutillus*	little bronze-cuckoo		C		10
animals	birds	Cuculidae	*Eudynamys scolopacea*	common koel		C		10
animals	birds	Dicaeidae	*Dicaeum hirundinaceum*	mistletoebird		C		31
animals	birds	Dicruridae	*Myiagra alecto*	shining flycatcher		C		2
animals	birds	Dicruridae	*Myiagra rubecula*	leaden flycatcher		C		33
animals	birds	Dicruridae	*Myiagra cyanoleuca*	satin flycatcher		C		1
animals	birds	Dicruridae	*Dicrurus bracteatus bracteatus*	spangled drongo (eastern Australia)		C		2
animals	birds	Dicruridae	*Rhipidura leucophrys*	willie wagtail		C		2
animals	birds	Dicruridae	*Rhipidura fuliginosa*	grey fantail		C		31

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Dicruridae	*Monarcha trivirgatus*	spectacled monarch		C		52
animals	birds	Dicruridae	*Rhipidura rufifrons*	rufous fantail		C		30
animals	birds	Dicruridae	*Monarcha melanopsis*	black-faced monarch		C		7
animals	birds	Dicruridae	*Grallina cyanoleuca*	magpie-lark		C		12
animals	birds	Dicruridae	*Dicrurus bracteatus*	spangled drongo		C		45
animals	birds	Dicruridae	*Monarcha leucotis*	white-eared monarch		C		15
animals	birds	Dicruridae	*Myiagra inquieta*	restless flycatcher		C		1
animals	birds	Falconidae	*Falco peregrinus*	peregrine falcon		C		5
animals	birds	Falconidae	*Falco cenchroides*	nankeen kestrel		C		8
animals	birds	Fregatidae	*Fregata sp.*					1
animals	birds	Fregatidae	*Fregata ariel*	lesser frigatebird		C		1
animals	birds	Haematopodidae	*Haematopus fuliginosus*	sooty oystercatcher		R		16
animals	birds	Haematopodidae	*Haematopus longirostris*	pied oystercatcher		C		19
animals	birds	Halcyonidae	*Dacelo leachii*	blue-winged kookaburra		C		7
animals	birds	Halcyonidae	*Dacelo novaeguineae*	laughing kookaburra		C		38
animals	birds	Halcyonidae	*Tanysiptera sylvia*	buff-breasted paradise-kingfisher		C		15
animals	birds	Halcyonidae	*Todiramphus chloris*	collared kingfisher		C		7
animals	birds	Halcyonidae	*Todiramphus macleayii*	forest kingfisher		C		3
animals	birds	Halcyonidae	*Todiramphus sanctus*	sacred kingfisher		C		7
animals	birds	Hirundinidae	*Hirundo ariel*	fairy martin		C		1
animals	birds	Hirundinidae	*Hirundo neoxena*	welcome swallow		C		53
animals	birds	Laridae	*Sterna bergii*	crested tern		C		66
animals	birds	Laridae	*Sterna albifrons*	little tern		E		1/1
animals	birds	Laridae	*Sterna anaethetus*	bridled tern		C		1
animals	birds	Laridae	*Sterna bengalensis*	lesser crested tern		C		10
animals	birds	Laridae	*Sterna sumatrana*	black-naped tern		C		27
animals	birds	Laridae	*Larus novaehollandiae*	silver gull		C		100
animals	birds	Megapodiidae	*Alectura lathami*	Australian brush-turkey		C		41
animals	birds	Megapodiidae	*Megapodius reinwardt*	orange-footed scrubfowl		C		38
animals	birds	Meliphagidae	*Acanthorhynchus tenuirostris*	eastern spinebill		C		1
animals	birds	Meliphagidae	*Philemon buceroides*	helmeted friarbird		C		25
animals	birds	Meliphagidae	*Lichmera indistincta*	brown honeyeater		C		3
animals	birds	Meliphagidae	*Myzomela sanguinolenta*	scarlet honeyeater		C		10
animals	birds	Meliphagidae	*Lichenostomus fasciogularis*	mangrove honeyeater		C		16
animals	birds	Meliphagidae	*Melithreptus albogularis*	white-throated honeyeater		C		14
animals	birds	Meliphagidae	*Lichenostomus versicolor*	varied honeyeater		C		1
animals	birds	Meliphagidae	*Philemon corniculatus*	noisy friarbird		C		2
animals	birds	Meliphagidae	*Lichenostomus flavus*	yellow honeyeater		C		4
animals	birds	Meliphagidae	*Entomyzon cyanotis*	blue-faced honeyeater		C		6
animals	birds	Meliphagidae	*Myzomela obscura*	dusky honeyeater		C		47
animals	birds	Meliphagidae	*Meliphaga lewinii*	Lewin's honeyeater		C		65
animals	birds	Meropidae	*Merops ornatus*	rainbow bee-eater		C		27
animals	birds	Nectariniidae	*Nectarinia jugularis*	yellow-bellied sunbird		C		52
animals	birds	Oriolidae	*Oriolus sagittatus*	olive-backed oriole		C		13
animals	birds	Oriolidae	*Sphecotheres viridis*	figbird		C		44
animals	birds	Pachycephalidae	*Pachycephala melanura*	mangrove golden whistler		C		3

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Pachycephalidae	*Pachycephala pectoralis*	golden whistler		C		7
animals	birds	Pachycephalidae	*Pachycephala rufiventris*	rufous whistler		C		7
animals	birds	Pachycephalidae	*Colluricincla megarhyncha*	little shrike-thrush		C		35
animals	birds	Pachycephalidae	*Colluricincla harmonica*	grey shrike-thrush		C		2
animals	birds	Pardalotidae	*Gerygone mouki*	brown gerygone		C		11
animals	birds	Pardalotidae	*Sericornis frontalis*	white-browed scrubwren		C		26
animals	birds	Pardalotidae	*Sericornis magnirostris*	large-billed scrubwren		C		16
animals	birds	Pardalotidae	*Gerygone magnirostris*	large-billed gerygone		C		8
animals	birds	Pardalotidae	*Acanthiza reguloides*	buff-rumped thornbill		C		1
animals	birds	Pardalotidae	*Acanthiza pusilla*	brown thornbill		C		1
animals	birds	Pardalotidae	*Gerygone levigaster*	mangrove gerygone		C		4
animals	birds	Pardalotidae	*Gerygone palpebrosa*	fairy gerygone		C		22
animals	birds	Pardalotidae	*Pardalotus striatus*	striated pardalote		C		1
animals	birds	Passeridae	*Passer domesticus*	house sparrow	Y			5
animals	birds	Passeridae	*Lonchura castaneothorax*	chestnut-breasted mannikin		C		5
animals	birds	Passeridae	*Neochmia temporalis*	red-browed finch		C		2
animals	birds	Passeridae	*Lonchura punctulata*	nutmeg mannikin	Y			6
animals	birds	Pelecanidae	*Pelecanus conspicillatus*	Australian pelican		C		16
animals	birds	Petroicidae	*Eopsaltria australis*	eastern yellow robin		C		24
animals	birds	Phalacrocoracidae	*Phalacrocorax varius*	pied cormorant		C		49
animals	birds	Phalacrocoracidae	*Phalacrocorax sulcirostris*	little black cormorant		C		4
animals	birds	Phalacrocoracidae	*Phalacrocorax melanoleucos*	little pied cormorant		C		2
animals	birds	Phasianidae	*Gallus gallus*	red junglefowl	Y			3
animals	birds	Phasianidae	*Pavo cristatus*	Indian peafowl	Y			1
animals	birds	Phasianidae	*Coturnix ypsilophora*	brown quail		C		2
animals	birds	Pittidae	*Pitta versicolor*	noisy pitta		C		17
animals	birds	Podargidae	*Podargus strigoides*	tawny frogmouth		C		6
animals	birds	Podicipedidae	*Tachybaptus novaehollandiae*	Australasian grebe		C		1
animals	birds	Psittacidae	*Alisterus scapularis*	Australian king-parrot		C		4
animals	birds	Psittacidae	*Trichoglossus haematodus moluccanus*	rainbow lorikeet		C		58
animals	birds	Psittacidae	*Glossopsitta pusilla*	little lorikeet		C		1
animals	birds	Psittacidae	*Platycercus adscitus*	pale-headed rosella		C		4
animals	birds	Psittacidae	*Trichoglossus chlorolepidotus*	scaly-breasted lorikeet		C		8
animals	birds	Psittacidae	*Platycercus adscitus palliceps*	pale-headed rosella (southern form)		C		1
animals	birds	Ptilonorhynchidae	*Chlamydera nuchalis*	great bowerbird		C		1
animals	birds	Rallidae	*Porphyrio porphyrio*	purple swamphen		C		3
animals	birds	Rallidae	*Gallirallus philippensis*	buff-banded rail		C		3
animals	birds	Scolopacidae	*Xenus cinereus*	terek sandpiper		C		1
animals	birds	Scolopacidae	*Limosa lapponica*	bar-tailed godwit		C		1
animals	birds	Scolopacidae	*Actitis hypoleucos*	common sandpiper		C		1
animals	birds	Scolopacidae	*Numenius madagascariensis*	eastern curlew		R		5
animals	birds	Scolopacidae	*Heteroscelus brevipes*	grey-tailed tattler		C		7
animals	birds	Scolopacidae	*Numenius phaeopus*	whimbrel		C		13
animals	birds	Strigidae	*Ninox novaeseelandiae*	southern boobook		C		5
animals	birds	Strigidae	*Ninox rufa queenslandica*	rufous owl (southern subspecies)		V		3
animals	birds	Sturnidae	*Aplonis metallica*	metallic starling		C		11

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Sturnidae	*Acridotheres tristis*	common myna	Y			1
animals	birds	Sulidae	*Sula leucogaster*	brown booby		C		1
animals	birds	Sylviidae	*Cisticola exilis*	golden-headed cisticola		C		3
animals	birds	Sylviidae	*Megalurus timoriensis*	tawny grassbird		C		7
animals	birds	Threskiornithidae	*Platalea regia*	royal spoonbill		C		1
animals	birds	Threskiornithidae	*Threskiornis spinicollis*	straw-necked ibis		C		2
animals	birds	Threskiornithidae	*Threskiornis molucca*	Australian white ibis		C		4
animals	birds	Tytonidae	*Tyto alba*	barn owl		C		1
animals	birds	Zosteropidae	*Zosterops lateralis*	silvereye		C		29
animals	birds	Zosteropidae	*Zosterops lateralis cornwalli*	silvereye (eastern)		C		2
animals	insects	Hesperiidae	*Tagiades japetus janetta*	pied flat				4
animals	insects	Lycaenidae	*Arhopala madytus*	bright oak-blue				1
animals	insects	Lycaenidae	*Rapala varuna simsoni*	indigo flash				1
animals	insects	Lycaenidae	*Candalides hyacinthina*					1
animals	insects	Lycaenidae	*Prosotas dubiosa dubiosa*	small purple line-blue				1
animals	insects	Lycaenidae	*Hypolycaena phorbas phorbas*	black-spotted flash				1
animals	insects	Lycaenidae	*Nacaduba berenice berenice*	large purple line-blue				1
animals	insects	Lycaenidae	*Candalides erinus erinus*	small dusky-blue				1
animals	insects	Lycaenidae	*Arhopala micale amphis*	shining oak-blue (southern subspecies)				1
animals	insects	Nymphalidae	*Hypocysta irius*	orange-streaked ringlet				2
animals	insects	Nymphalidae	*Cupha prosope prosope*	bordered rustic (Australian subspecies)				2
animals	insects	Nymphalidae	*Danaus affinis affinis*	marsh tiger				1
animals	insects	Nymphalidae	*Hypolimnas bolina nerina*	varied eggfly				2
animals	insects	Nymphalidae	*Danaus plexippus plexippus*	monarch				1
animals	insects	Nymphalidae	*Pantoporia consimilis consimilis*	orange plane				3
animals	insects	Nymphalidae	*Doleschallia bisaltide australis*	leafwing				2
animals	insects	Nymphalidae	*Mycalesis terminus terminus*	orange bush-brown				2
animals	insects	Nymphalidae	*Euploea tulliolus tulliolus*	purple crow				2
animals	insects	Nymphalidae	*Euploea sylvester sylvester*	two-brand crow				1
animals	insects	Nymphalidae	*Hypolimnas alimena lamina*	blue-banded eggfly				1
animals	insects	Nymphalidae	*Tirumala hamata hamata*	blue tiger				3
animals	insects	Nymphalidae	*Melanitis leda bankia*	common evening-brown				2
animals	insects	Nymphalidae	*Euploea core corinna*	common crow				1
animals	insects	Papilionidae	*Papilio aegeus aegeus*	orchard swallowtail (Australian subspecies)				1
animals	insects	Papilionidae	*Papilio ulysses joesa*	Ulysses butterfly		C		1
animals	insects	Papilionidae	*Papilio fuscus capaneus*	fuscous swallowtail (Australian subspecies)				1
animals	insects	Papilionidae	*Cressida cressida cressida*	greasy swallowtail				1
animals	insects	Pieridae	*Appias paulina ego*	yellow albatross				1
animals	insects	Pieridae	*Eurema hecabe phoebus*	large grass-yellow				2
animals	insects	Pieridae	*Delias mysis mysis*	red-banded jezebel (Queensland subspecies)				1
animals	insects	Pieridae	*Elodina queenslandica*					1

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	insects	Pieridae	*Catopsilia pomona pomona*	lemon migrant				1
animals	mammals	Balaenopteridae	*Megaptera novaeangliae*	humpback whale		V	V	4
animals	mammals	Bovidae	*Capra hircus*	goat	Y			19
animals	mammals	Canidae	*Canis familiaris*	dog	Y			3
animals	mammals	Canidae	*Canis lupus dingo*	dingo				2
animals	mammals	Dasyuridae	*Planigale maculata*	common planigale		C		28/4
animals	mammals	Dasyuridae	*Dasyurus hallucatus*	northern quoll		C	E	6
animals	mammals	Delphinidae	*Sousa chinensis*	Indo-Pacific hump-backed dolphin		R		1
animals	mammals	Delphinidae	*Tursiops truncatus*	bottlenose dolphin		C		1
animals	mammals	Delphinidae	*Orcaella heinsohni*	Australian snubfin dolphin		R		1
animals	mammals	Dugongidae	*Dugong dugon*	dugong		V		15
animals	mammals	Felidae	*Felis catus*	cat	Y			5
animals	mammals	Macropodidae	*Macropus agilis*	agile wallaby		C		3
animals	mammals	Macropodidae	*Wallabia bicolor*	swamp wallaby		C		8
animals	mammals	Macropodidae	*Petrogale persephone*	Proserpine rock-wallaby		E	E	88
animals	mammals	Macropodidae	*Thylogale stigmatica*	red-legged pademelon		C		2
animals	mammals	Macropodidae	*Macropus giganteus*	eastern grey kangaroo		C		1
animals	mammals	Molossidae	*Tadarida australis*	white-striped freetail bat		C		1
animals	mammals	Muridae	*Rattus rattus*	black rat	Y			5/1
animals	mammals	Muridae	*Melomys burtoni*	grassland melomys		C		9/4
animals	mammals	Muridae	*Rattus fuscipes*	bush rat		C		1
animals	mammals	Muridae	*Hydromys chrysogaster*	water rat		C		10
animals	mammals	Muridae	*Melomys cervinipes*	fawn-footed melomys		C		83/1
animals	mammals	Peramelidae	*Perameles nasuta*	long-nosed bandicoot		C		2
animals	mammals	Peramelidae	*Isoodon macrourus*	northern brown bandicoot		C		10
animals	mammals	Petauridae	*Petaurus breviceps*	sugar glider		C		1
animals	mammals	Petauridae	*Petaurus norfolcensis*	squirrel glider		C		5
animals	mammals	Phalangeridae	*Trichosurus vulpecula*	common brushtail possum		C		17
animals	mammals	Pseudocheiridae	*Pseudocheirus peregrinus*	common ringtail possum		C		4
animals	mammals	Pteropodidae	*Pteropus alecto*	black flying-fox		C		10
animals	mammals	Pteropodidae	*Pteropus scapulatus*	little red flying-fox		C		1
animals	mammals	Pteropodidae	*Syconycteris australis*	eastern blossom bat		C		4/1
animals	mammals	Pteropodidae	*Nyctimene robinsoni*	eastern tube-nosed bat		C		12
animals	mammals	Rhinolophidae	*Rhinolophus megaphyllus*	eastern horseshoe-bat		C		3/1
animals	mammals	Suidae	*Sus scrofa*	pig	Y			5
animals	mammals	Tachyglossidae	*Tachyglossus aculeatus*	short-beaked echidna		C		6
animals	mammals	Vespertilionidae	*Scotorepens greyii*	little broad-nosed bat		C		1
animals	mammals	Vespertilionidae	*Nyctophilus bifax bifax*	northern long-eared bat		C		16/2
animals	mammals	Vespertilionidae	*Vespadelus troughtoni*	eastern cave bat		C		6
animals	mammals	Ziphiidae	*Mesoplodon layardii*	strap-toothed beaked whale		C		1/1
animals	reptiles	Agamidae	*Diporiphora australis*			C		2
animals	reptiles	Agamidae	*Physignathus lesueurii*	eastern water dragon		C		8/2
animals	reptiles	Boidae	*Morelia spilota*	carpet python		C		11
animals	reptiles	Boidae	*Antaresia childreni*	children's python		C		7
animals	reptiles	Boidae	*Morelia amethistina*	amethystine python (New Guinean form)		C		1
animals	reptiles	Boidae	*Antaresia maculosa*			C		1/1

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	reptiles	Cheloniidae	*Chelonia mydas*	green turtle		V	V	2
animals	reptiles	Cheloniidae	*Eretmochelys imbricata*	hawksbill turtle		V	V	1
animals	reptiles	Colubridae	*Boiga irregularis*	brown tree snake		C		7
animals	reptiles	Colubridae	*Tropidonophis mairii*	freshwater snake		C		2/1
animals	reptiles	Colubridae	*Dendrelaphis punctulata*	common tree snake		C		10
animals	reptiles	Crocodylidae	*Crocodylus porosus*	estuarine crocodile		V		6
animals	reptiles	Elapidae	*Demansia torquata*	collared whip snake		C		3
animals	reptiles	Elapidae	*Cacophis harriettae*	white-crowned snake		C		3/1
animals	reptiles	Elapidae	*Demansia vestigiata*	black whip snake		C		2
animals	reptiles	Elapidae	*Rhinoplocephalus nigrescens*	eastern small-eyed snake		C		3/1
animals	reptiles	Elapidae	*Pseudechis porphyriacus*	red-bellied black snake		C		13/1
animals	reptiles	Elapidae	*Vermicella annulata*	bandy-bandy		C		1
animals	reptiles	Elapidae	*Demansia psammophis*	yellow-faced whip snake		C		2
animals	reptiles	Gekkonidae	*Gehyra dubia*			C		8
animals	reptiles	Gekkonidae	*Oedura lesueurii*	Lesueur's velvet gecko		C		1
animals	reptiles	Gekkonidae	*Oedura rhombifer*	zig-zag gecko		C		6/1
animals	reptiles	Gekkonidae	*Heteronotia binoei*	Bynoe's gecko		C		7
animals	reptiles	Gekkonidae	*Hemidactylus frenatus*	house gecko	Y			3
animals	reptiles	Gekkonidae	*Phyllurus ossa*			C		2/2
animals	reptiles	Gekkonidae	*Oedura monilis*			C		2
animals	reptiles	Pygopodidae	*Lialis burtonis*	Burton's legless lizard		C		1
animals	reptiles	Pygopodidae	*Delma tincta*			C		5
animals	reptiles	Scincidae	*Carlia sp.*					4
animals	reptiles	Scincidae	*Egernia frerei*	major skink		C		5/2
animals	reptiles	Scincidae	*Egernia major*	land mullet		C		1
animals	reptiles	Scincidae	*Carlia vivax*			C		4
animals	reptiles	Scincidae	*Carlia foliorum*			C		1
animals	reptiles	Scincidae	*Eulamprus quoyii*	eastern water skink		C		4/3
animals	reptiles	Scincidae	*Lampropholis sp.*			C		1
animals	reptiles	Scincidae	*Saproscincus hannahae*			C		40/4
animals	reptiles	Scincidae	*Lampropholis delicata*			C		4
animals	reptiles	Scincidae	*Eulamprus brachysoma*			C		5/4
animals	reptiles	Scincidae	*Lampropholis adonis*			C		46/6
animals	reptiles	Scincidae	*Carlia rhomboidalis*			C		27/3
animals	reptiles	Scincidae	*Ctenotus eutaenius*			C		1
animals	reptiles	Scincidae	*Ctenotus robustus*			C		8
animals	reptiles	Scincidae	*Carlia schmeltzii*			C		19
animals	reptiles	Scincidae	*Carlia pectoralis*			C		3
animals	reptiles	Scincidae	*Glaphyromorphus punctulatus*			C		2
animals	reptiles	Scincidae	*Cryptoblepharus litoralis*			C		14
animals	reptiles	Scincidae	*Cyclodomorphus gerrardii*	pink-tongued lizard		C		2/1
animals	reptiles	Scincidae	*Cryptoblepharus virgatus*			C		3
animals	reptiles	Scincidae	*Saproscincus basiliscus*			C		1
animals	reptiles	Scincidae	*Eulamprus tenuis*			C		20
animals	reptiles	Scincidae	*Eulamprus amplus*			R		2/1
animals	reptiles	Typhlopidae	*Ramphotyphlops polygrammicus*			C		1/1

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	reptiles	Varanidae	*Varanus varius*	lace monitor		C		11
fungi	club fungi	Basidiomycota	*Auricularia delicata*			C		1/1
fungi	club fungi	Basidiomycota	*Pycnoporus sanguineus*			C		1/1
fungi	club fungi	Basidiomycota	*Tyromyces grammocephalus*			C		1/1
fungi	sac fungi	Chiodectonaceae	*Chiodecton*			C		1/1
fungi	sac fungi	Collemataceae	*Physma*			C		1/1
fungi	sac fungi	Collemataceae	*Collema rugosum*			C		1/1
fungi	sac fungi	Collemataceae	*Leptogium cyanescens*			C		1/1
fungi	sac fungi	Graphidaceae	*Platythecium colliculosum*			C		1/1
fungi	sac fungi	Haematommaceae	*Haematomma africanum*			C		7/7
fungi	sac fungi	Haematommaceae	*Haematomma stevensiae*			C		1/1
fungi	sac fungi	Lecanoraceae	*Lecanora pseudodecorata*			C		1/1
fungi	sac fungi	Phyllopsoraceae	*Phyllopsora conwayensis*			C		1/1
plants	conifers	Araucariaceae	*Araucaria cunninghamii*	hoop pine		C		2
plants	ferns	Adiantaceae	*Adiantum diaphanum*			C		1/1
plants	ferns	Adiantaceae	*Adiantum atroviride*			C		1/1
plants	ferns	Adiantaceae	*Doryopteris concolor*			C		1/1
plants	ferns	Adiantaceae	*Adiantum hispidulum var. hispidulum*			C		2/2
plants	ferns	Adiantaceae	*Adiantum hispidulum var. minus*			C		1/1
plants	ferns	Adiantaceae	*Cheilanthes tenuifolia*	rock fern		C		2/1
plants	ferns	Adiantaceae	*Adiantum hispidulum*			C		4
plants	ferns	Aspleniaceae	*Asplenium paleaceum*	scaly asplenium		C		2/2
plants	ferns	Aspleniaceae	*Asplenium australasicum*			C		3
plants	ferns	Blechnaceae	*Doodia media*			C		3/1
plants	ferns	Blechnaceae	*Blechnum cartilagineum*	gristle fern		C		2
plants	ferns	Blechnaceae	*Doodia aspera*	prickly rasp fern		C		2
plants	ferns	Dennstaedtiaceae	*Microlepia speluncae*	cave fern		C		2/1
plants	ferns	Dennstaedtiaceae	*Pteridium esculentum*	common bracken		C		1/1
plants	ferns	Dryopteridaceae	*Lastreopsis tenera*			C		2/2
plants	ferns	Dryopteridaceae	*Lastreopsis rufescens*			C		5/3
plants	ferns	Dryopteridaceae	*Coveniella poecilophlebia*			C		7/3
plants	ferns	Dryopteridaceae	*Tectaria confluens*			C		1/1
plants	ferns	Hymenophyllaceae	*Crepidomanes saxifragoides*			C		4/3
plants	ferns	Hymenophyllaceae	*Crepidomanes bipunctatum*			C		4/4
plants	ferns	Lindsaeaceae	*Lindsaea ensifolia*			C		2
plants	ferns	Nephrolepidaceae	*Nephrolepis hirsutula*			C		2/1
plants	ferns	Ophioglossaceae	*Ophioglossum pendulum*	ribbon fern		C		2
plants	ferns	Polypodiaceae	*Drynaria rigidula*			C		5/1
plants	ferns	Polypodiaceae	*Goniophlebium subauriculatum*			C		1
plants	ferns	Polypodiaceae	*Microsorum grossum*			C		1/1
plants	ferns	Polypodiaceae	*Drynaria sparsisora*			C		4
plants	ferns	Polypodiaceae	*Platycerium bifurcatum*			C		3
plants	ferns	Polypodiaceae	*Microsorum punctatum*			C		2/1
plants	ferns	Pteridaceae	*Pteris tremula*			C		1
plants	ferns	Pteridaceae	*Pteris ensiformis*	slender bracken		C		3/3
plants	ferns	Thelypteridaceae	*Thelypteridaceae*			C		1/1

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	ferns	Thelypteridaceae	*Christella dentata*	creek fern		C		3
plants	ferns	Thelypteridaceae	*Christella parasitica*			C		1/1
plants	ferns	Vittariaceae	*Vittaria elongata*			C		2/1
plants	ferns	Vittariaceae	*Vittaria ensiformis*			C		1/1
plants	higher dicots	Acanthaceae	*Rostellularia*			C		1/1
plants	higher dicots	Acanthaceae	*Harnieria hygrophiloides*	white karambal		C		7/5
plants	higher dicots	Acanthaceae	*Pseuderanthemum variabile*	pastel flower		C		4/1
plants	higher dicots	Acanthaceae	*Rostellularia adscendens subsp. dallachyi*			C		1/1
plants	higher dicots	Acanthaceae	*Thunbergia grandiflora*	sky flower	Y			1/1
plants	higher dicots	Aizoaceae	*Sesuvium portulacastrum*	sea purslane		C		1/1
plants	higher dicots	Amaranthaceae	*Deeringia amaranthoides*	redberry		C		3/3
plants	higher dicots	Amaranthaceae	*Alternanthera denticulata*	lesser joyweed		C		1/1
plants	higher dicots	Anacardiaceae	*Euroschinus falcatus*			C		3
plants	higher dicots	Anacardiaceae	*Pleiogynium timorense*	Burdekin plum		C		7/3
plants	higher dicots	Anacardiaceae	*Euroschinus falcatus var. falcatus*			C		3/3
plants	higher dicots	Anacardiaceae	*Euroschinus falcatus var. angustifolius*			C		2
plants	higher dicots	Apiaceae	*Centella asiatica*			C		2/2
plants	higher dicots	Apiaceae	*Mackinlaya macrosciadea*	mackinlaya		C		7/3
plants	higher dicots	Apocynaceae	*Parsonsia plaesiophylla*			C		6/3
plants	higher dicots	Apocynaceae	*Sarcostemma viminale subsp. brunonianum*			C		1
plants	higher dicots	Apocynaceae	*Parsonsia longipetiolata*			C		1/1
plants	higher dicots	Apocynaceae	*Secamone elliptica*			C		1
plants	higher dicots	Apocynaceae	*Parsonsia velutina*	hairy silkpod		C		10/3
plants	higher dicots	Apocynaceae	*Ochrosia elliptica*	northern ochrosia		C		6/2
plants	higher dicots	Apocynaceae	*Neisosperma poweri*			C		8/4
plants	higher dicots	Apocynaceae	*Cynanchum carnosum*			C		1/1
plants	higher dicots	Apocynaceae	*Alstonia scholaris*	white cheesewood		C		8/3
plants	higher dicots	Apocynaceae	*Alyxia ruscifolia*			C		7
plants	higher dicots	Apocynaceae	*Parsonsia rotata*	veinless silkpod		C		1/1
plants	higher dicots	Apocynaceae	*Alyxia spicata*			C		2
plants	higher dicots	Apocynaceae	*Heterostemma acuminatum*			C		4/2
plants	higher dicots	Apocynaceae	*Marsdenia glandulifera*			C		1
plants	higher dicots	Apocynaceae	*Marsdenia tricholepis*			C		3/3
plants	higher dicots	Apocynaceae	*Parsonsia ventricosa*			C		1
plants	higher dicots	Apocynaceae	*Marsdenia micradenia*	gymnema		C		4/2
plants	higher dicots	Apocynaceae	*Tylophora benthamii*	coast tylophora		C		6/2
plants	higher dicots	Apocynaceae	*Parsonsia latifolia*	green-leaved silkpod		C		2
plants	higher dicots	Apocynaceae	*Melodinus australis*	southern melodinus		C		7/2
plants	higher dicots	Apocynaceae	*Tabernaemontana orientalis*			C		10/1
plants	higher dicots	Araliaceae	*Polyscias nodosa*			C		1/1
plants	higher dicots	Araliaceae	*Schefflera actinophylla*	umbrella tree		C		2
plants	higher dicots	Araliaceae	*Polyscias australiana*	ivory basswood		C		4
plants	higher dicots	Araliaceae	*Polyscias elegans*	celery wood		C		8/1
plants	higher dicots	Asclepiadaceae	*Hoya australis*			C		1
plants	higher dicots	Asteraceae	*Emilia sonchifolia*		Y			1
plants	higher dicots	Asteraceae	*Ageratum conyzoides*	billygoat weed	Y			3

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plants	higher dicots	Asteraceae	*Wollastonia biflora*			C		1/1
plants	higher dicots	Asteraceae	*Calyptocarpus vialis*	creeping cinderella weed	Y			1/1
plants	higher dicots	Asteraceae	*Synedrella nodiflora*		Y			2/1
plants	higher dicots	Asteraceae	*Cyanthillium cinereum*			C		2/2
plants	higher dicots	Asteraceae	*Youngia japonica*			C		1/1
plants	higher dicots	Asteraceae	*Bidens pilosa*		Y			2
plants	higher dicots	Asteraceae	*Emilia sonchifolia var. javanica*		Y			1/1
plants	higher dicots	Asteraceae	*Crassocephalum crepidioides*	thickhead	Y			1
plants	higher dicots	Asteraceae	*Eleutheranthera ruderalis*		Y			1/1
plants	higher dicots	Asteraceae	*Bidens alba var. radiata*		Y			4/4
plants	higher dicots	Asteraceae	*Sphagneticola trilobata*		Y			1/1
plants	higher dicots	Asteraceae	*Pterocaulon sphacelatum*	applebush		C		1/1
plants	higher dicots	Asteraceae	*Sigesbeckia orientalis*	Indian weed		C		1/1
plants	higher dicots	Asteraceae	*Wedelia asperrima*			C		2/1
plants	higher dicots	Asteraceae	*Tridax procumbens*	tridax daisy	Y			1/1
plants	higher dicots	Asteraceae	*Ageratum houstonianum*	blue billygoat weed	Y			1
plants	higher dicots	Asteraceae	*Carthamus tinctorius*	safflower	Y			1/1
plants	higher dicots	Balanophoraceae	*Balanophora fungosa*			C		1
plants	higher dicots	Bignoniaceae	*Pandorea pandorana*	wonga vine		C		7/1
plants	higher dicots	Bignoniaceae	*Spathodea campanulata subsp. nilotica*		Y			1/1
plants	higher dicots	Bignoniaceae	*Pandorea jasminoides*			C		4/1
plants	higher dicots	Boraginaceae	*Cordia aspera*			C		2/2
plants	higher dicots	Boraginaceae	*Heliotropium sarmentosum*			C		6/3
plants	higher dicots	Boraginaceae	*Argusia argentea*	octopus bush		C		1
plants	higher dicots	Boraginaceae	*Cordia subcordata*			C		4/2
plants	higher dicots	Boraginaceae	*Cordia dichotoma*			C		9/4
plants	higher dicots	Burseraceae	*Canarium muelleri*	scrub turpentine		C		2/1
plants	higher dicots	Burseraceae	*Canarium australasicum*	mango bark		C		1
plants	higher dicots	Byttneriaceae	*Waltheria indica*			C		1/1
plants	higher dicots	Byttneriaceae	*Commersonia bartramia*	brown kurrajong		C		4/1
plants	higher dicots	Cactaceae	*Opuntia*			C		2
plants	higher dicots	Caesalpiniaceae	*Delonix regia*	poinciana	Y			1/1
plants	higher dicots	Caesalpiniaceae	*Cynometra iripa*			C		1/1
plants	higher dicots	Caesalpiniaceae	*Cassia sp. (Paluma Range G.Sankowsky+ 450)*			R		1/1
plants	higher dicots	Caesalpiniaceae	*Schotia brachypetala*	kaffir bean	Y			1/1
plants	higher dicots	Caesalpiniaceae	*Caesalpinia crista*			C		1
plants	higher dicots	Caesalpiniaceae	*Caesalpinia bonduc*	nicker bean		C		3/1
plants	higher dicots	Caesalpiniaceae	*Bauhinia variegata*		Y			1/1
plants	higher dicots	Caesalpiniaceae	*Cassia fistula*	Indian laburnum	Y			1/1
plants	higher dicots	Caesalpiniaceae	*Intsia bijuga*			C		1/1
plants	higher dicots	Capparaceae	*Capparis*			C		1
plants	higher dicots	Capparaceae	*Capparis sepiaria*			C		2
plants	higher dicots	Capparaceae	*Capparis velutina*			C		4
plants	higher dicots	Capparaceae	*Capparis arborea*	brush caper berry		C		4/1
plants	higher dicots	Capparaceae	*Capparis lucida*			C		4
plants	higher dicots	Caryophyllaceae	*Polycarpaea corymbosa var. minor*			C		1/1

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plants	higher dicots	Celastraceae	*Celastrus subspicata*	large-leaved staffvine		C		7/3
plants	higher dicots	Celastraceae	*Elaeodendron melanocarpum*			C		9/4
plants	higher dicots	Clusiaceae	*Calophyllum australianum*			C		3/2
plants	higher dicots	Combretaceae	*Terminalia catappa*			C		1
plants	higher dicots	Combretaceae	*Terminalia porphyrocarpa*			C		3/1
plants	higher dicots	Combretaceae	*Macropteranthes fitzalanii*			R		15/10
plants	higher dicots	Combretaceae	*Terminalia sericocarpa*	damson		C		10/1
plants	higher dicots	Combretaceae	*Terminalia melanocarpa*			C		1/1
plants	higher dicots	Combretaceae	*Terminalia muelleri*			C		1
plants	higher dicots	Connaraceae	*Rourea brachyandra*			R		5/1
plants	higher dicots	Convolvulaceae	*Ipomoea indica*	blue morning-glory	Y			1/1
plants	higher dicots	Convolvulaceae	*Ipomoea abrupta*			C		1/1
plants	higher dicots	Convolvulaceae	*Argyreia nervosa*		Y			1/1
plants	higher dicots	Convolvulaceae	*Ipomoea quamoclit*	star of Bethlehem	Y			2/2
plants	higher dicots	Convolvulaceae	*Ipomoea macrantha*			C		4/1
plants	higher dicots	Convolvulaceae	*Erycibe coccinea*			C		5/2
plants	higher dicots	Convolvulaceae	*Ipomoea cairica*		Y			1
plants	higher dicots	Convolvulaceae	*Ipomoea mauritiana*			C		2
plants	higher dicots	Cornaceae	*Alangium villosum subsp. tomentosum*			C		7/5
plants	higher dicots	Cornaceae	*Alangium villosum subsp. polyosmoides*			C		1
plants	higher dicots	Cucurbitaceae	*Sicyos australis*	star cucumber		C		3
plants	higher dicots	Cucurbitaceae	*Momordica charantia*	balsam pear	Y			2/2
plants	higher dicots	Cucurbitaceae	*Diplocyclos palmatus subsp. palmatus*			C		6/3
plants	higher dicots	Cucurbitaceae	*Neoalsomitra clavigera*			C		1/1
plants	higher dicots	Cucurbitaceae	*Diplocyclos palmatus*			C		1/1
plants	higher dicots	Dilleniaceae	*Hibbertia scandens*			C		1
plants	higher dicots	Ebenaceae	*Diospyros ferrea*			C		1
plants	higher dicots	Ebenaceae	*Diospyros compacta*			C		8/4
plants	higher dicots	Ebenaceae	*Diospyros australis*	black plum		C		2
plants	higher dicots	Ebenaceae	*Diospyros hebecarpa*			C		10/2
plants	higher dicots	Ebenaceae	*Diospyros geminata*	scaly ebony		C		8/2
plants	higher dicots	Ebenaceae	*Diospyros cupulosa*			C		1/1
plants	higher dicots	Ebenaceae	*Diospyros pentamera*	myrtle ebony		C		2
plants	higher dicots	Ebenaceae	*Diospyros fasciculosa*	grey ebony		C		2/1
plants	higher dicots	Elaeagnaceae	*Elaeagnus triflora*			C		2/1
plants	higher dicots	Elaeocarpaceae	*Elaeocarpus grandis*	blue quandong		C		2
plants	higher dicots	Elaeocarpaceae	*Elaeocarpus obovatus*	blueberry ash		C		5/2
plants	higher dicots	Elaeocarpaceae	*Elaeocarpus ruminatus*			C		1
plants	higher dicots	Ericaceae	*Acrotriche aggregata*	red cluster heath		C		4/4
plants	higher dicots	Euphorbiaceae	*Chamaesyce hirta*	asthma plant	Y			1/1
plants	higher dicots	Euphorbiaceae	*Chamaesyce bifida*			C		1/1
plants	higher dicots	Euphorbiaceae	*Baloghia inophylla*	scrub bloodwood		C		2/1
plants	higher dicots	Euphorbiaceae	*Dimorphocalyx australiensis*			C		1
plants	higher dicots	Euphorbiaceae	*Tragia novae-hollandiae*	stinging-vine		C		3
plants	higher dicots	Euphorbiaceae	*Claoxylon angustifolium*			C		11/7
plants	higher dicots	Euphorbiaceae	*Mallotus philippensis*	red kamala		C		11

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	higher dicots	Euphorbiaceae	*Macaranga involucrata*			C		5
plants	higher dicots	Euphorbiaceae	*Mallotus paniculatus*			C		1/1
plants	higher dicots	Euphorbiaceae	*Mallotus mollissimus*			C		1
plants	higher dicots	Euphorbiaceae	*Cleidion spiciflorum*			C		3
plants	higher dicots	Euphorbiaceae	*Mallotus polyadenos*			C		5/3
plants	higher dicots	Euphorbiaceae	*Mallotus nesophilus*			C		2/1
plants	higher dicots	Euphorbiaceae	*Macaranga tanarius*	macaranga		C		5
plants	higher dicots	Euphorbiaceae	*Homalanthus nutans*			C		1
plants	higher dicots	Euphorbiaceae	*Cleidion javanicum*			C		4/4
plants	higher dicots	Euphorbiaceae	*Croton arnhemicus*			C		2/2
plants	higher dicots	Fabaceae	*Crotalaria mitchellii subsp. mitchellii*			C		1/1
plants	higher dicots	Fabaceae	*Macroptilium lathyroides var. semierectum*		Y			1/1
plants	higher dicots	Fabaceae	*Tephrosia sp. (Copperfield River P.I.Forster PIF14768)*			C		1/1
plants	higher dicots	Fabaceae	*Austrosteenisia*			C		1
plants	higher dicots	Fabaceae	*Centrosema molle*		Y			4/4
plants	higher dicots	Fabaceae	*Crotalaria juncea*	sunhemp	Y			2/2
plants	higher dicots	Fabaceae	*Flemingia lineata*			C		2/2
plants	higher dicots	Fabaceae	*Galactia tenuiflora*			C		1
plants	higher dicots	Fabaceae	*Erythrina variegata*	Indian coral tree		C		3/1
plants	higher dicots	Fabaceae	*Desmodium triflorum*		Y			1/1
plants	higher dicots	Fabaceae	*Indigofera hirsuta*	hairy indigo		C		1/1
plants	higher dicots	Fabaceae	*Glycine tomentella*	woolly glycine		C		3
plants	higher dicots	Fabaceae	*Crotalaria pallida*		Y			1
plants	higher dicots	Fabaceae	*Sophora tomentosa*			C		2
plants	higher dicots	Fabaceae	*Millettia pinnata*			C		2/1
plants	higher dicots	Fabaceae	*Glycine cyrtoloba*			C		2
plants	higher dicots	Fabaceae	*Austrosteenisia mollitricha*			C		3
plants	higher dicots	Fabaceae	*Rhynchosia acuminatissima*			C		2/2
plants	higher dicots	Fabaceae	*Austrosteenisia blackii*	bloodvine		C		6
plants	higher dicots	Fabaceae	*Alysicarpus aurantiacus*			C		1/1
plants	higher dicots	Fabaceae	*Hanslia ormocarpoides*			C		4/3
plants	higher dicots	Fabaceae	*Erythrina vespertilio*			C		1/1
plants	higher dicots	Fabaceae	*Alysicarpus vaginalis*		Y			1/1
plants	higher dicots	Fabaceae	*Pycnospora lutescens*	pycnospora		C		3/1
plants	higher dicots	Fabaceae	*Flemingia parviflora*	flemingia		C		5/2
plants	higher dicots	Fabaceae	*Desmodium heterocarpon var. strigosum*			C		1/1
plants	higher dicots	Fabaceae	*Aeschynomene americana var. americana*		Y			1/1
plants	higher dicots	Fabaceae	*Tephrosia brachyodon var. brachyodon*			C		3/3
plants	higher dicots	Fabaceae	*Crotalaria montana var. angustifolia*			C		1/1
plants	higher dicots	Fabaceae	*Austrosteenisia blackii var. blackii*			C		1/1
plants	higher dicots	Fabaceae	*Sophora tomentosa subsp. australis*			C		1/1
plants	higher dicots	Fabaceae	*Crotalaria pallida var. obovata*		Y			1/1
plants	higher dicots	Fabaceae	*Derris trifoliata*			C		3/1
plants	higher dicots	Fabaceae	*Canavalia papuana*	wild jack bean		C		1/1
plants	higher dicots	Fabaceae	*Mucuna gigantea*	burny bean		C		6/1

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plants	higher dicots	Fabaceae	*Tephrosia*			C		1
plants	higher dicots	Fabaceae	*Dendrolobium umbellatum var. umbellatum*			C		1/1
plants	higher dicots	Flacourtiaceae	*Scolopia braunii*	flintwood		C		8/1
plants	higher dicots	Flacourtiaceae	*Homalium sp. (South Molle Island J.A.Gresty AQ208995)*			C		3/3
plants	higher dicots	Haloragaceae	*Myriophyllum*			C		1/1
plants	higher dicots	Lamiaceae	*Clerodendrum longiflorum var. glabrum*			C		1/1
plants	higher dicots	Lamiaceae	*Vitex acuminata*			C		1/1
plants	higher dicots	Lamiaceae	*Vitex trifolia*			C		2
plants	higher dicots	Lamiaceae	*Vitex melicopea*			C		4/4
plants	higher dicots	Lamiaceae	*Clerodendrum inerme*	coastal lolly bush		C		2
plants	higher dicots	Lamiaceae	*Premna serratifolia*			C		1
plants	higher dicots	Lamiaceae	*Callicarpa longifolia*			C		2/1
plants	higher dicots	Lamiaceae	*Callicarpa pedunculata*	velvet leaf		C		1
plants	higher dicots	Lamiaceae	*Vitex trifolia var. trifolia*			C		2/2
plants	higher dicots	Lamiaceae	*Plectranthus diversus*			C		1/1
plants	higher dicots	Lamiaceae	*Gmelina leichhardtii*	white beech		C		1
plants	higher dicots	Lamiaceae	*Leucas decemdentata*			C		1/1
plants	higher dicots	Lamiaceae	*Premna dallachyana*			C		2/2
plants	higher dicots	Lecythidaceae	*Planchonia careya*	cockatoo apple		C		1
plants	higher dicots	Loranthaceae	*Dendrophthoe curvata*			C		1/1
plants	higher dicots	Loranthaceae	*Dendrophthoe vitellina*	long-flowered mistletoe		C		1/1
plants	higher dicots	Loranthaceae	*Amyema congener subsp. rotundifolia*			C		1/1
plants	higher dicots	Lythraceae	*Sonneratia alba*			C		1/1
plants	higher dicots	Malpighiaceae	*Ryssopterys timorensis*			C		2/2
plants	higher dicots	Malvaceae	*Sida*			C		1
plants	higher dicots	Malvaceae	*Sida cordifolia*		Y			1/1
plants	higher dicots	Malvaceae	*Hibiscus tiliaceus*	cotton tree		C		1
plants	higher dicots	Malvaceae	*Thespesia populnea*			C		2/1
plants	higher dicots	Malvaceae	*Hibiscus heterophyllus*			C		1/1
plants	higher dicots	Malvaceae	*Malvastrum coromandelianum subsp. coromandelianum*		Y			1/1
plants	higher dicots	Malvaceae	*Abelmoschus manihot*		Y			1
plants	higher dicots	Melastomataceae	*Memecylon pauciflorum*			C		8
plants	higher dicots	Melastomataceae	*Melastoma malabathricum subsp. malabathricum*			C		1/1
plants	higher dicots	Meliaceae	*Dysoxylum*			C		1/1
plants	higher dicots	Meliaceae	*Aglaia brownii*			C		1/1
plants	higher dicots	Meliaceae	*Melia azedarach*	white cedar		C		2
plants	higher dicots	Meliaceae	*Aglaia sapindina*			C		3
plants	higher dicots	Meliaceae	*Dysoxylum klanderi*			C		2/1
plants	higher dicots	Meliaceae	*Dysoxylum mollissimum subsp. molle*	miva mahogany		C		3
plants	higher dicots	Meliaceae	*Xylocarpus granatum*	cedar mangrove		C		1/1
plants	higher dicots	Meliaceae	*Dysoxylum alliaceum*			C		5/4
plants	higher dicots	Meliaceae	*Aglaia elaeagnoidea*			C		6/1
plants	higher dicots	Meliaceae	*Turraea pubescens*	native honeysuckle		C		7/4
plants	higher dicots	Meliaceae	*Vavaea amicorum*			C		5/4
plants	higher dicots	Meliaceae	*Dysoxylum rufum*			C		1/1

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plants	higher dicots	Meliaceae	*Toona ciliata*	red cedar		C		2
plants	higher dicots	Memecylaceae	*Memecylon pauciflorum var. pauciflorum*			C		4/4
plants	higher dicots	Mimosaceae	*Acacia decora*	pretty wattle		C		3/3
plants	higher dicots	Mimosaceae	*Acacia aulacocarpa*			C		1
plants	higher dicots	Mimosaceae	*Entada phaseoloides*	matchbox bean		C		1
plants	higher dicots	Mimosaceae	*Acacia spirorbis subsp. solandri*			C		6/4
plants	higher dicots	Mimosaceae	*Mimosa pudica var. unijuga*		Y			1/1
plants	higher dicots	Mimosaceae	*Archidendron grandiflorum*	lace flower tree		C		3/1
plants	higher dicots	Mimosaceae	*Archidendron hendersonii*	white lace flower		C		2/1
plants	higher dicots	Mimosaceae	*Paraserianthes toona*	Mackay cedar		C		11/1
plants	higher dicots	Mimosaceae	*Acacia multisiliqua*			C		1
plants	higher dicots	Mimosaceae	*Acacia leptocarpa*	north coast wattle		C		2
plants	higher dicots	Mimosaceae	*Acacia maidenii*	Maiden's wattle		C		2/1
plants	higher dicots	Mimosaceae	*Albizia procera*			C		3/2
plants	higher dicots	Mimosaceae	*Acacia flavescens*	toothed wattle		C		3/2
plants	higher dicots	Mimosaceae	*Acacia umbellata*			C		1/1
plants	higher dicots	Mimosaceae	*Acacia simsii*			C		1/1
plants	higher dicots	Moraceae	*Ficus copiosa*			C		5/1
plants	higher dicots	Moraceae	*Ficus destruens*			C		1
plants	higher dicots	Moraceae	*Ficus leptoclada*			C		1
plants	higher dicots	Moraceae	*Ficus adenosperma*			C		3/2
plants	higher dicots	Moraceae	*Ficus rubiginosa forma rubiginosa*			C		1/1
plants	higher dicots	Moraceae	*Trophis scandens subsp. scandens*			C		2/2
plants	higher dicots	Moraceae	*Ficus virens var. sublanceolata*			C		6/1
plants	higher dicots	Moraceae	*Ficus racemosa var. racemosa*			C		2
plants	higher dicots	Moraceae	*Ficus microcarpa var. hillii*			C		1/1
plants	higher dicots	Moraceae	*Ficus superba var. henneana*			C		2
plants	higher dicots	Moraceae	*Ficus septica var. septica*			C		1/1
plants	higher dicots	Moraceae	*Maclura cochinchinensis*	cockspur thorn		C		4/1
plants	higher dicots	Moraceae	*Trophis scandens*			C		9
plants	higher dicots	Moraceae	*Ficus religiosa*		Y			1/1
plants	higher dicots	Moraceae	*Ficus opposita*			C		2
plants	higher dicots	Moraceae	*Ficus hispida*			C		1
plants	higher dicots	Moraceae	*Ficus septica*			C		3/2
plants	higher dicots	Moraceae	*Ficus congesta*			C		3
plants	higher dicots	Moraceae	*Ficus fraseri*	white sandpaper fig		C		4/1
plants	higher dicots	Myoporaceae	*Myoporum acuminatum*	coastal boobialla		C		1
plants	higher dicots	Myrsinaceae	*Myrsine porosa*			C		1
plants	higher dicots	Myrsinaceae	*Embelia australiana*	embelia		C		2
plants	higher dicots	Myrsinaceae	*Myrsine crassifolia*			C		1/1
plants	higher dicots	Myrsinaceae	*Tapeinosperma pseudojambosa*	tapeinosperma		C		3
plants	higher dicots	Myrsinaceae	*Aegiceras corniculatum*	river mangrove		C		2/2
plants	higher dicots	Myrsinaceae	*Myrsine variabilis*			C		2
plants	higher dicots	Myrtaceae	*Gossia bidwillii*			C		10/5
plants	higher dicots	Myrtaceae	*Gossia myrsinocarpa*			C		7/4
plants	higher dicots	Myrtaceae	*Lophostemon confertus*	brush box		C		2

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	higher dicots	Myrtaceae	*Eugenia reinwardtiana*	beach cherry		C		11/3
plants	higher dicots	Myrtaceae	*Eucalyptus portuensis*			C		9/7
plants	higher dicots	Myrtaceae	*Backhousia citriodora*	lemon ironwood		C		4/3
plants	higher dicots	Myrtaceae	*Syzygium corynanthum*	sour cherry		C		1/1
plants	higher dicots	Myrtaceae	*Corymbia tessellaris*	Moreton Bay ash		C		2/1
plants	higher dicots	Myrtaceae	*Corymbia dallachiana*			C		1
plants	higher dicots	Myrtaceae	*Rhodamnia spongiosa*			C		9/5
plants	higher dicots	Myrtaceae	*Rhodamnia rubescens*			C		1
plants	higher dicots	Myrtaceae	*Eucalyptus drepanophylla*			C		5/3
plants	higher dicots	Myrtaceae	*Acmenosperma claviflorum*	grey satinash		C		9/3
plants	higher dicots	Myrtaceae	*Rhodomyrtus macrocarpa*	finger cherry		C		2/2
plants	higher dicots	Myrtaceae	*Rhodamnia pauciovulata*			R		2/1
plants	higher dicots	Myrtaceae	*Eucalyptus platyphylla*	poplar gum		C		1/1
plants	higher dicots	Myrtaceae	*Syzygium erythrodoxum*			C		1
plants	higher dicots	Myrtaceae	*Corymbia intermedia*	pink bloodwood		C		5/3
plants	higher dicots	Myrtaceae	*Gossia pubiflora*			C		14/10
plants	higher dicots	Myrtaceae	*Syzygium australe*	scrub cherry		C		7/4
plants	higher dicots	Myrtaceae	*Osbornia octodonta*	myrtle mangrove		C		1/1
plants	higher dicots	Myrtaceae	*Syzygium johnsonii*	Johnson's satinash		C		2/1
plants	higher dicots	Myrtaceae	*Acmena hemilampra*			C		2
plants	higher dicots	Nyctaginaceae	*Pisonia aculeata*	thorny Pisonia		C		4
plants	higher dicots	Nyctaginaceae	*Pisonia umbellifera*	birdlime tree		C		4/1
plants	higher dicots	Nyctaginaceae	*Bougainvillea glabra*		Y			1/1
plants	higher dicots	Nyctaginaceae	*Boerhavia mutabilis*			C		1/1
plants	higher dicots	Nyctaginaceae	*Boerhavia dominii*			C		1/1
plants	higher dicots	Oleaceae	*Olea paniculata*			C		6/2
plants	higher dicots	Oleaceae	*Jasminum didymum*			C		4
plants	higher dicots	Oleaceae	*Chionanthus ramiflora*	northern olive		C		7/1
plants	higher dicots	Oleaceae	*Jasminum didymum subsp. racemosum*			C		5/2
plants	higher dicots	Oleaceae	*Jasminum simplicifolium subsp. australiense*			C		2/1
plants	higher dicots	Oleaceae	*Jasminum simplicifolium*			C		1
plants	higher dicots	Onagraceae	*Ludwigia octovalvis*	willow primrose		C		1/1
plants	higher dicots	Passifloraceae	*Passiflora foetida*		Y			1
plants	higher dicots	Passifloraceae	*Passiflora aurantia*			C		1
plants	higher dicots	Passifloraceae	*Passiflora suberosa*	corky passion flower	Y			15/4
plants	higher dicots	Phyllanthaceae	*Actephila*			C		3/3
plants	higher dicots	Phyllanthaceae	*Breynia oblongifolia*			C		1/1
plants	higher dicots	Phyllanthaceae	*Flueggea virosa subsp. melanthesoides*			C		1/1
plants	higher dicots	Phyllanthaceae	*Phyllanthus novae-hollandiae*			C		5/2
plants	higher dicots	Phyllanthaceae	*Cleistanthus dallachyanus*			C		1/1
plants	higher dicots	Phyllanthaceae	*Actephila sessilifolia*			R		1
plants	higher dicots	Phyllanthaceae	*Glochidion sumatranum*	umbrella cheese tree		C		3
plants	higher dicots	Phyllanthaceae	*Glochidion lobocarpum*			C		7/3
plants	higher dicots	Phyllanthaceae	*Glochidion apodogynum*			C		4/1
plants	higher dicots	Phyllanthaceae	*Bridelia leichhardtii*			C		3/1
plants	higher dicots	Phyllanthaceae	*Antidesma parvifolium*			C		2/1

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plants	higher dicots	Phyllanthaceae	*Sauropus albiflorus*	snowbush		C		1/1
plants	higher dicots	Phyllanthaceae	*Actephila lindleyi*	actephila		C		1
plants	higher dicots	Phyllanthaceae	*Flueggea leucopyrus*			C		1/1
plants	higher dicots	Picrodendraceae	*Dissiliaria laxinervis*			C		1
plants	higher dicots	Picrodendraceae	*Dissiliaria indistincta*			C		2/2
plants	higher dicots	Pittosporaceae	*Bursaria incana*			C		4/2
plants	higher dicots	Pittosporaceae	*Pittosporum ferrugineum subsp. linifolium*			C		1/1
plants	higher dicots	Pittosporaceae	*Auranticarpa rhombifolia*			C		2/1
plants	higher dicots	Pittosporaceae	*Bursaria tenuifolia*			C		3/3
plants	higher dicots	Pittosporaceae	*Hymenosporum flavum*	native frangipani		C		1
plants	higher dicots	Pittosporaceae	*Pittosporum ferrugineum*			C		2
plants	higher dicots	Polygonaceae	*Persicaria barbata*			C		1/1
plants	higher dicots	Proteaceae	*Banksia integrifolia subsp. compar*			C		1/1
plants	higher dicots	Putranjivaceae	*Drypetes deplanchei*	grey boxwood		C		12/2
plants	higher dicots	Rhamnaceae	*Alphitonia incana*			C		1/1
plants	higher dicots	Rhamnaceae	*Emmenosperma cunninghamii*			C		1/1
plants	higher dicots	Rhamnaceae	*Alphitonia sp. (Little Crystal Creek A.R.Bean 5237)*			C		1/1
plants	higher dicots	Rhamnaceae	*Emmenosperma alphitonioides*	yellow ash		C		1/1
plants	higher dicots	Rhamnaceae	*Ventilago ecorollata*			C		7/2
plants	higher dicots	Rhamnaceae	*Alphitonia excelsa*	soap tree		C		4
plants	higher dicots	Rhamnaceae	*Alphitonia petriei*	pink ash		C		2
plants	higher dicots	Rhamnaceae	*Colubrina asiatica*			C		6/3
plants	higher dicots	Rhamnaceae	*Ziziphus mauritiana*	Indian jujube	Y			1/1
plants	higher dicots	Rhizophoraceae	*Bruguiera gymnorhiza*	large-fruited orange mangrove		C		1/1
plants	higher dicots	Rhizophoraceae	*Bruguiera parviflora*			C		1/1
plants	higher dicots	Rhizophoraceae	*Rhizophora apiculata*			C		2/2
plants	higher dicots	Rhizophoraceae	*Carallia brachiata*	carallia		C		4/2
plants	higher dicots	Rhizophoraceae	*Ceriops tagal*	yellow mangrove		C		2/2
plants	higher dicots	Rubiaceae	*Canthium*			C		1
plants	higher dicots	Rubiaceae	*Psychotria*			C		5/2
plants	higher dicots	Rubiaceae	*Caelospermum*			C		2
plants	higher dicots	Rubiaceae	*Aidia racemosa*			C		10/4
plants	higher dicots	Rubiaceae	*Geophila repens*			C		1
plants	higher dicots	Rubiaceae	*Ixora timorensis*			C		17/6
plants	higher dicots	Rubiaceae	*Pavetta australiensis*			C		4
plants	higher dicots	Rubiaceae	*Larsenaikia jardinei*			C		10/3
plants	higher dicots	Rubiaceae	*Tarenna dallachiana*			C		2
plants	higher dicots	Rubiaceae	*Morinda jasminoides*	morinda		C		1
plants	higher dicots	Rubiaceae	*Antirhea tenuiflora*			C		1/1
plants	higher dicots	Rubiaceae	*Randia tuberculosa*			C		1
plants	higher dicots	Rubiaceae	*Nauclea orientalis*	Leichhardt tree		C		7/4
plants	higher dicots	Rubiaceae	*Morinda citrifolia*			C		1/1
plants	higher dicots	Rubiaceae	*Guettarda speciosa*			C		1
plants	higher dicots	Rubiaceae	*Gen.(Aq520454) sp. (Shute Harbour D.A.Halford Q811)*			C		9/6
plants	higher dicots	Rubiaceae	*Psychotria sp. (Shute Harbour L.J.Webb+ 7916)*			C		1/1
plants	higher dicots	Rubiaceae	*Atractocarpus fitzalanii subsp. fitzalanii*			C		6/6

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plants	higher dicots	Rubiaceae	*Psychotria sp. (Danbulla S.T.Blake 15262)*			C		1/1
plants	higher dicots	Rubiaceae	*Coelospermum paniculatum var. paniculatum*			C		2/1
plants	higher dicots	Rubiaceae	*Tarenna dallachiana subsp. dallachiana*			C		2/2
plants	higher dicots	Rubiaceae	*Psychotria daphnoides var. daphnoides*			C		1/1
plants	higher dicots	Rubiaceae	*Timonius timon var. timon*			C		2/2
plants	higher dicots	Rubiaceae	*Cyclophyllum coprosmoides*			C		3
plants	higher dicots	Rubiaceae	*Atractocarpus fitzalanii*			C		7
plants	higher dicots	Rubiaceae	*Psychotria loniceroides*	hairy psychotria		C		5/2
plants	higher dicots	Rubiaceae	*Pogonolobus reticulatus*			C		1
plants	higher dicots	Rubiaceae	*Spermacoce brachystema*			C		2/2
plants	higher dicots	Rubiaceae	*Psychotria poliostemma*			C		3
plants	higher dicots	Rubiaceae	*Psychotria daphnoides*			C		1
plants	higher dicots	Rubiaceae	*Psydrax odorata*			C		6/1
plants	higher dicots	Rubiaceae	*Timonius timon*			C		1
plants	higher dicots	Rutaceae	*Acronychia laevis*	glossy acronychia		C		12/3
plants	higher dicots	Rutaceae	*Melicope bonwickii*			C		4/1
plants	higher dicots	Rutaceae	*Micromelum minutum*	clusterberry		C		2
plants	higher dicots	Rutaceae	*Bosistoa pentacocca*			C		1
plants	higher dicots	Rutaceae	*Zanthoxylum nitidum*			C		2/1
plants	higher dicots	Rutaceae	*Glycosmis trifoliata*			C		5/1
plants	higher dicots	Rutaceae	*Bosistoa pentacocca var. connaricarpa*			C		4/3
plants	higher dicots	Rutaceae	*Sarcomelicope simplicifolia*			C		3
plants	higher dicots	Rutaceae	*Zanthoxylum brachyacanthum*			C		1
plants	higher dicots	Rutaceae	*Melicope xanthoxyloides*			C		1
plants	higher dicots	Rutaceae	*Murraya ovatifoliolata*			C		5/3
plants	higher dicots	Rutaceae	*Flindersia schottiana*	bumpy ash		C		8/2
plants	higher dicots	Rutaceae	*Bosistoa medicinalis*			C		1/1
plants	higher dicots	Rutaceae	*Geijera salicifolia*	brush wilga		C		7/2
plants	higher dicots	Santalaceae	*Exocarpos latifolius*			C		1
plants	higher dicots	Sapindaceae	*Atalaya rigida*			R		8/4
plants	higher dicots	Sapindaceae	*Guioa lasioneura*			C		2/1
plants	higher dicots	Sapindaceae	*Harpullia hillii*			C		2/2
plants	higher dicots	Sapindaceae	*Guioa semiglauca*	guioa		C		1
plants	higher dicots	Sapindaceae	*Harpullia pendula*			C		2
plants	higher dicots	Sapindaceae	*Lepiderema punctulata*			C		9/2
plants	higher dicots	Sapindaceae	*Cupaniopsis foveolata*	narrow-leaved tuckeroo		C		1
plants	higher dicots	Sapindaceae	*Sarcopteryx martyana*			C		1/1
plants	higher dicots	Sapindaceae	*Ganophyllum falcatum*			C		6/2
plants	higher dicots	Sapindaceae	*Diploglottis obovata*			C		5/1
plants	higher dicots	Sapindaceae	*Alectryon tomentosus*			C		4
plants	higher dicots	Sapindaceae	*Arytera divaricata*	coogera		C		6/1
plants	higher dicots	Sapindaceae	*Alectryon connatus*	grey birds-eye		C		5/1
plants	higher dicots	Sapindaceae	*Jagera pseudorhus*			C		6
plants	higher dicots	Sapindaceae	*Lepiderema sp. (Impulse Creek A.B.Pollock 73)*			C		4/3
plants	higher dicots	Sapindaceae	*Dodonaea lanceolata var. lanceolata*			C		1/1
plants	higher dicots	Sapindaceae	*Jagera pseudorhus var. pseudorhus*			C		1/1

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plants	higher dicots	Sapindaceae	*Cardiospermum grandiflorum*	heart seed vine	Y			2/2
plants	higher dicots	Sapindaceae	*Cupaniopsis anacardioides*	tuckeroo		C		7
plants	higher dicots	Sapindaceae	*Elattostachys megalantha*			C		3
plants	higher dicots	Sapindaceae	*Mischocarpus pyriformis*			C		1
plants	higher dicots	Sapindaceae	*Elattostachys xylocarpa*	white tamarind		C		4
plants	higher dicots	Sapindaceae	*Elattostachys bidwillii*			C		1/1
plants	higher dicots	Sapindaceae	*Cupaniopsis wadsworthii*			C		7/1
plants	higher dicots	Sapindaceae	*Mischocarpus anodontus*	veiny pearfruit		C		9/1
plants	higher dicots	Sapotaceae	*Mimusops elengi*			C		5
plants	higher dicots	Sapotaceae	*Pouteria sericea*			C		3/1
plants	higher dicots	Sapotaceae	*Pouteria pohlmaniana*			C		2
plants	higher dicots	Sapotaceae	*Pouteria cotinifolia var. pubescens*			C		1
plants	higher dicots	Sapotaceae	*Pouteria myrsinodendron*			C		5/2
plants	higher dicots	Sapotaceae	*Pouteria queenslandica*			C		5
plants	higher dicots	Sapotaceae	*Pouteria chartacea*	thin-leaved coondoo		C		5/2
plants	higher dicots	Sapotaceae	*Pouteria cotinifolia var. cotinifolia*			C		1/1
plants	higher dicots	Scrophulariaceae	*Scoparia dulcis*	Scoparia	Y			1/1
plants	higher dicots	Simaroubaceae	*Brucea javanica*			C		4/2
plants	higher dicots	Simaroubaceae	*Ailanthus triphysa*	white siris		C		4/2
plants	higher dicots	Solanaceae	*Solanum torvum*	devil's fig	Y			4/2
plants	higher dicots	Solanaceae	*Capsicum frutescens*		Y			1/1
plants	higher dicots	Solanaceae	*Solanum seaforthianum*	Brazilian nightshade	Y			1
plants	higher dicots	Solanaceae	*Solanum sporadotrichum*			R		2/2
plants	higher dicots	Solanaceae	*Lycianthes shanesii*			C		1/1
plants	higher dicots	Sparrmanniaceae	*Grewia australis*			C		4/4
plants	higher dicots	Sparrmanniaceae	*Grewia oxyphylla*			C		5/3
plants	higher dicots	Sparrmanniaceae	*Corchorus olitorius*	jute		C		1/1
plants	higher dicots	Sparrmanniaceae	*Triumfetta rhomboidea*	chinese burr	Y			2/1
plants	higher dicots	Sterculiaceae	*Heritiera littoralis*			C		1
plants	higher dicots	Sterculiaceae	*Argyrodendron sp. (Whitsundays W.J.McDonald+ 5831)*			C		1/1
plants	higher dicots	Sterculiaceae	*Sterculia quadrifida*	peanut tree		C		5/2
plants	higher dicots	Sterculiaceae	*Brachychiton compactus*			R		4/3
plants	higher dicots	Sterculiaceae	*Argyrodendron polyandrum*	brown tulip oak		C		14/3
plants	higher dicots	Sterculiaceae	*Argyrodendron actinophyllum subsp. diversifolium*			C		6/3
plants	higher dicots	Sterculiaceae	*Brachychiton acerifolius*	flame tree		C		9/2
plants	higher dicots	Symplocaceae	*Symplocos thwaitesii*	buff hazelwood		C		1
plants	higher dicots	Symplocaceae	*Symplocos cochinchinensis var. pilosiuscula*			C		4/4
plants	higher dicots	Symplocaceae	*Symplocos cochinchinensis var. gittonsii*			C		2
plants	higher dicots	Thymelaeaceae	*Phaleria octandra*	phaleria		C		1/1
plants	higher dicots	Thymelaeaceae	*Pimelea latifolia subsp. latifolia*			C		1/1
plants	higher dicots	Ulmaceae	*Trema tomentosa*			C		3
plants	higher dicots	Ulmaceae	*Trema orientalis*	tree peach		C		5
plants	higher dicots	Ulmaceae	*Celtis philippensis*			C		6
plants	higher dicots	Ulmaceae	*Celtis paniculata*	native celtis		C		6/1
plants	higher dicots	Ulmaceae	*Aphananthe philippinensis*			C		8/3
plants	higher dicots	Ulmaceae	*Celtis philippensis var. philippensis*			C		4/4

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plants	higher dicots	Urticaceae	*Pipturus argenteus*	white nettle		C		2/1
plants	higher dicots	Urticaceae	*Dendrocnide photinophylla*	shiny-leaved stinging tree		C		6/1
plants	higher dicots	Urticaceae	*Dendrocnide moroides*	Gympie stinger		C		6/1
plants	higher dicots	Verbenaceae	*Lantana camara*		Y			11
plants	higher dicots	Violaceae	*Hybanthus stellarioides*			C		1
plants	higher dicots	Vitaceae	*Leea indica*	bandicoot berry		C		5/3
plants	higher dicots	Vitaceae	*Cissus antarctica*			C		3/1
plants	higher dicots	Vitaceae	*Tetrastigma thorsborneorum*			C		6/2
plants	higher dicots	Vitaceae	*Cissus sterculiifolia*			C		1
plants	higher dicots	Vitaceae	*Clematicissus opaca*			C		2/2
plants	higher dicots	Vitaceae	*Tetrastigma nitens*	shining grape		C		11
plants	higher dicots	Vitaceae	*Cissus penninervis*			C		3
plants	higher dicots	Vitaceae	*Cissus oblonga*			C		12/3
plants	higher dicots	Vitaceae	*Cissus opaca*			C		1
plants	higher dicots	Vitaceae	*Cissus adnata*			C		1
plants	higher dicots	Vitaceae	*Cissus repens*			C		5/2
plants	higher dicots	Vitaceae	*Cissus hastata*			C		9/5
plants	liverworts	Frullaniaceae	*Frullania hicksiae forma litoralis*			C		1/1
plants	liverworts	Geocalycaceae	*Heteroscyphus argutus*			C		2/2
plants	liverworts	Lejeuneaceae	*Lejeuneaceae*			C		1/1
plants	liverworts	Lejeuneaceae	*Lejeunea ramosissima*			C		1/1
plants	liverworts	Lejeuneaceae	*Archilejeunea planiuscula*			C		1/1
plants	liverworts	Lejeuneaceae	*Schiffneriolejeunea pulopenangensis*			C		1/1
plants	liverworts	Lejeuneaceae	*Schiffneriolejeunea tumida var. hasskarliana*			C		1/1
plants	liverworts	Lejeuneaceae	*Lopholejeunea muelleriana var. australis*			C		1/1
plants	liverworts	Lejeuneaceae	*Lopholejeunea hispidissima*			C		1/1
plants	liverworts	Lejeuneaceae	*Thysananthus retusus*			C		1/1
plants	liverworts	Lejeuneaceae	*Cololejeunea falcata*			C		1/1
plants	liverworts	Lejeuneaceae	*Lejeunea drummondii*			C		1/1
plants	lower dicots	Annonaceae	*Miliusa brahei*			C		4/2
plants	lower dicots	Annonaceae	*Melodorum leichhardtii*			C		13/3
plants	lower dicots	Annonaceae	*Fitzalania heteropetala*			C		8/3
plants	lower dicots	Annonaceae	*Polyalthia nitidissima*	polyalthia		C		5
plants	lower dicots	Annonaceae	*Xylopia maccreae*			C		5/4
plants	lower dicots	Annonaceae	*Annona squamosa*		Y			1/1
plants	lower dicots	Aristolochiaceae	*Aristolochia*			C		1
plants	lower dicots	Avicenniaceae	*Avicennia marina subsp. eucalyptifolia*			C		1/1
plants	lower dicots	Hernandiaceae	*Gyrocarpus americanus subsp. americanus*			C		1/1
plants	lower dicots	Lauraceae	*Litsea leefeana*			C		4
plants	lower dicots	Lauraceae	*Neolitsea brassii*			C		3/3
plants	lower dicots	Lauraceae	*Endiandra muelleri*			C		3
plants	lower dicots	Lauraceae	*Neolitsea dealbata*	white bolly gum		C		2/1
plants	lower dicots	Lauraceae	*Beilschmiedia obtusifolia*	hard bolly gum		C		10/4
plants	lower dicots	Lauraceae	*Cryptocarya triplinervis*			C		10/2
plants	lower dicots	Lauraceae	*Cryptocarya hypospodia*	north Queensland purple laurel		C		7
plants	lower dicots	Lauraceae	*Cryptocarya bidwillii*	yellow laurel		C		8

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	lower dicots	Lauraceae	*Endiandra hypotephra*	blue walnut		C		1
plants	lower dicots	Lauraceae	*Endiandra cowleyana*	northern rose walnut		C		5/2
plants	lower dicots	Lauraceae	*Cryptocarya murrayi*	Murray's laurel		C		1
plants	lower dicots	Lauraceae	*Cryptocarya grandis*			C		1
plants	lower dicots	Lauraceae	*Cassytha filiformis*	dodder laurel		C		2
plants	lower dicots	Lauraceae	*Cryptocarya triplinervis var. pubens*			C		1/1
plants	lower dicots	Lauraceae	*Endiandra muelleri subsp. bracteata*			C		1/1
plants	lower dicots	Lauraceae	*Litsea fawcettiana*			C		7/4
plants	lower dicots	Lauraceae	*Endiandra discolor*	domatia tree		C		1
plants	lower dicots	Lauraceae	*Litsea reticulata*			C		1
plants	lower dicots	Lauraceae	*Litsea glutinosa*			C		5/1
plants	lower dicots	Lauraceae	*Litsea bindoniana*			C		1
plants	lower dicots	Menispermaceae	*Pachygone ovata*			C		5/2
plants	lower dicots	Menispermaceae	*Stephania japonica var. discolor*			C		1
plants	lower dicots	Menispermaceae	*Tinospora smilacina*	snakevine		C		1
plants	lower dicots	Menispermaceae	*Pleogyne australis*	wiry grape		C		1
plants	lower dicots	Menispermaceae	*Hypserpa laurina*			C		1/1
plants	lower dicots	Menispermaceae	*Legnephora moorei*			C		3/1
plants	lower dicots	Monimiaceae	*Wilkiea pubescens*			C		2/2
plants	lower dicots	Monimiaceae	*Tetrasynandra laxiflora*	tetra beech		C		1
plants	lower dicots	Monimiaceae	*Wilkiea macrophylla*	large-leaved wilkiea		C		4/1
plants	lower dicots	Monimiaceae	*Wilkiea huegeliana*	veiny wilkiea		C		1
plants	lower dicots	Myristicaceae	*Myristica globosa subsp. muelleri*	native nugmeg		C		6/1
plants	lower dicots	Piperaceae	*Piper*			C		1
plants	lower dicots	Piperaceae	*Piper caninum*	peppervine		C		3
plants	lower dicots	Piperaceae	*Piper hederaceum*			C		1
plants	lower dicots	Piperaceae	*Piper umbellatum*			C		2/2
plants	lower dicots	Piperaceae	*Piper hederaceum var. hederaceum*			C		1/1
plants	lower dicots	Piperaceae	*Piper interruptum*			C		3/3
plants	lower dicots	Ranunculaceae	*Clematis glycinoides*			C		2
plants	lower dicots	Winteraceae	*Bubbia semecarpoides*			C		1
plants	monocots	Amaryllidaceae	*Crinum pedunculatum*	river lily		C		3/1
plants	monocots	Amaryllidaceae	*Proiphys infundibularis*			C		1/1
plants	monocots	Araceae	*Pothos longipes*			C		3
plants	monocots	Araceae	*Alocasia brisbanensis*			C		3/1
plants	monocots	Arecaceae	*Calamus australis*	hairy mary		C		2
plants	monocots	Arecaceae	*Ptychosperma elegans*	solitaire palm		C		6/2
plants	monocots	Arecaceae	*Archontophoenix alexandrae*	Alexandra palm		C		4
plants	monocots	Commelinaceae	*Pollia macrophylla*			C		5/1
plants	monocots	Commelinaceae	*Tradescantia spathacea*		Y			1/1
plants	monocots	Commelinaceae	*Commelina benghalensis*		Y			1
plants	monocots	Commelinaceae	*Aneilema acuminatum*			C		5/2
plants	monocots	Cyperaceae	*Carex*			C		1
plants	monocots	Cyperaceae	*Cyperus enervis*			C		5/5
plants	monocots	Cyperaceae	*Carex horsfieldii*			C		3/1
plants	monocots	Cyperaceae	*Cyperus difformis*	rice sedge		C		1/1

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	monocots	Cyperaceae	*Scleria mackaviensis*			C		5/5
plants	monocots	Cyperaceae	*Cyperus tetraphyllus*			C		1/1
plants	monocots	Cyperaceae	*Cyperus perangustus*			C		1/1
plants	monocots	Cyperaceae	*Cyperus gymnocaulos*	spiny flatsedge		C		1/1
plants	monocots	Cyperaceae	*Cyperus dietrichiae*			C		1/1
plants	monocots	Cyperaceae	*Scleria sphacelata*			C		5/3
plants	monocots	Cyperaceae	*Abildgaardia ovata*			C		1/1
plants	monocots	Cyperaceae	*Schoenus sparteus*			C		1/1
plants	monocots	Cyperaceae	*Cyperus trinervis*			C		1/1
plants	monocots	Cyperaceae	*Cyperus polystachyos var. polystachyos*			C		1/1
plants	monocots	Cyperaceae	*Scleria lithosperma var. linearis*			C		4/4
plants	monocots	Cyperaceae	*Schoenoplectus mucronatus*			C		1/1
plants	monocots	Cyperaceae	*Schoenoplectus validus*			C		1/1
plants	monocots	Cyperaceae	*Lepidosperma laterale*			C		1
plants	monocots	Cyperaceae	*Cyperus cyperinus*			C		2/2
plants	monocots	Cyperaceae	*Scleria brownii*			C		1
plants	monocots	Cyperaceae	*Cyperus laevis*			C		1/1
plants	monocots	Cyperaceae	*Cyperus iria*			C		1/1
plants	monocots	Cyperaceae	*Gahnia aspera*			C		3/1
plants	monocots	Cyperaceae	*Scleria levis*			C		2/1
plants	monocots	Cyperaceae	*Carex indica*			C		1/1
plants	monocots	Dioscoreaceae	*Dioscorea transversa*	native yam		C		3/1
plants	monocots	Flagellariaceae	*Flagellaria indica*	whip vine		C		7
plants	monocots	Hemerocallidaceae	*Dianella*			C		1
plants	monocots	Hemerocallidaceae	*Dianella caerulea*			C		4
plants	monocots	Hemerocallidaceae	*Dianella bambusifolia*			C		1/1
plants	monocots	Hemerocallidaceae	*Geitonoplesium cymosum*	scrambling lily		C		7
plants	monocots	Hemerocallidaceae	*Dianella caerulea var. vannata*			C		3
plants	monocots	Hemerocallidaceae	*Dianella longifolia*			C		2
plants	monocots	Laxmanniaceae	*Lomandra*			C		1
plants	monocots	Laxmanniaceae	*Cordyline murchisoniae*			C		6
plants	monocots	Laxmanniaceae	*Lomandra multiflora subsp. multiflora*			C		1
plants	monocots	Laxmanniaceae	*Eustrephus latifolius*	wombat berry		C		5/1
plants	monocots	Laxmanniaceae	*Lomandra filiformis*			C		1
plants	monocots	Laxmanniaceae	*Lomandra longifolia*			C		3/1
plants	monocots	Orchidaceae	*Diuris*			C		2
plants	monocots	Orchidaceae	*Dendrobium speciosum*			C		1
plants	monocots	Orchidaceae	*Dendrobium capitis-york*			C		1
plants	monocots	Orchidaceae	*Corymborkis veratrifolia*	cinnamon orchid		C		1/1
plants	monocots	Orchidaceae	*Geodorum densiflorum*	pink nodding orchid		C		2/1
plants	monocots	Orchidaceae	*Dendrobium discolor*			C		4
plants	monocots	Orchidaceae	*Nervilia plicata*			C		1/1
plants	monocots	Orchidaceae	*Cymbidium madidum*			C		2
plants	monocots	Orchidaceae	*Liparis simmondsii*			R		1/1
plants	monocots	Orchidaceae	*Cymbidium*			C		1
plants	monocots	Pandanaceae	*Pandanus tectorius*			C		1

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	monocots	Pandanaceae	*Freycinetia scandens*			C		1
plants	monocots	Poaceae	*Panicum*			C		2/2
plants	monocots	Poaceae	*Enteropogon unispiceus*			C		1/1
plants	monocots	Poaceae	*Oplismenus imbecillis*			C		4/1
plants	monocots	Poaceae	*Oplismenus compositus*			C		3/3
plants	monocots	Poaceae	*Heteropogon triticeus*	giant speargrass		C		2
plants	monocots	Poaceae	*Heteropogon contortus*	black speargrass		C		2
plants	monocots	Poaceae	*Eragrostis unioloides*			C		1/1
plants	monocots	Poaceae	*Chionachne cyathopoda*	river grass		C		5/3
plants	monocots	Poaceae	*Paspalum paniculatum*	Russell River grass	Y			1/1
plants	monocots	Poaceae	*Aristida personata*			C		2/2
plants	monocots	Poaceae	*Panicum decompositum var. tenuius*			C		1
plants	monocots	Poaceae	*Megathyrsus maximus var. maximus*		Y			2/2
plants	monocots	Poaceae	*Sorghum nitidum forma aristatum*			C		2/1
plants	monocots	Poaceae	*Mnesithea rottboellioides*			C		2/1
plants	monocots	Poaceae	*Walwhalleya subxerophila*			C		1
plants	monocots	Poaceae	*Capillipedium spicigerum*	spicytop		C		3/2
plants	monocots	Poaceae	*Sporobolus jacquemontii*		Y			1/1
plants	monocots	Poaceae	*Ancistrachne uncinulata*	hooky grass		C		4/2
plants	monocots	Poaceae	*Paspalum scrobiculatum*	ditch millet		C		1/1
plants	monocots	Poaceae	*Aristida queenslandica var. dissimilis*			C		1/1
plants	monocots	Poaceae	*Oplismenus undulatifolius var. mollis*			C		1/1
plants	monocots	Poaceae	*Dichanthium sericeum subsp. sericeum*			C		2/2
plants	monocots	Poaceae	*Eriachne pallescens var. pallescens*			C		1/1
plants	monocots	Poaceae	*Themeda triandra*	kangaroo grass		C		3
plants	monocots	Poaceae	*Panicum robustum*			C		1/1
plants	monocots	Poaceae	*Panicum effusum*			C		1
plants	monocots	Poaceae	*Lepturus repens*	stalky grass		C		1/1
plants	monocots	Poaceae	*Eleusine indica*	crowsfoot grass	Y			1/1
plants	monocots	Poaceae	*Chloris inflata*	purpletop chloris	Y			1/1
plants	monocots	Poaceae	*Aristida spuria*			C		3/2
plants	monocots	Poaceae	*Panicum simile*			C		2/2
plants	monocots	Poaceae	*Oplismenus burmannii*			C		1
plants	monocots	Poaceae	*Digitaria parviflora*			C		1
plants	monocots	Poaceae	*Bothriochloa pertusa*		Y			2/2
plants	monocots	Poaceae	*Paspalidium gracile*	slender panic		C		2/1
plants	monocots	Poaceae	*Paspalidium distans*	shotgrass		C		2/2
plants	monocots	Poaceae	*Melinis minutiflora*	molasses grass	Y			1/1
plants	monocots	Poaceae	*Imperata cylindrica*	blady grass		C		2
plants	monocots	Poaceae	*Eriachne pallescens*			C		1/1
plants	monocots	Poaceae	*Dichanthium setosum*			R	V	1
plants	monocots	Poaceae	*Cymbopogon obtectus*			C		2/2
plants	monocots	Poaceae	*Cymbopogon ambiguus*	lemon grass		C		3/2
plants	monocots	Poaceae	*Chrysopogon filipes*			C		1/1
plants	monocots	Poaceae	*Aristida gracilipes*			C		1/1
plants	monocots	Poaceae	*Panicum mitchellii*			C		1/1

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	monocots	Poaceae	*Oplismenus aemulus*	creeping shade grass		C		6/1
plants	monocots	Poaceae	*Chrysopogon fallax*			C		1
plants	monocots	Poaceae	*Cenchrus echinatus*	Mossman River grass	Y			1/1
plants	monocots	Poaceae	*Poaceae*			C		1
plants	monocots	Poaceae	*Aristida*			C		1
plants	monocots	Poaceae	*Oplismenus*			C		1
plants	monocots	Poaceae	*Melinis repens*	red natal grass	Y			1
plants	monocots	Poaceae	*Paspalidium*			C		3/1
plants	monocots	Ripogonaceae	*Ripogonum album*	white supplejack		C		4/2
plants	monocots	Smilacaceae	*Smilax australis*	barbed-wire vine		C		12/3
plants	monocots	Taccaceae	*Tacca leontopetaloides*			C		2
plants	monocots	Xanthorrhoeaceae	*Xanthorrhoea*			C		3
plants	monocots	Xanthorrhoeaceae	*Xanthorrhoea latifolia subsp. latifolia*			C		1/1
plants	monocots	Zingiberaceae	*Alpinia caerulea*	wild ginger		C		3
plants	mosses	Leucobryaceae	*Leucobryum*			C		1/1
plants	mosses	Rhizogoniaceae	*Rhizogonium*			C		1/1
protists	brown algae	Phaeophyceae	*Rosenvingea orientalis*			C		1/1
protists	green algae	Chlorophyceae	*Cladophora*			C		1/1
protists	green algae	Chlorophyceae	*Enteromorpha*			C		1/1
protists	green algae	Chlorophyceae	*Boodleopsis pusilla*			C		2/2
protists	green algae	Chlorophyceae	*Rhizoclonium implexum*			C		1/1
protists	green algae	Chlorophyceae	*Ulva flexuosa subsp. paradoxa*			C		2/2
protists	red algae	Rhodophyceae	*Catenella*			C		1/1
protists	red algae	Rhodophyceae	*Ceramium codii*			C		1/1
protists	red algae	Rhodophyceae	*Catenella nipae*			C		1/1
protists	red algae	Rhodophyceae	*Bostrychia radicans*			C		1/1
protists	red algae	Rhodophyceae	*Stictosiphonia kelanensis*			C		1/1

CODES

I - Y indicates that the taxon is introduced to Queensland and has naturalised.

Q - Indicates the Queensland conservation status of each taxon under the *Nature Conservation Act 1992.* The codes are Presumed Extinct (PE), Endangered (E), Vulnerable (V), Rare (R), Common (C) or Not Protected ( ).

A - Indicates the Australian conservation status of each taxon under the *Environment Protection and Biodiversity Conservation Act 1999.* The values of EPBC are Conservation Dependent (CD), Critically Endangered (CE), Endangered (E), Extinct (EX), Extinct in the Wild (XW) and Vulnerable (V).

Records – The first number indicates the total number of records of the taxon for the record option selected (i.e. All, Confirmed or Specimens).
This number is output as 99999 if it equals or exceeds this value. The second number located after the / indicates the number of specimen records for the taxon.
This number is output as 999 if it equals or exceeds this value.

APPENDIX D

Significant Species Profiles

Appendix D – Significant Species Profiles

THREATENED SPECIES

FLORA
Leucopogon cuspidatus
Medicosma obovata
Ozothamnus eriocephalus

MAMMALS
Blue Whale *(Balaenoptera musculus)*
Humpback whale (*Megaptera novaeangliae*)
Northern Quoll (*Dasyurus hallucatus*)
Proserpine Rock-wallaby (*Petrogale persephone*)
Spectacled Flying Fox (*Pteropus conspicillatus*)
Water Mouse (*Xeromys myoides*)

BIRDS
Southern Giant-petrel (*Macronectes giganteus*)
Red Goshawk (*Erythrotriorchis radiatus*)
Australian Painted Snipe (*Rostratula australis*)
Squatter Pigeon- southern sub-species (*Geophaps scripta scripta*)
Kermadec Petrel (*Pterodroma neglecta neglecta*)

REPTILES
Loggerhead Turtle (*Caretta caretta*)
Green Turtle (*Chelonia mydas*)
Leatherback Turtle (*Dermochelys coriacea*)
Hawksbill Turtle *(Eretmochelys imbricata)*
Pacific Ridley (*Lepidochelys olivacea*)
Flatback Turtle (*Natator depressus*)
Striped Tailed Delma (*Delma labialis*)
Yakka Skink (*Egernia rugosa*)

SHARKS
Whale Shark (*Rhincodon typus*)

MIGRATORY TERRESTRIAL SPECIES

BIRDS
White-Bellied Sea-Eagle (*Haliaeetus leucogaster*)
White-throated Needletail (*Hirundapus caudacutus*)
Barn Swallow (*Hirundo rustica*)
Rainbow Bee-eater (*Merops ornatus*)
Black-faced Monarch (*Monarcha melanopsis*)
Spectacled Monarch (*Monarcha trivirgatus*)
Satin Flycatcher (*Myiagra cyanoleuca*)
Common Sandpiper (*Actitis hypoleucos*)
Great Egret (*Ardea alba*)
Cattle Egret (*Ardea ibis*)
Lesser Sand Plover (*Charadrius mongolus*)
Latham's Snipe (*Gallinago hardwickii*)
Bar-tailed Godwit (*Limosa lapponica*)

Australian Cotton Pygmy-goose (*Nettapus coromandelianus albipennis*)
Eastern Curlew (*Numenis madagascariensis*)
Little Curlew (*Numenius minutus*)
Terek sandpiper (Xenus cinereus)

MIGRATORY MARINE SPECIES

MAMMALS
Bryde's Whale (*Balaenoptera edeni*)
Dugong (*Dugong dugon*)
Irrawaddy dolphin (*Orcaella brevirostris*) / Australian Snubfin Dolphin (*Orcaella heinsohni*)
Indo-Pacific Humpback Dolphin (*Sousa chinensis*)
Killer Whale (*Orcinus orca*)

BIRDS
Little Tern (*Sterna albifrons*)
Bridled Tern (*Sterna anaethetus*)
Black-naped Tern (*Sterna sumatrana*)

REPTILES
Estuarine Crocodile (*Crocodylus porosus*)

Significant Species Profiles

This Appendix provides a summary profile of significant flora and fauna species that may occur in the project area and be affected by the proposed Shute Harbour Marina Resort (SHMR). Significant fauna and flora species considered in this Appendix are species listed under relevant provisions of the *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).* This Appendix contains a summary of relevant details concerning:

- the general ecology of the species including consideration of its critical habitat requirements, feeding and breeding behaviour;
- the distribution and abundance of the species;
- the likelihood of the species utilising areas to be affected by the SHMR project;
- recognised threats to the viability of populations of the species;
- impact mitigation measures proposed that may be of relevance to the species; and
- the nature and significance of potential impacts of the SHMR project upon the viability of local populations of the species.

The species considered in this Appendix were identified based on field observations and a review of the Queensland EPA's Wildlife Online database (the EPA Database) and the Commonwealth Department of the Environment, Water, Heritage and the Arts (DEWHA) EPBC Protected Matters Search Tool (DEWHA Database). The relevant search area for both database searches was based on a 10km search radius from the centre of the site. Based on these sources the SHMR project has the potential to affect:

- 12 threatened terrestrial species;
- 11 threatened marine species;
- 17 migratory terrestrial species; and
- 9 migratory marine species.

The habitat requirements of each species have been examined to assess the likelihood that the species would utilise areas to be affected by the SHMR development. Each species has been allocated a rating of Very High, High, Moderate or Low according to the following criteria:

Very High: species observed in areas of suitable habitat to be directly affected by the proposal.

High: no site observations but both EPA database and DEWHA database records for the species in the locality, with substantial areas of suitable habitat to be directly affected by the proposal.

Moderate: no site observations, but EPA database records for the species in the locality and at least some suitable habitat to be directly affected by the proposal.

Low: no site observations, but either EPA database records or DEWHA records for the species in the locality, with no suitable habitat to be directly affected by the proposal.

(note: In respect of the above categories, the Wildlife Online database is considered to provide a more reliable assessment of the likelihood of a species occurring in SEQ due to the fact that it is based on actual recorded sightings of a species whilst the DEWHA *EPBC Act* online database is not based on actual sighting records.)

Assessments of the potential of the SHMR development to have a significant impact on each species was made with reference to the known ecology of the species, the spatial extent and temporal duration of impacts, the likely efficacy of proposed impact mitigation measures, and the criteria specified in *EPBC Act* Policy Statement 1.1 - Significant Impact Guidelines - Matters of National Environmental Significance (May 2006). In this respect a Significant Impact is likely upon a species if the SHMR development results in:

- a long-term decrease in the size of a population;
- a reduction in the area of occupancy of the species;

- the fragmentation of an existing population into two or more populations;
- adverse affects to habitat critical to the survival of a species;
- disruptions to the breeding cycle of a population;
- decreases in the availability/quality of habitat to the extent that the species is likely to decline; or
- the establishment of invasive species that are harmful to a threatened species in the species´ habitat.

The assessments provided herein also draw from the results of detailed ecological surveys and assessments of the SHMR project that are contained within the following documents:

- *Shute Harbour Marina EIS – Aquatic Ecology Report* dated 6th of March 2007, prepared by frc environmental;
- *Shute Harbour Marina Resort EIS – Terrestrial Ecological Assessment* dated 25th of February 2008, prepared by PLACE Environmental; and
- *Shute Harbour Marina Resort EIS – Marina Mega Fauna Impact Assessment and Management Plan,* Final Report dated 28 July 2008, prepared by Natural Solutions Environmental Consultants Pty Ltd.

THREATENED SPECIES

FLORA

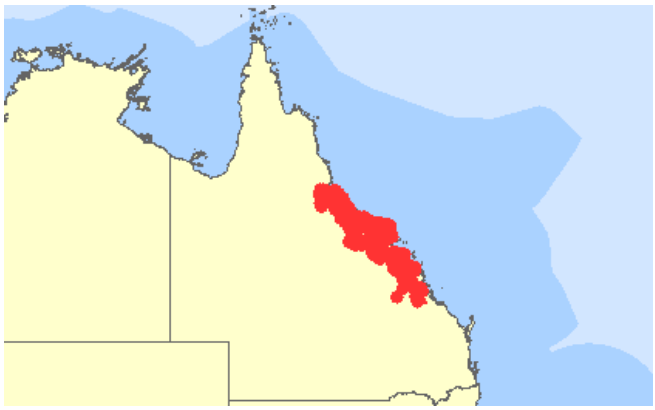
Leucopogon cuspidatus

Conservation Status:

EPBC Act – Vulnerable

Species Profile:

Leucopogon cuspidatus is a shrub found in the central coastal region of Queensland, from approximately Mackay to Port Douglas.



Additional details: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=9739

Critical Habitat Resources:

Deep sand and sandy soil substrates are of importance to this species.

Site Observations/Habitat Values:

Site Observations:		EPA database record:		DEWHA database record:	✓

According to the criteria, there is a low probability of occurrence for this species given its habitat preference. PLACE Environmental (2008) carried out a targeted survey of the SHMR development site for this species and no specimens were detected.

Recognised Threats and Potential Development Impact(s):

Habitat clearance, weed invasion and altered fire regimes.

Proposed Impact Mitigation Measures:

Areas of potential habitat for this species located to the north of Proserpine-Shute Harbour Road will be surrendered to the State for potential incorporation into the adjoining Conway National Park.

Relevant Environmental Management and Monitoring Linkages:
The following SHMR environmental management and monitoring programs, and the specific sections/elements noted, are designed to minimise adverse impacts on this species.

- Construction Environmental Management Plan (Cardno, 11 January 2008) - Section 15: Aquatic and Terrestrial Ecology
- Terrestrial Ecological Assessment (PLACE Environmental, 2008) - Section 4.7 Potential Effects and Management

Likelihood of Significant Impacts:
None. Potential habitat for this species would be preserved and surrendered to the State for potential incorporation into the Conway National Park.

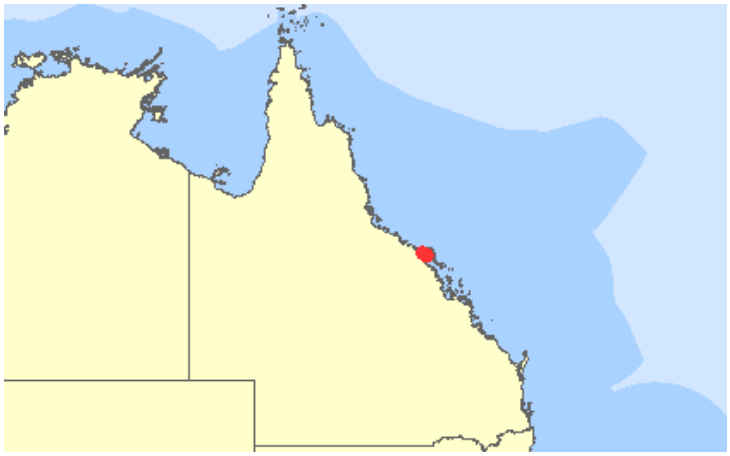
Medicosma obovata

Conservation Status:

NC Act – Vulnerable
EPBC Act – Vulnerable

Species Profile:

This species, belonging to the *Rutaceae* family is found only in a specific area of the Queensland central coast. It is a small tree of dry vine thickets and vine forests.



Additional details: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=17533

Critical Habitat Resources: None known.

Site Observations/Habitat Values:

Site Observations:		EPA database record:		DEWHA database record:	√

PLACE Environmental (2008) carried out a targeted survey of the SHMR development site for this species and no specimens were detected.

Recognised Threats and Potential Development Impact(s):

Habitat clearance, weed invasion and altered fire regimes.

Proposed Impact Mitigation Measures:

Areas of potential habitat for this species located to the north of Proserpine-Shute Harbour Road will be surrendered to the State for potential incorporation into the adjoining Conway National Park.

Relevant Environmental Management and Monitoring Linkages:
The following SHMR environmental management and monitoring programs, and the specific sections/elements noted, are designed to minimise adverse impacts on this species.

- Construction Environmental Management Plan (Cardno, 11 January 2008) - Section 15: Aquatic and Terrestrial Ecology
- Terrestrial Ecological Assessment (PLACE Environmental, 2008) - Section 4.7 Potential Effects and Management

Likelihood of Significant Impacts:
None. Potential habitat for this species would be preserved and surrendered to the State for potential incorporation into the Conway National Park.

Ozothamnus eriocephalus

Conservation Status:

NC Act – Vulnerable
EPBC Act – Vulnerable

Species Profile:

This species is a weakly woody shrub restricted to the Bowen and Mackay regions of the central coast of Queensland, with a range of approximately 180km. *O.eriocephalus* is distributed through a variety of different habitat types including disturbed borders of notophyll vine forest, margins of gallery forest, microphyll vine forest, tall open *Eucalyptus andrewsii – E.resinifera* with an understorey of *Allocasuarina littoralis*, in open eucalypt forest and on rocky ridges with *Eucalyptus spp.* and *Acacia spp*. Scrub. It is also known from the edge of creek banks and in crevices on steep granite slopes, often in high sunlight areas. It is known from moderate (380m) to high (950m) elevations. It generally occurs on sandy or gravelly soils and occasionally on clay loams derived from granites and sandstones.

Additional details:

http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=56133

Critical Habitat Resources:

This species occurs in woodlands and open forests on granite.

Site Observations/Habitat Values:

Site Observations:		EPA database record:		DEWHA database record:	✓

According to the criteria, there is a low probability of occurrence for this species on site given its habitat preferences. PLACE Environmental (2008) carried out a targeted survey of the SHMR development site for this species and no specimens were detected.

Recognised Threats and Potential Development Impact(s):

Habitat clearance, weed invasion and altered fire regimes.

Proposed Impact Mitigation Measures:

Areas of potential habitat for this species located to the north of Proserpine-Shute Harbour Road will be surrendered to the State for potential incorporation into the adjoining Conway National Park.

Relevant Environmental Management and Monitoring Linkages:
The following SHMR environmental management and monitoring programs, and the specific sections/elements noted, are designed to minimise adverse impacts on this species.

- Construction Environmental Management Plan (Cardno, 11 January 2008) - Section 15: Aquatic and Terrestrial Ecology
- Terrestrial Ecological Assessment (PLACE Environmental, 2008) - Section 4.7 Potential Effects and Management

Likelihood of Significant Impacts:
None. Potential habitat for this species would be preserved and surrendered to the State for potential incorporation into the Conway National Park.

MAMMALS

Blue Whale *(Balaenoptera musculus)*

Conservation Status:

EPBC Act – Endangered

Species Profile:
Blue whales are the largest living animals, growing over 30 metres long and weighing up to 180 tonnes. The blue whale species consists of three sub-species, two of which occupy the southern hemisphere and the other, the northern hemisphere. Within the southern hemisphere, the pygmy blue whale (*B. musculus brevicauda*) and the 'true blue' (*B. musculus intermedia*) co–exist. The southern hemisphere whales are thought to occur right around Australia, as well as other southern hemisphere continents, including Antarctica. Research suggests that the species distribution is generally associated with feeding grounds which are located in regions of upwelled water on the continental shelf. The species has high energy requirements which are satisfied by a diet of krill. During summer through to autumn the species feeds almost exclusively in Antarctica where krill productivity is high. Breeding behaviour for this species, within the southern hemisphere, is poorly understood.

Additional details:

http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=36

http://www.environment.gov.au/coasts/publications/cetaceans-action-plan/pubs/whaleplan.pdf

http://www.environment.gov.au/biodiversity/threatened/publications/recovery/balaenoptera-sp/pubs/balaenoptera-sp.pdf

Critical Habitat Resources:

There is limited knowledge relating to the distribution and abundance of the Blue whale and therefore the location of important habitats and resources. However, it is known that all three sub-species of Blue whale rely on the Australian Antarctic waters as aggregation areas, in particular, feeding areas. These areas should be considered important for Blue whale survival as they seasonally support significant aggregations of Blue whales, and the ecosystem processes on which the Blue whale relies.

Site Observations/Habitat Values:

Site Observations:		EPA database record:		DEWHA database record:	✓

According to the criteria, there is a low probability of occurrence for the species at the site given the habitat preferences of this species.

Recognised Threats and Potential Development Impact(s):

Habitat Degradation (Anthropogenic Influence):

- Acoustic pollution (e.g. commercial and recreational vessel noise, seismic survey activity)
- Physical injury and death from ship strike
- Infrastructure that may impact upon habitat availability and/or use (e.g. 0ff-shore marinas, wharves, aquaculture installation, mining or drilling infrastructure)
- Changing water quality and pollution (e.g. runoff from land based agriculture, oil spills, outputs from aquaculture)
- Changes to water flow regimes causing extensive sedimentation or erosion or altered currents in near shore habitat (e.g. dredging and canals)

Proposed Impact Mitigation Measures:
During maintenance dredging, the Contractor shall monitor for marine megafauna, including whales, each half hour, by observation using binoculars. Dredging shall be suspended if any megafauna are observed

within 200m of dredge head. Dredging shall only re-commence when fauna have left the 200m zone (Cardno, CEMP, 11/1/2008).

Also, waste management shall be undertaken as per the Waste Management Plan, to ensure that no visible rubbish is observable within the marine environment during construction works (Cardno, CEMP, 11/1/2008).

Shute Harbour Marina will become a key stake holder in the region and will therefore contribute to the development of a regional approach to managing increasing boating traffic in the Whitsunday area that is being developed by the Department of State Development. A key outcome of this regional approach will be methods to manage the potential for boat strike on a regional basis. Boat strikes on marine vertebrates shall be avoided through speed limits and use of "Vessel Transit Lanes" (Cardno, Marina SBMP, 11/1/2008).

Relevant Environmental Management and Monitoring Linkages:
The following SHMR environmental management and monitoring programs, and the specific sections/elements noted, are designed to minimise adverse impacts on this species.

CONSTRUCTION PHASE

- Construction Environmental Management Plan (Cardno, 11 January 2008)
    - Section 15: Aquatic and Terrestrial Ecology
    - Section 16: Marine Megafauna
    - Section 19: Waste Management
    - Section 22: Traffic (including Navigation)

OPERATIONAL PHASE

- SHMR Site Based Management Plan (Cardno, 10 July 2008)
    - Section 5.4: Water Quality
    - Section 5.6.1.1: Litter Control
    - Section 5.7: Flora and Fauna Management

- Marine Megafauna Impact Assessment and Management Plan (Natural Solutions, 28 July 2008)
    - Section 10: Conclusions and Management Recommendations

Likelihood of Significant Impacts:
None. Blue whales are unlikely to be encountered in the vicinity of the SHMR development.

Humpback whale (*Megaptera novaeangliae*)

Conservation Status:

NC Act – Vulnerable
EPBC Act – Vulnerable

Species Profile:

The Humpback whale is a moderately large baleen whale. This species migrates annually between cooler temperature feeding grounds and warmer temperature breeding grounds. Humpback whales utilising Australian waters currently have tropical calving grounds along the mid and northern parts of the east and west coast of Australia and feeding grounds in the Southern Ocean. Majority of migration north to calving grounds occurs between June to August and the return trip to the southern feeding grounds generally occurs between September to November. The spatial and temporal movement patterns of the species have been well documented. The species feeds almost exclusively on krill, although it has been recorded that, in warmer waters, small fish and plankton are also consumed.

Additional details:

http://www.environment.gov.au/coasts/publications/cetaceans-action-plan/pubs/whaleplan.pdf

http://www.environment.gov.au/biodiversity/threatened/publications/recovery/m-novaeangliae/pubs/m-novaeangliae.pdf

Critical Habitat Resources:

It is not currently possible to define habitat that is critical to the survival of the Humpback whale. The flexibility and adaptability of the species habitat requirements are unknown and it is not clear if all currently utilised areas are critical to the animal's survival or whether the loss of one area could be sustained. Therefore, the areas that are seasonally known to support aggregations of humpbacks (e.g. calving grounds, feeding ground, resting grounds and migration paths) can be considered important (and potentially critical) habitat.

Site Observations/Habitat Values:

Site Observations:		EPA database record:		DEWHA database record:	√

According to the criteria, there is a low probability of occurrence for this species at this site given its habitat preference.

However Natural Solutions (2008) note the following.

- *The Whitsunday Islands and passage have been identified as a key area for breeding and resting grounds for humpback whales (DEH, 2005b).*
- *Humpback Whales may occur in the Whitsunday region during the winter migration to/from southern waters.*
- *Humpback whales would not occur in Shute Bay or adjacent Molle Channel because of the shallow waters.*
- *It is possible they could pass outside the adjacent islands of Repair and Tancred.*
- *It is possible that passing humpback whales may encounter boat traffic that is serviced by the Shute Harbour Marina Development.*

Recognised Threats and Potential Development Impact(s):

Habitat Degradation (Anthropogenic Influence**)**:

- Acoustic pollution (e.g. commercial and recreational vessel noise, seismic survey activity)
- Physical injury and death from ship strike

- Infrastructure that may impact upon habitat availability and/or use (e.g. off-shore marinas, wharves, aquaculture installation, mining or drilling infrastructure)
- Changing water quality and pollution (e.g. runoff from land based agriculture, oil spills, outputs from aquaculture)
- Changes to water flow regimes causing extensive sedimentation or erosion or altered currents in near shore habitat (e.g. dredging and canals)

Proposed Impact Mitigation Measures:

During maintenance dredging, the Contractor shall monitor for marine megafauna, including whales, each half hour, by observation using binoculars. Dredging shall be suspended if any megafauna are observed within 200m of dredge head. Dredging shall only re-commence when fauna have left the 200m zone (Cardno, CEMP, 11/1/2008).

Also, waste management shall be undertaken as per the Waste Management Plan, to ensure that no visible rubbish is observable within the marine environment during construction works (Cardno, CEMP, 11/1/2008).

Where feasible, limit activities such as maintenance dredging to times outside migration period for Humpback whales (i.e. outside July to October).

Shute Harbour Marina will become a key stake holder in the region and will therefore contribute to the development of a regional approach to managing increasing boating traffic in the Whitsunday area that is being developed by the Department of State Development. A key outcome of this regional approach will be methods to manage the potential for boat strike on a regional basis. Boat strikes on marine vertebrates shall be avoided through speed limits and use of "Vessel Transit Lanes" (Cardno, Marina SBMP, 11/1/2008).

Relevant Environmental Management and Monitoring Linkages:

The following SHMR environmental management and monitoring programs, and the specific sections/elements noted, are designed to minimise adverse impacts on this species.

- Construction Environmental Management Plan (Cardno, 11 January 2008)
  - Section 15: Aquatic and Terrestrial Ecology
  - Section 16: Marine Megafauna
  - Section 19: Waste Management
  - Section 22: Traffic (including Navigation)
- SHMR Site Based Management Plan (Cardno, 10 July 2008)
  - Section 5.4: Water Quality
  - Section 5.6.1.1: Litter Control
  - Section 5.7: Flora and Fauna Management
- Marine Megafauna Impact Assessment and Management Plan (Natural Solutions, 28 July 2008) - Section 10: Conclusions and Management Recommendations

Likelihood of Significant Impacts:
Low.

The development of Shute Harbour is not likely to have any long term significant impacts upon this species. The Humpback Whale is not known to occur within Shute Bay, but is known to frequent the Whitsunday islands and passage, which are important resting and breeding grounds for this species.

Potential indirect impacts attributable to boating activity and inappropriate waste management practices are recognised and will be appropriately mitigated through the management regimes proposed.

Northern Quoll (*Dasyurus hallucatus*)

Conservation Status:

NC Act –
EPBC Act – Endangered

Species Profile:

The Northern Quoll is a medium sized, carnivorous marsupial that is found from south-eastern Queensland across to northern Western Australia. It is generally found in rocky, open areas within 50km of the coast, sometimes near human habitation. This species is the smallest and the most tree-based out of the four Quoll species. Its diet consists of small mammals, worms, soft fruit, reptiles, ants, termites, moths and honey. The Northern Quoll is usually solitary and nocturnal and breeds between June and September, making a den in rock crevices, tree hollows or termite mounds. All males die after mating except those living in non-stressful (usually rockier) habitats. Cane toads are thought to be accelerating the rate of decline of the Northern Quoll.

Additional details:
http://www.environment.gov.au/biodiversity/threatened/publications/quolls2004.html#north

http://www.environment.gov.au/biodiversity/threatened/publications/tsd05northern-quoll.html

Critical Habitat Resources:
The species is found in six main locations across a fragmented range extending from the Pilbara of Western Queensland to south eastern Queensland. Because of the species rapid decline it is important to conserve all habitats utilised by the Northern Quoll.

Site Observations/Habitat Values:

Site Observations:		EPA database record:		DEWHA database record:	✓

According to the criteria, there is a high probability of occurrence for the species at this site given its habitat preferences.

Recognised Threats and Potential Development Impact(s):
Loss of habitat through vegetation clearing for development.

Proposed Impact Mitigation Measures:
Most areas of potential habitat for this species located to the north of Proserpine-Shute Harbour Road will be surrendered to the State for potential incorporation into the adjoining Conway National Park.

The potential for impacts on this species may be further minimised by employing a survey for these species immediately prior to the commencement of clearing and construction (PLACE Environmental, 2008). Also, an appropriately experienced "spotter and catcher" should be employed prior to terrestrial vegetation clearing to ensure all fauna present in trees and other vegetation is relocated prior to the vegetation being cleared (Cardno, CEMP, 11/1/2008).

Relevant Environmental Management and Monitoring Linkages:
The following SHMR environmental management and monitoring programs, and the specific sections/elements noted, are designed to minimise adverse impacts on this species.

- Construction Environmental Management Plan (Cardno, 11 January 2008) - Section 15: Aquatic and Terrestrial Ecology
- Terrestrial Ecological Assessment (PLACE Environmental, 2008) - Section 4.7 Potential Effects and Management

Likelihood of Significant Impacts:
None. The Northern Quoll has been recorded in the locality by the EPA. During the survey period, no signs of the species occurrence (tracks, scats, feeding sites) were recorded at the site. However, suitable forage and den habitat for the Northern Quoll occurs along the slopes and ridges of the site, and this species may therefore occur here despite the absence of records during the survey period. Suitable habitat for the species is more extensively represented in the adjacent Conway National Park, and the

location of the proposed development in low-lying areas of the site will result in no significant impacts on Northern Quoll which may occur in the wider locality. (PLACE Environmental, 2008).

Proserpine Rock-wallaby (*Petrogale persephone*)

Conservation Status:

NC Act – Endangered
EPBC Act – Endangered

Species Profile:

This species occurs in Conway National Park, Gloucester Island National Park, Dryander National Park, on Clarke Range near Proserpine, on the northern, eastern and some sections of the western border of the Conway Range and around the town of Airlie Beach. All recorded sightings of the Proserpine Rock-wallaby occur within a 14,000ha area between Mackay and Bowen. Its habitat preference includes rocky outcrops, cliffs and rock piles, with semi-deciduous vine forest. It is believed that up to 40% of this species habitat is found on free-hold and leasehold land.

Additional details:
http://www.environment.gov.au/biodiversity/threatened/publications/recovery/p-rock-wallaby/index.html

Critical Habitat Resources:

The Proserpine rock-wallaby prefers rocky outcrops, rock piles and cliffs within a microphyll/notophyll semi-deciduous dry vine forest. At higher elevation the habitat is rocky outcrops, rock piles and rocky creeks within an acacia open forest. During dry periods, the Proserpine Rock-wallaby will move to the edge of the vine forest to feed on grasses. This species has not been recorded on the mainland in wet tropical rainforest and has a preference for the narrow band of dry vine forest between the wet tropical forest and the open forest.

Site Observations/Habitat Values:

Site Observations:		EPA database record:	✓	DEWHA database record:	✓

According to the criteria, there is a high probability of occurrence for the species in the site locality. Suitable habitat is primarily restricted to vegetated land to the north of Proserpine-Shute Harbour Road.

Recognised Threats and Potential Development Impact(s):

The SHMR development has the potential to impact directly and indirectly upon the locality's Proserpine rock-wallaby population in a number of ways, including:

- clearance of habitat;
- the generation of additional vehicular movements on the existing road network and an associated increase in the potential for road trauma;
- a potential increase in the number of dogs residing in the locality and associated potential for dog attacks on rock-wallabies.
- a potential increase in the number domestic cats in the site locality which may increase the potential for the spread *Toxoplasmosis gondii* which has been known to cause blindness and death in rock-wallabies.
- the potential for the introduction of exotic, and potentially toxic, plants into the site locality which may by browsed by rock wallaby in the drier months.

Proposed Impact Mitigation Measures:
In recognition of the potential for the SHMR development to have adverse impacts upon the local Proserpine rock-wallaby population the following impact mitigation measures are proposed:

- most areas of potential rock-wallaby habitat for this species located to the north of Proserpine-Shute Harbour Road will be surrendered to the State for potential incorporation into the adjoining Conway National Park;

- SHMR will work with the QPWS to monitor the location and frequency of vehicular interactions with rock wallaby along Proserpine-Shute Harbour Road and if required contribute to the implementation of necessary impact mitigation measures, such as reduction in speed limits, wildlife crossing signs and reflective devices, audible rumble strips or introduction of traffic calming devices (raised traffic platforms, series of speed humps) at the approaches to identified crossing points, and/or establishment of guide fences to direct rock-wallabies towards safe crossing points.

- the imposition of controls over the keeping and handling of cats and dogs within the SHMR development site to reduce the potential for interactions to occur with the local rock-wallaby population; and

- the landscaping of the SHMR development with native plant species that are unlikely to be toxic to the local rock-wallaby population and if required the establishment of fencing that will restrict rock-wallaby from entering the SHMR development.

Relevant Environmental Management and Monitoring Linkages:
The following SHMR environmental management and monitoring programs, and the specific sections/elements noted, are designed to minimise adverse impacts on this species.

- Construction Environmental Management Plan (Cardno, 11 January 2008) - Section 15: Aquatic and Terrestrial Ecology
- Terrestrial Ecological Assessment (PLACE Environmental, 2008) - Section 4.7 Potential Effects and Management

Likelihood of Significant Impacts:
Low: Potential impacts upon the local Proserpine rock-wallaby population have been recognised and will be appropriately mitigated through the management regimes proposed. In the presence of these impact mitigation measures and management strategies no significant impacts are anticipated.

Spectacled Flying Fox (*Pteropus conspicillatus*)

Conservation Status:

NC Act –
EPBC Act – Vulnerable

Species Profile:

Pteropus. conspicillatus, like other flying foxes, are highly mobile, crossing habitat boundaries, mountains and rivers. In Australia, this species is found in and around the rainforests of north-east Queensland, with the largest population existing between Townsville and Cooktown. The species feeds mainly on Eucalypt nectar and pollen, as well as native and exotic fruit. The Spectacled flying fox contributes to, and constitutes part of the World Heritage values of the Wet Tropics of Queensland World Heritage area.

Additional details: http://www.tfrc.csiro.au/research/flyingfox/index.html

Critical Habitat Resources:

Although it is unknown what constitutes critical habitat for this species, given the species limited distribution, it is important to protect the habitats which they currently utilise (i.e. rainforests.)

Site Observations/Habitat Values:

Site Observations:		EPA database record:		DEWHA database record:	✓

According to the criteria, there is a low probability of occurrence for this species at this site given its habitat preferences.

Recognised Threats and Potential Development Impact(s):
Possible loss of foraging/roosting sites through vegetation clearance.

Proposed Impact Mitigation Measures:
Most areas of potential habitat for this species located to the north of Proserpine-Shute Harbour Road will be surrendered to the State for potential incorporation into the adjoining Conway National Park.

The potential for impacts on this species may be further minimised by employing a survey for this species immediately prior to the commencement of clearing and construction (PLACE Environmental, 2008). Also, an appropriately experienced "spotter and catcher" should be employed prior to terrestrial vegetation clearing to ensure all fauna present in trees and other vegetation is relocated prior to the vegetation being cleared (Cardno, CEMP, 11/1/2008).

Relevant Environmental Management and Monitoring Linkages:
The following SHMR environmental management and monitoring programs, and the specific sections/elements noted, are designed to minimise adverse impacts on this species.

- Construction Environmental Management Plan (Cardno, 11 January 2008) - Section 15: Aquatic and Terrestrial Ecology
- Terrestrial Ecological Assessment (PLACE Environmental, 2008) - Section 4.7 Potential Effects and Management

Likelihood of Significant Impacts:
Low: Although it is possible that the Spectacled flying fox utilise the site as a forage area, it is highly unlikely that the proposed development would significantly impact on the species.

Water Mouse (*Xeromys myoides*)

Conservation Status:

NC Act – Vulnerable
EPBC Act – Vulnerable

Species Profile:

This species is regarded as particularly elusive and very little is known in regards to the ecology of the species. It is known to live within mangrove and associated saltmarsh communities throughout Australia with known populations ranging from the Northern Territory to south-east Queensland. The species is believed to feed on a variety of molluscs, crustaceans and polyclads located within the tidal areas of mangrove communities. It builds nests at the base of mangrove trees, with Grey Mangrove (*Avicenna marina*) the most common species targeted.

Additional Details:
http://www.epa.qld.gov.au/nature_conservation/wildlife/az_of_animals/water_mouse_false_water_rat/

Critical Habitat Resources:
Coastal mangrove communities and intertidal salt marshes are important (and potentially critical) habitat resources.

Site Observations/Habitat Values:

Site Observations:		EPA database record:		DEWHA database record:	✓

According to the criteria, there is a low probability of occurrence for the species at the site given its habitat requirements. Targeted surveys for the Water mouse carried out by PLACE Environmental (2008) failed to record signs of Water mouse occurrence (nest mounds, feeding areas, tracks and scats) at the site.

Recognised Threats and Potential Development Impact(s):
The Water mouse is mostly threatened by habitat loss, fragmentation and degradation. Habitat degrading processes reduce potential feeding resources and nesting opportunities, promote weed invasion and increase predation by feral animals (foxes, pigs and cats).

Proposed Impact Mitigation Measures:
The potential for impacts on this species may be further minimised by employing a survey for this species immediately prior to the commencement of clearing and construction (PLACE Environmental, 2008). Also, an appropriately experienced "spotter and catcher" should be employed prior to terrestrial vegetation clearing to ensure all fauna present in trees and other vegetation is relocated prior to the vegetation being cleared (Cardno, CEMP, 11/1/2008).

Relevant Environmental Management and Monitoring Linkages:
The following SHMR environmental management and monitoring programs, and the specific sections/elements noted, are designed to minimise adverse impacts on this species.

- Construction Environmental Management Plan (Cardno, 11 January 2008) - Section 15: Aquatic and Terrestrial Ecology
- Terrestrial Ecological Assessment (PLACE Environmental, 2008) - Section 4.7 Potential Effects and Management

Likelihood of Significant Impacts:
Low: Water mouse are not known to occur at the site or in the Shute Bay locality. The site provides limited potential high tide foraging habitat for the Water mouse and the potential low tide forage habitat associated with the mangrove community fringing Shute Bay is limited in extent and of poor value due to the disturbance associated with Proserpine-Shute Harbour Road. As a consequence, it is unlikely that Water mouse occur in the locality and as such the proposed development would not have any significant impact on the species and its habitat.

BIRDS

Southern Giant-petrel (*Macronectes giganteus*)

Conservation Status:

NC Act – Endangered
EPBC Act – Endangered, Migratory

Species Profile:
The Southern Giant-petrel is a migratory bird with a pelagic lifestyle. During summer, this species nests on Antarctic and sub-Antarctic islands. South-eastern Australia is regarded as an important wintering site. Sightings of the species have been recorded in South America, South Africa, Australia and New Zealand. The species feed on penguin and seal carrion and will dive, or surface seize, for fish and cephalopods.

Additional details:
http://www.nationalparks.nsw.gov.au/npws.nsf/Content/Southern+giant+petrel+-+endangered+species+listing;

http://www.environment.gov.au/biodiversity/threatened/publications/recovery/albatross/breeding.html#2.7;

http://www.epa.qld.gov.au/nature_conservation/wildlife/native_animals/southern_giantpetrel/.

Critical Habitat Resources:
Breeds in Antarctic and sub-Antarctic islands
Pelagic lifestyle - feeds over open water and on marine carrion

Site Observations/Habitat Values:

Site Observations:		EPA database record:		DEWHA database record:	√

According to the criteria, there is a low probability of occurrence given the habitat requirements and pelagic lifestyle of this species.

Recognised Threats and Potential Development Impact(s):
None applicable.

Proposed Impact Mitigation Measures:
None applicable.

Relevant Environmental Management and Monitoring Linkages:
None applicable.

Likelihood of Significant Impacts:
None. There is no potential habitat available on this site for the Southern Giant-petrel.

Red Goshawk (*Erythrotriorchis radiatus*)

Conservation Status:

NC Act – Endangered
EPBC Act – Vulnerable

Species Profile:
This species has a distribution that encompasses coastal and sub-coastal areas from the Kimberley region of Western Australia to northern New South Wales. The Red goshawk has a very large home range covering between 50 and 220 square kilometers. Throughout its range it is most frequently observed in tropical to warm temperate forests and woodlands in close proximity to watercourses and wetlands where it feeds primarily on other bird species. It is a sparsely distributed and rarely encountered species and as a consequence little is known of its biology or reasons for its apparent rarity.

Additional details:
http://www.epa.qld.gov.au/publications/p02093aa.pdf/Red_goshawk_emErythrotriorchis_radiatus/em.pdf

http://www.epa.qld.gov.au/nature_conservation/wildlife/threatened_plants_and_animals/endangered/red_goshawk/

Critical Habitat Resources:
Various habitat types including coastal and sub-coastal tall open forest, tropical savannah adjacent to wooded or forested rivers, and rainforest edges are utilised with a preference for a mosaic of vegetation types near to a permanent watercourse.

Site Observations/Habitat Values:

Site Observations:		EPA database record:		DEWHA database record:	✓

According to the criteria, there is a low probability of occurrence for the species at the site given its habitat preference.

Recognised Threats and Potential Development Impact(s):
Loss of habitat and availability of large nesting trees and prey.

Proposed Impact Mitigation Measures:
Most areas of potential habitat for this species located to the north of Proserpine-Shute Harbour Road will be surrendered to the State for potential incorporation into the adjoining Conway National Park.

The potential for impacts on this species may be further minimised by employing a survey for this species immediately prior to the commencement of clearing and construction (PLACE Environmental, 2008). Also, an appropriately experienced “spotter and catcher” should be employed prior to terrestrial vegetation clearing to ensure all fauna present in trees and other vegetation is relocated prior to the vegetation being cleared (Cardno, CEMP, 11/1/2008).

Relevant Environmental Management and Monitoring Linkages:
The following SHMR environmental management and monitoring programs, and the specific sections/elements noted, are designed to minimise adverse impacts on this species.

- Construction Environmental Management Plan (Cardno, 11 January 2008) - Section 15: Aquatic and Terrestrial Ecology
- Terrestrial Ecological Assessment (PLACE Environmental, 2008) - Section 4.7 Potential Effects and Management

Likelihood of Significant Impacts:

Low: Most areas of potential habitat for this species located to the north of Proserpine-Shute Harbour Road will be surrendered to the State for potential incorporation into the adjoining Conway National Park.

Australian Painted Snipe (*Rostratula australis*)

Conservation Status:

NC Act – Rare
EPBC Act – Vulnerable, Migratory

Species Profile:

This species has a scattered distribution across Australia and is usually found in freshwater or brackish, shallow, inland wetland areas. It nests on the ground in tall reed-like vegetation near water and feeds on worms, insects and seeds.

Additional details:
http://www.environment.gov.au/biodiversity/threatened/publications/painted-snipe.html

Critical Habitat Resources:

Although the Australian Painted Snipe can occur across Australia, the areas of most sensitivity to the species are those wetlands where the birds frequently occur and are known to breed.

Site Observations/Habitat Values:

Site Observations:		EPA database record:	✓	DEWHA database record:	✓

According to the criteria, there is a low probability of occurrence for the species at this site given that there are no areas of preferred habitat for this species within or immediately adjacent to the site.

Recognised Threats and Potential Development Impact(s):
None applicable.

Proposed Impact Mitigation Measures:
None applicable.

Relevant Environmental Management and Monitoring Linkages:
None applicable.

Likelihood of Significant Impacts:
None. There is no suitable habitat on the site for the Australian Painted snipe and as such, any significant impact to the species is unlikely.

Squatter Pigeon- southern sub-species (*Geophaps scripta scripta*)

Conservation Status:

NC Act – Vulnerable
EPBC Act – Vulnerable

Species Profile:

This sub-species occupies a variety of habitats including open forests, dominated by eucalypts, grassy woodlands, disturbed habitats and sown grasslands with remnant vegetation present. The bird is similar in appearance to the northern, non threatened sub-species (*Geophaps scripta peninsulae*), except for the coloration of skin surrounding the eye. Both species inhabit grassy plains and woodlands. Although listed as vulnerable, the species remains common in heavily grazed areas north of the Tropic of Capricorn and is commonly observed in habitats close to a water body. The squatter pigeon feeds mainly on the seeds of grasses, legumes and other herbaceous plants.

Additional details:
http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=64440#habitat

http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=64440

Critical Habitat Resources:

The Squatter pigeon has been recorded as requiring a various range of habitat types including woodland, grassland and shrubland, with grassy woodlands and forests being of significant importance.

Site Observations/Habitat Values:

Site Observations:		EPA database record:		DEWHA database record:	✓

According to the criteria, there is a low probability of occurrence for this species at the site given its habitat preferences. Habitat assessment indicates that the site is generally unsuitable for the species as it prefers sandy woodlands near freshwater.

Recognised Threats and Potential Development Impact(s):
None applicable.

Proposed Impact Mitigation Measures:
None applicable.

Relevant Environmental Management and Monitoring Linkages:
None applicable.

Likelihood of Significant Impacts:
None. The Squatter pigeon is uncommon in settled coastal areas of Queensland. This species was not detected during the survey period. Habitat assessment indicates that the site is generally unsuitable for the species as it prefers sandy woodlands near freshwater. It is therefore highly unlikely that the proposed development at the site will have any significant impacts on this species.

Kermadec Petrel (*Pterodroma neglecta neglecta*)

Conservation Status:

NC Act – Vulnerable
EPBC Act – Vulnerable

Species Profile:

This species is found across the South Pacific, feeding on cephalopods and crustaceans in cooler waters off shore. The only known breeding grounds in Australia are Ball's Pyramid and Phillip Island (near Lord Howe Island). It nests within crevices of rocky outcrops usually on the ground, increasing risk of predation, particularly by rodents (e.g. *Rattus rattus*)

Additional details:
http://www.environment.gov.au/biodiversity/threatened/publications/action/birds2000/pubs/kermadec-petrel.pdf

Critical Habitat Resources:

Pelagic lifestyle.
Suitable nesting habitats (rocky outcrops) are critical for the survival of the species.

Site Observations/Habitat Values:

Site Observations:		EPA database record:		DEWHA database record:	✓

According to the criteria, there is low probability of occurrence for this species at the site given its habitat preference and pelagic lifestyle.

Recognised Threats and Potential Development Impact(s):
None applicable.

Proposed Impact Mitigation Measures:
None applicable.

Relevant Environmental Management and Monitoring Linkages:
None applicable.

Likelihood of Significant Impacts:
None. There is no potential habitat available on this site for the Kermadec petrel and no indirect impacts are anticipated.

REPTILES

Loggerhead Turtle (*Caretta caretta*)

Conservation Status:

NC Act – Endangered
EPBC Act – Endangered, Marine, Migratory

Species Profile:

This species has a global distribution throughout tropical, sub-tropical and temperate waters. It occurs in the waters of coral and rocky reefs, seagrass beds and muddy bays throughout eastern, northern and western Australia and has been recorded in the coastal waters of all states.

Additional details:

http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=1763
http://www.environment.gov.au/coasts/publications/turtle-recovery/pubs/marine-turtles.pdf
Marquez, R.M. (1990). FAO Species Catalogue. Vol. 11, Sea Turtles of the World, FAO, Rome.

Critical Habitat Resources:

Hatchling to sub-adult Loggerheads occur in the open ocean foraging on planktonic organisms and larger loggerheads enter the benthic foraging habitat at a larger size than other hard-shelled sea turtles where they can remain residents for extended periods. Adults and large juveniles, greater than (70 cm curved carapace length) occur in waters with both hard and soft substrates including rocky and coral reefs, muddy bays, sandflats, estuaries and seagrass meadows. Loggerheads breed on tropical sandy beaches and feed on a range of benthic invertebrates.

Site Observations/Habitat Values:

Observations:		EPA database record:	✓	DEWHA database record:	✓

According to the criteria, there is a high probability of occurrence at this site given the habitat preference of this species.

Natural Solutions (2008) note the following.

- *Loggerhead turtles are known to utilise Shute Bay and surrounds as foraging and resting grounds (QPWS, pers. comm. Ross Monash, 23 October 2006).*
- *The range of nearby reefs and intertidal habitats provides suitable feeding ground for the Loggerhead turtle.*
- *While Shute Bay provides suitable habitat and food sources for Loggerhead, it is not identified as being of particular significance within the Whitsunday region given the presence of similar or better resources elsewhere..*
- *Shute Bay and adjacent beaches are not known to support turtle nesting.*

Recognised Threats and Potential Development Impact(s):

The recognised threats to marine turtles that have potential to be associated with the proposed marina development are:

- coastal development;
- deteriorating water quality;
- marine debris;
- loss of habitat; and
- boat strike.

Proposed Impact Mitigation Measures:

Shute Harbour Marina will become a key stake holder in the region and will therefore contribute to the development of a regional approach to managing increasing boating traffic in the Whitsunday area that is

being developed by the Department of State Development. A key outcome of this regional approach will be methods to manage the potential for boat strike on a regional basis.

Prior to dredging works, any marine megafauna located within the marina footprint shall be relocated so that no marine megafauna are trapped within the enclosed marina basin. During maintenance dredging, the Contractor shall monitor for marine turtles, dugong, whales or dolphins each half hour, by observation using binoculars. Dredging shall be suspended if turtles, dugongs, whales or dolphins are observed within 200m of dredge head. Dredging shall only re-commence when fauna have left the 200m zone. In order to deter turtles interaction with the dredge apparatus, the Contractor shall ensure that tickler chains are installed and functional at all times.

Waste management shall be undertaken as per the Waste Management Plan in an effort to minimise visible debris within the marine environment during construction works.

Construction lighting within the marina shall be limited to that required for safety only. Lights not required for safety shall be turned off. Lighting on the dredge apparatus shall be shielded (Cardno, CEMP).

The design of building and general marina lighting to service the post construction phase of the SHMRD will minimise the emission of light into adjacent habitats to the extent practicable whilst providing an appropriate level of illumination for safety and amenity purposes.

Relevant Environmental Management and Monitoring Linkages:
The following SHMR environmental management and monitoring programs, and the specific sections/elements noted, are designed to minimise adverse impacts on this species.

- Construction Environmental Management Plan (Cardno, 11 January 2008)
  - Section 15: Aquatic and Terrestrial Ecology
  - Section 16: Marine Megafauna
  - Section 19: Waste Management
  - Section 22: Traffic (including Navigation)

- SHMR Site Based Management Plan (Cardno, 10 July 2008)
  - Section 5.6.1.1: Litter Control
  - Section 5.7: Flora and Fauna Management

- Marine Megafauna Impact Assessment and Management Plan (Natural Solutions, 28 July 2008) - Section 10: Conclusions and Management Recommendations

Likelihood of Significant Impacts:
Low: Whilst Loggerhead turtles are known to utilise available resources within and adjacent to the SHMR site, the project site at Shute Bay is not likely to be of higher significance than other areas within the Whitsunday region and is not known to support turtle nesting.

Potential indirect impacts attributable to boating activity and inappropriate waste management practices are recognised and will be appropriately mitigated through the management regimes proposed.

Green Turtle (*Chelonia mydas*)

Conservation Status:

NC Act – Vulnerable
EPBC Act – Vulnerable, Migratory

Species Profile:

Green Turtles are found in tropical and subtropical waters throughout the world, normally remaining within the northern and southern limits of the 20°C isotherms, but individuals may stray into temperate waters. Green Turtles make long reproductive migrations between foraging grounds and nesting areas. Although migrations recorded from rookeries in the southern GBR have exceeded 2600 km the average migration is approximately 400 km.

Additional details:
http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=1765
http://www.environment.gov.au/coasts/publications/turtle-recovery/pubs/marine-turtles.pdf
Marquez, R.M. (1990). FAO Species Catalogue. Vol. 11, Sea Turtles of the World, FAO, Rome.

Critical Habitat Resources:

Post hatchling and juvenile turtles up to 30 cm curved carapace length are pelagic, drifting on the surface of the water, usually associated with Sargassum drift-lines. At a size between 30 and 40 cm curved carapace length they move to shallow benthic foraging habitat containing seagrass and/ or algae where they remain for several decades. These habitats include coral and rocky reefs, and inshore seagrass beds. Although carnivorous when young, green turtles are primarily herbivorous, with a major diet of seagrass and algae. They also feed on a variety of other items including mangrove, fish eggcases, jellyfish and sponges. In Australia, green turtles nest on beaches in the Gulf of Carpentaria, Rayne Island and coral cays in the Capricorn and Bunker Groups.

Site Observations/Habitat Values:

Observations:	✓	EPA database record:	✓	DEWHA database record:	✓

According to the criteria, there is a very high probability of occurrence at this site given the habitat preference of this species.

Natural Solutions (2008) note the following.

- *Green turtles are known to utilise Shute Bay and the surrounding waters as foraging and resting grounds (QPWS, pers. comm. Ross Monash, 23 October 2006).*
- *Three adult green turtles were observed during a one day reconnaissance survey of the bay for the original EIS, by Connell Wagner (pers.comm. Shannah Brown, ex-Connell Wagner, 11 January 2007).*
- *While sparse in cover, the dominant seagrasses of Shute Bay, Halophila ovalis and Halodule uninervis are the preferred foraging species for Green Turtles. Green turtles also feed on the propagules of the mangrove Avicennia marina, which are likely to be seasonally common in the bay.*
- *While Shute Bay provides suitable habitat and food sources for green turtles, it is not identified as being of particular significance within the Whitsunday region given the presence of similar or better resources elsewhere.*
- *Shute Bay and adjacent beaches are not known to support turtle nesting.*

Recognised Threats and Potential Development Impact(s):

- Same as for previously described marine turtles.

Proposed Impact Mitigation Measures:

- Same as for previously described marine turtles.

Relevant Environmental Management and Monitoring Linkages:

- Same as for previously described marine turtles.

Likelihood of Significant Impacts:
Low: Whilst Green turtles are known to utilise available resources within and adjacent to the SHMR site, the project site at Shute Bay is not likely to be of higher significance than other areas within the Whitsunday region and is not known to support turtle nesting.

Potential indirect impacts attributable to boating activity and inappropriate waste management practices are recognised and will be appropriately mitigated through the management regimes proposed.

Leatherback Turtle (*Dermochelys coriacea*)

Conservation Status:

NC Act –
EPBC Act – Vulnerable, Migratory

Species Profile:

This species has the widest distribution of any marine turtle, occurring from the North Sea and the Gulf of Alaska in the Northern Hemisphere, to Chile and New Zealand in the Southern Hemisphere. Leatherback Turtles are pelagic feeders, found in tropical, subtropical and temperate waters throughout the world and has been recorded feeding in the coastal waters of all Australian States.

Additional details:
http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=1768
http://www.environment.gov.au/coasts/publications/turtle-recovery/pubs/marine-turtles.pdf
Marquez, R.M. (1990). FAO Species Catalogue. Vol. 11, Sea Turtles of the World, FAO, Rome.

Critical Habitat Resources:

This species makes reproductive migrations from foraging areas to nesting beaches, although it is thought that no nesting occurs in Australia.

Leatherbacks utilise pelagic habitat in both the juvenile and adult phases of their life history. Small juveniles seem to disappear for several years but may concentrate around upwellings where food sources are abundant. Large juvenile and adult turtles are found in both pelagic and coastal waters from tropical to temperate and boreal waters. Foraging occurs throughout the water column from the surface layer to depths of over 200 m. Little is known about the diet of post-hatchlings and small juveniles as they seem to disappear for several years after entering the open ocean. The diet of adults is dominated by gelatinous organisms such as jellyfish, salps, squid and siphonophores.

Site Observations/Habitat Values:

Observations:		EPA database record:		DEWHA database record:	√

According to the criteria, there is a low probability of occurrence for this species on the site given its habitat requirements.

Recognised Threats and Potential Development Impact(s):

- Same as for previously described marine turtles.

Proposed Impact Mitigation Measures:

- Same as for previously described marine turtles.

Relevant Environmental Management and Monitoring Linkages:

- Same as for previously described marine turtles.

Likelihood of Significant Impacts:

Negligible: Leatherback turtles are primarily pelagic and are unlikely to occur in the vicinity of the project site at Shute Bay.

Potential indirect impacts attributable to boating activity and inappropriate waste management practices are recognised and will be appropriately mitigated through the management regimes proposed.

Hawksbill Turtle *(Eretmochelys imbricata)*

Conservation Status:

NC Act – Vulnerable
EPBC Act – Vulnerable, Migratory

Species Profile:

Hawksbill turtles are found in tropical, subtropical and temperate waters in all the oceans of the world. In Australia there are two nesting populations in the Great Barrier Reef and Arnhem Land and the NW Shelf. These are genetically distinct from each other and from populations in other countries, indicating little interbreeding between populations. Limited studies have shown that this species migrates up to 2400 km between foraging areas to nesting beaches. These have linked nesting populations of eastern Qld to the Solomon Is, Indonesia, PNG, and Vanuatu.

Additional details:
http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=1766
http://www.environment.gov.au/coasts/publications/turtle-recovery/pubs/marine-turtles.pdf
Marquez, R.M. (1990). FAO Species Catalogue. Vol. 11, Sea Turtles of the World, FAO, Rome.

Critical Habitat Resources:
Post-hatchlings, during their oceanic phase, feed on planktonic plants and animals but little is known about this phase for this species in Australia. Juvenile and adult Hawksbill turtles have been described as sponge specialists but other evidence suggests they are omnivorous feeding on a variety of animals and plants including sponges, hydroids, cephlapods, gastropods, cnidarians, seagrass and algae. In Australia they eat both sponges and algae in high proportions. At between 30 and 40 cm curved carapace length they recruit to benthic foraging grounds where they remain for decades.

In Australia, nesting occurs mainly on the beaches of inshore islands in Arnhem Land and the Gulf of Carpentaria and on tropical beaches in the northern Great Barrier Reef islands.

Site Observations/Habitat Values:

Observations:	✓	EPA database record:		DEWHA database record:	✓

According to the criteria, there is a very high probability of occurrence for this species at the site.

Natural Solutions (2008) also report the following.

- *Hawksbill turtles are likely to utilise the study area and surrounds for foraging and resting (QPWS, pers. comm. Ross Monash, 23 October 2006).*
- *A single individual was observed within Shute Bay during a one day reconnaissance survey of the bay for the original EIS, by Connell Wagner (pers. comm. Shannah Brown, ex-Connell Wagner, 11 January 2007).*
- *The range of nearby reefs and intertidal habitats provides suitable feeding ground for the Hawksbill turtle.*
- *While Shute Bay provides suitable habitat and food sources for Hawksbill turtles, it is not identified as being of particular significance within the Whitsunday region given the abundance of similar or better resources throughout the region.*
- *Shute Bay and adjacent beaches are not known to support turtle nesting.*

Recognised Threats and Potential Development Impact(s):

- Same as for previously described marine turtles.

Proposed Impact Mitigation Measures:

- Same as for previously described marine turtles.

Relevant Environmental Management and Monitoring Linkages:

- Same as for previously described marine turtles.

Likelihood of Significant Impacts:

Low: Whilst Hawksbill turtles are known to utilise available resources within and adjacent to the SHMR site, the project site at Shute Bay is not likely to be of higher significance than other areas within the Whitsunday region and is not known to support turtle nesting.

Potential indirect impacts attributable to boating activity and inappropriate waste management practices are recognised and will be appropriately mitigated through the management regimes proposed.

Pacific Ridley (*Lepidochelys olivacea*)

Conservation Status:

NC Act –
EPBC Act – Endangered, Migratory

Species Profile:

The Pacific Ridley or Olive Ridley is the smallest of the Australian sea turtles and the most abundant. This species is found in tropical and subtropical waters throughout the world, with large nesting aggregations in the eastern Pacific and in India.

Reproductive migrations have not been recorded for this species in Australia because no ongoing tagging program exists. However, studies in the eastern Pacific and Atlantic Ocean show long distance reproductive migratory behaviour similar to other sea turtle species. Journeys of up to 1900 km have been recorded in the Atlantic Ocean.

Additional details:
http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=1767
http://www.environment.gov.au/coasts/publications/turtle-recovery/pubs/marine-turtles.pdf
Marquez, R.M. (1990). FAO Species Catalogue. Vol. 11, Sea Turtles of the World, FAO, Rome.

Critical Habitat Resources:

Post-hatchlings and small juvenile turtles occur in the surface waters of the open ocean but little is known about their diet during this stage. Large juveniles and adults of this species have been recorded in both benthic and pelagic foraging habitats. Foraging habitat can range from depths of several metres to over 100 m. However, most individuals captured by trawlers in the east coast otter trawl fishery in Qld were in depths of between 11 to 40 m. Trawling data from the east coast of Qld indicate that benthic foraging habitat supports turtles between 20 and 80 cm curved carapace length. The most comprehensive feeding study in Australia documented mostly gastropod and bivalve molluscs from the stomachs of 36 adult Olive Ridley turtles. Crabs, shrimp, tunicates, jellyfish, salps and algae have been found in their diet in studies outside Australia.

In Australia, nesting occurs mainly on the beaches of inshore islands in Arnhem Land and the Gulf of Carpentaria.

Site Observations/Habitat Values:

Observations:		EPA database record:	✓	DEWHA database record:	✓

According to the criteria, there is a low probability of occurrence for this species on the site given its habitat requirements.

Recognised Threats and Potential Development Impact(s):

- Same as for previously described marine turtles.

Proposed Impact Mitigation Measures:

- Same as for previously described marine turtles.

Relevant Environmental Management and Monitoring Linkages:

- Same as for previously described marine turtles.

Likelihood of Significant Impacts:

Low: Olive Ridley Turtles may occur in the Shute Harbour region, including the project site, as the shoreline provides suitable habitat, being soft bottomed, shallow protected waters. The project site at Shute Bay is not likely to be of higher significance than other areas within the Whitsunday region and is not known to support turtle nesting.

Potential indirect impacts attributable to boating activity and inappropriate waste management practices are recognised and will be appropriately mitigated through the management regimes proposed.

Flatback Turtle (*Natator depressus*)

Conservation Status:

NC Act – Vulnerable
EPBC Act – Vulnerable

Species Profile:

Although this species is migratory, it has the smallest migration range of any sea turtle species. It nests and breeds only in Australia between November and January. It nests on tropical beaches and off-shore islands in Western Australia, Northern Territory, Gulf of Carpentaria and down the Queensland coast to Mon Repos. The species does occur in open seas, however, it prefers inshore, shallow, soft bottomed sea beds where it feeds on soft bodied organisms such as sea cucumbers, jellyfish and soft corals.

Additional details:

http://www.environment.gov.au/biodiversity/threatened/publications/pubs/tsd05flatback-turtle.pdf

Critical Habitat Resources:

The restricted range indicates that this species is vulnerable to habitat loss, especially breeding sites. Inshore, shallow, soft-bottomed sea beds are important habitat for the species.

Site Observations/Habitat Values:

Site Observations:		EPA database record:		DEWHA database record:	✓

Natural Solutions (2008) report that:

- Flatback turtles *utilise the Shute Harbour area and surrounds as feeding and resting grounds (QPWS, pers. comm. Ross Monash, 23 October 2006).*
- *While Shute Bay provides suitable habitat and food sources, similar habitat and resources are widely distributed throughout the Whitsunday region;*
- *Flatback Turtles are considered unlikely to be highly dependant on the project area.*
- *Shute Bay and adjacent beaches are not known to support turtle nesting.*

Recognised Threats and Potential Development Impact(s):

- Same as for previously described marine turtles.

Proposed Impact Mitigation Measures:

- Same as for previously described marine turtles.

Relevant Environmental Management and Monitoring Linkages:

- Same as for previously described marine turtles.

Likelihood of Significant Impacts:

Low: Whilst Flatback turtles utilise the Shute Harbour area and surrounds as feeding and resting grounds, the immediate locality of the SHMR development site is not considered to be an important habitat area for the species.

Potential indirect impacts attributable to boating activity and inappropriate waste management practices are recognised and will be appropriately mitigated through the management regimes proposed.

Striped Tailed Delma (*Delma labialis*)

Conservation Status:

NC Act – Vulnerable
EPBC Act – Vulnerable

Species Profile:

The Striped tailed delma is endemic to Queensland with majority of its range confined to the Queensland Brigalow Belt region. Sightings of the species have been recorded around the Townsville coastal area and south to Keswick Island, off Mackay, as well as Magnetic, South Mole and Shaw Islands. This species inhabits both mainland and island environments. On the mainland, it is found in open forests and woodlands with a grassy understorey while on islands it is found in wet sclerophyll habitats. It has a diurnal nature, feeding on a range of arthropod species. The species seeks refuge under leaf litter, logs and other woody debris.

Additional details:
http://www.epa.qld.gov.au/nature_conservation/wildlife/az_of_animals/stripedtailed_delma/

Critical Habitat Resources:

Open forest and woodland with leaf litter and other woody debris.

Site Observations/Habitat Values:

Site Observations:		EPA database record:		DEWHA database record:	✓

According to the criteria, there is a low probability of occurrence for this species on the site given its habitat requirements.

Recognised Threats and Potential Development Impact(s):
Loss of habitat

Proposed Impact Mitigation Measures:
Most areas of potential habitat for this species located to the north of Proserpine-Shute Harbour Road will be surrendered to the State for potential incorporation into the adjoining Conway National Park.

An appropriately experienced "spotter and catcher" should be employed prior to terrestrial vegetation clearing to ensure all fauna present in trees and other vegetation is relocated prior to the vegetation being cleared (Cardno, CEMP, 11/1/2008).

Re-landscaping of the development will use species endemic to the area and in accordance with landscape design plans (refer to the CEMP).

Relevant Environmental Management and Monitoring Linkages:
The following SHMR environmental management and monitoring programs, and the specific sections/elements noted, are designed to minimise adverse impacts on this species.

- Construction Environmental Management Plan (Cardno, 11 January 2008) - Section 15: Aquatic and Terrestrial Ecology
- Terrestrial Ecological Assessment (PLACE Environmental, 2008) - Section 4.7 Potential Effects and Management

Likelihood of Significant Impacts:
Low. Potentially suitable habitat is better represented in the adjacent Conway National Park. It is therefore unlikely that the proposed development will have a significant impact on the species.

Yakka Skink (*Egernia rugosa*)

Conservation Status:

NC Act –
EPBC Act – Vulnerable

Species Profile:

This pale fawn coloured reptile is found from the St. George area in the south of Queensland to Cape York. Within this range it inhabits both coastal areas and sub-humid to semi-arid regions in the eastern Queensland interior. This species generally occupies open, dry sclerophyll forests or woodlands, taking refuge in dense, ground vegetation, beneath rocks, log hollows and cavities formed in the soil from the roots of fallen trees.

Additional details:
http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=1420

Critical Habitat Resources:
Dense ground vegetation within open, dry sclerophyll.

Site Observations/Habitat Values:

Observations:		EPA database record:		DEWHA database record:	✓

According to the criteria, there is a low probability of occurrence for this species on the site given its habitat requirements.

Recognised Threats and Potential Development Impact(s):
Habitat loss.

Proposed Impact Mitigation Measures:
Most areas of potential habitat for this species located to the north of Proserpine-Shute Harbour Road will be surrendered to the State for potential incorporation into the adjoining Conway National Park.

The potential for impacts on this species may be further minimised by employing a survey for this species immediately prior to the commencement of clearing and construction (PLACE Environmental, 2008). Also, an appropriately experienced "spotter and catcher" should be employed prior to terrestrial vegetation clearing to ensure all fauna present in trees and other vegetation is relocated prior to the vegetation being cleared (Cardno, CEMP, 11/1/2008).

Relevant Environmental Management and Monitoring Linkages:
The following SHMR environmental management and monitoring programs, and the specific sections/elements noted, are designed to minimise adverse impacts on this species.

- Construction Environmental Management Plan (Cardno, 11 January 2008) - Section 15: Aquatic and Terrestrial Ecology
- Terrestrial Ecological Assessment (PLACE Environmental, 2008) - Section 4.7 Potential Effects and Management

Likelihood of Significant Impacts:
Low. No signs of occurrence of the Yakka skink were detected in any areas of the site during the survey period and most areas of potential habitat for this species located to the north of Proserpine-Shute Harbour Road will be surrendered to the State for potential incorporation into the adjoining Conway National Park.

SHARKS

Whale Shark (*Rhincodon typus*)

Conservation Status:

NC Act –
EPBC Act – Vulnerable, Migratory

Species Profile:

Whale Sharks are distributed broadly throughout the warm temperate and tropical waters usually within the latitudes 30°N and 35°S and are considered highly migratory. This species is closely related to bottom dwelling sharks such as the Wobbegong and is one of only three filter feeding shark species. Their diet consists of krill, jellyfish and zooplankton which are sieved through specialised gill rakers. Whale sharks have internal fertilisation and produce live young.

Additional details:
http://www.environment.gov.au/coasts/species/sharks/whaleshark/index.html

Critical Habitat Resources:

Whale Sharks make seasonal migrations and within Australia critical habitat for this species lies on the west coast in Ningaloo Reef, Christmas Island and the Coral Sea. The sharks regularly appear at locations where seasonal food 'pulses' are known to occur, such as at Ningaloo Reef around March/April each year in association with mass coral spawning events.

Site Observations/Habitat Values:

Observations:		EPA database record:		DEWHA database record:	✓

According to the criteria, there is low probability of occurrence for this species on the site given its habitat requirements.

Recognised Threats and Potential Development Impact(s):
None applicable.

Proposed Impact Mitigation Measures:
None applicable.

Relevant Environmental Management and Monitoring Linkages:
None applicable.

Likelihood of Significant Impacts:
None.

MIGRATORY TERRESTRIAL SPECIES

BIRDS

White-Bellied Sea-Eagle (*Haliaeetus leucogaster*)

Conservation Status:

EPBC Act – Migratory

Species Profile:

The White-bellied Sea-eagle is the second largest raptor found in Australia, it has white on the head, rump and underparts and dark grey on the back and wings. In flight the black flight feathers on the wings are easily seen when the bird is viewed from below. The large, hooked bill is grey with a darker tip, and the eye is dark brown. They form permanent pairs that inhabit territories throughout the year in coastal and near coastal areas of Australia. Aquatic animals form the primary source of food for this species diet, including sea snakes, fish and turtles and occasionally birds and mammals.

Additional Details:

Critical Habitat Resources:
Large Rivers, fresh and saline lakes, coastal seas. Large eucalypts as nest sites.

Site Observations/Habitat Values:

Site Observations:		EPA database record:		DEWHA database record:	✓

According to the criteria, there is a high probability of occurrence for this species on the site given its habitat requirements. However no nesting sites were observed within or adjacent to the site.

Recognised Threats and Potential Development Impact(s):
The SHMR development would not impact directly or indirectly upon any existing nesting site's for the White-bellied sea-eagle. The terrestrial vegetation that is located within the northern sector of the site and adjacent land is also considered unlikely to be used as a nesting area by White-bellied sea-eagles due to:

- the regular disturbance associated with vehicular traffic on Proserpine-Shute Harbour Road; and
- the availability of suitable nesting site's in areas more remote from human activity.

Proposed Impact Mitigation Measures:

Most areas of potential rooting habitat for this species located to the north of Proserpine-Shute Harbour Road will be surrendered to the State for potential incorporation into the adjoining Conway National Park.

Relevant Environmental Management and Monitoring Linkages:
The following SHMR environmental management and monitoring programs, and the specific sections/elements noted, are designed to minimise adverse impacts on this species.

- Construction Environmental Management Plan (Cardno, 11 January 2008)
    - Section 15: Aquatic and Terrestrial Ecology
    - Section 19: Waste Management

- SHMR Site Based Management Plan (Cardno, 10 July 2008)
    - Section 5.6.1.1: Litter Control
    - Section 5.7: Flora and Fauna Management

Likelihood of Significant Impacts:
Low: Whilst White-bellied sea-eagle inhabit the locality no existing nesting sites would be affected by the proposal and the majority of potential roosting sites would be retained. Potential indirect impacts upon

forage habitat in the locality attributable to inappropriate waste management practices are recognised and will be appropriately mitigated through the management regimes proposed.

White-throated Needletail (*Hirundapus caudacutus*)

Conservation Status:

NC Act -
EPBC Act – Migratory

Species Profile:

The White-throated Needletail is predominantly grey-brown, glossed with green and the long curved wings have white markings. The tail is short and square, with the protruding feather shafts giving a spiky appearance. This species is predominantly a fly over species occurring across a range of habitats in eastern Australia; however they may roost in trees intermittently. Flying insects, such as termites, ants, beetles and flies are the primary resources for the diets of these birds.

Critical Habitat Resources:
Aerial across variety of habitats.

Site Observations/Habitat Values:

Site Observations:		EPA database record:		DEWHA database record:	✓

According to the criteria, there is a moderate probability of occurrence for this species on the site given its habitat requirements.

Recognised Threats and Potential Development Impact(s):
The SHMR development would not have any discernible direct or indirect impact upon this species.

Proposed Impact Mitigation Measures:
None applicable.

Relevant Environmental Management and Monitoring Linkages:
None applicable.

Likelihood of Significant Impacts:
None. The White-throated needletail is unlikely to be impacted by any development on this site.

Barn Swallow (*Hirundo rustica*)

Conservation Status:

NC Act –
EPBC Act – Migratory

Species Profile:
This species is a summer migrant to Australia where it is common along the coast of Queensland and northern New South Wales, as well as along the north west coast of Australia, from Darwin to Broome. It constructs a mud nest on the walls of buildings, caves or cliffs.

Additional Details:

Morecombe, M. [2004] Field Guide to Australian Birds, Steve Parish Publishing Pty Ltd

Critical Habitat Resources:
This species is fairly adaptable to dynamic environments. However, increasing urbanization is reducing potential habitat for this species.

Site Observations/Habitat Values:

Site Observations:		EPA database record:		DEWHA database record:	✓

According to the criteria, there is a low probability of occurrence for this species on the site given its habitat requirements.

Recognised Threats and Potential Development Impact(s):
The SHMR development would not have any discernible direct or indirect impact upon this species.

Proposed Impact Mitigation Measures:
None applicable.

Relevant Environmental Management and Monitoring Linkages:
None applicable.

Likelihood of Significant Impacts:
None.

Rainbow Bee-eater (*Merops ornatus*)

Conservation Status:

NC Act –
EPBC Act – Migratory

Species Profile:

The Rainbow Bee-eater is found throughout mainland Australia, as well as eastern Indonesia, New Guinea and, rarely, the Solomon Islands. In Australia it is widespread, except in desert areas. This species is a brilliantly coloured bird, with a long slim curved bill and a long tail with distinctive tail-streamers. The upperparts are green, with the flight feathers coppery and black tipped. The under wings are bright orange, with a black edge and the head is often a cap of yellow. The Rainbow Bee-eater is most often found in open forests, woodlands and shrublands, and cleared areas, usually near water. Rainbow Bee-eaters eat insects, mainly catching bees and wasps, as well as dragonflies, beetles, butterflies and moths.

Critical Habitat Resources:

Temperate to tropical woodland, savannah, forest edges, farmland.

Site Observations/Habitat Values:

Site Observations:		EPA database record:		DEWHA database record:	✓

According to the criteria, there is a low probability for this species on the site given its habitat requirements.

Recognised Threats and Potential Development Impact(s):

- Habitat loss.
- Predation by feral animals.
- Anthropological impacts on nesting areas.

Proposed Impact Mitigation Measures:
Most areas of potential habitat for this species located to the north of Proserpine-Shute Harbour Road will be surrendered to the State for potential incorporation into the adjoining Conway National Park.

The potential for impacts on this species may be further minimised by employing a survey for this species immediately prior to the commencement of clearing and construction (PLACE Environmental, 2008). Also, an appropriately experienced “spotter and catcher” should be employed prior to terrestrial vegetation clearing to ensure all fauna present in trees and other vegetation is relocated prior to the vegetation being cleared (Cardno, CEMP, 11/1/2008).

Relevant Environmental Management and Monitoring Linkages:
The following SHMR environmental management and monitoring programs, and the specific sections/elements noted, are designed to minimise adverse impacts on this species.

- Construction Environmental Management Plan (Cardno, 11 January 2008) - Section 15: Aquatic and Terrestrial Ecology
- Terrestrial Ecological Assessment (PLACE Environmental, 2008) - Section 4.7 Potential Effects and Management

Likelihood of Significant Impacts:

Low: Most areas of potential habitat for this species located to the north of Proserpine-Shute Harbour Road will be surrendered to the State for potential incorporation into the adjoining Conway National Park.

Black-faced Monarch (*Monarcha melanopsis*)

Conservation Status:

NC Act –
EPBC Act – Migratory

Species Profile:

The Black-faced Monarch is found along the coast of eastern Australia, becoming less common further south. It has a distinctive black face that does not extend across the eyes, grey upperparts, wings and upper breast, contrasting with a rufous belly. This species is found in rainforests, eucalypt woodlands, coastal scrub and damp gullies. It may be found in more open woodland when migrating. The Black-faced Monarch forages for insects among foliage, or catches flying insects on the wing.

Critical Habitat Resources:

Rainforest, Wet Eucalypt Forest and Mangroves along coastal regions.

Site Observations/Habitat Values:

Site Observations:		EPA database record:	✓	DEWHA database record:	√

According to the criteria, there is a high probability of occurrence for this species on the site given its habitat requirements.

Recognised Threats and Potential Development Impact(s):

- Habitat loss.
- Predation by feral animals.
- Anthropological impacts on nesting areas.

Proposed Impact Mitigation Measures:
Most areas of potential habitat for this species located to the north of Proserpine-Shute Harbour Road will be surrendered to the State for potential incorporation into the adjoining Conway National Park.

Additional areas of mangrove foraging habitat will also be created along the western edge of the proposed development to offset the loss of existing areas of mangrove habitat.

The potential for impacts on this species may be further minimised by employing a survey for this species immediately prior to the commencement of clearing and construction (PLACE Environmental, 2008). Also, an appropriately experienced "spotter and catcher" should be employed prior to terrestrial vegetation clearing to ensure all fauna present in trees and other vegetation is relocated prior to the vegetation being cleared (Cardno, CEMP, 11/1/2008).

Relevant Environmental Management and Monitoring Linkages:
The following SHMR environmental management and monitoring programs, and the specific sections/elements noted, are designed to minimise adverse impacts on this species.

- Construction Environmental Management Plan (Cardno, 11 January 2008) - Section 15: Aquatic and Terrestrial Ecology
- Terrestrial Ecological Assessment (PLACE Environmental, 2008) - Section 4.7 Potential Effects and Management

Likelihood of Significant Impacts:

Low: Most areas of potential habitat for this species located to the north of Proserpine-Shute Harbour Road will be surrendered to the State for potential incorporation into the adjoining Conway National Park.

Spectacled Monarch (*Monarcha trivirgatus*)

Conservation Status:

NC Act –
EPBC Act – Migratory

Species Profile:
The Spectacled Monarch is found in coastal north-eastern and eastern Australia, from Cape York, Queensland to Port Stephens, New South Wales It is a small flycatcher that is blue-grey above, with a black face mask that extends across both eyes, rufous breast, white underparts and a black tail. The Spectacled Monarch prefers thick understorey in rainforests, wet gullies and waterside vegetation, as well as mangroves where it feeds on insects, foraging mostly below the canopy in foliage and on tree trunks or vines.

Critical Habitat Resources:
Wet Forests and Mangroves.

Site Observations/Habitat Values:

Site Observations:		EPA database record:	✓	DEWHA database record:	✓

According to the criteria, there is a high probability of occurrence for this species on the site given its habitat requirements.

Recognised Threats and Potential Development Impact(s):

- Habitat loss.
- Predation by feral animals.
- Anthropological impacts on nesting areas.

Proposed Impact Mitigation Measures:
Most areas of potential habitat for this species located to the north of Proserpine-Shute Harbour Road will be surrendered to the State for potential incorporation into the adjoining Conway National Park.

Additional areas of mangrove foraging habitat will also be created along the western edge of the proposed development to offset the loss of existing areas of mangrove habitat.

The potential for impacts on this species may be further minimised by employing a survey for this species immediately prior to the commencement of clearing and construction (PLACE Environmental, 2008). Also, an appropriately experienced “spotter and catcher” should be employed prior to terrestrial vegetation clearing to ensure all fauna present in trees and other vegetation is relocated prior to the vegetation being cleared (Cardno, CEMP, 11/1/2008).

Relevant Environmental Management and Monitoring Linkages:
The following SHMR environmental management and monitoring programs, and the specific sections/elements noted, are designed to minimise adverse impacts on this species.

- Construction Environmental Management Plan (Cardno, 11 January 2008) - Section 15: Aquatic and Terrestrial Ecology
- Terrestrial Ecological Assessment (PLACE Environmental, 2008) - Section 4.7 Potential Effects and Management

Likelihood of Significant Impacts:

Low: Most areas of potential habitat for this species located to the north of Proserpine-Shute Harbour Road will be surrendered to the State for potential incorporation into the adjoining Conway National Park.

Satin Flycatcher (*Myiagra cyanoleuca*)

Conservation Status:

NC Act –
EPBC Act – Migratory

Species Profile:
The Satin flycatcher is found along the east coast of Australia from far northern Queensland to Tasmania, including south-eastern South Australia. It is a small blue-black and white bird with a small crest. The Satin flycatcher is found in tall forests, preferring wetter habitats such as heavily forested gullies, but not rainforests. The Satin flycatcher takes insects on the wing, foraging actively from perches in the mid to upper canopy

Critical Habitat Resources:
Heavily forested gullies near watercourses.

Site Observations/Habitat Values:

Site Observations:		EPA database record:	✓	DEWHA database record:	✓

According to the criteria, there is a low probability of occurrence for this species on the site given its habitat requirements.

Recognised Threats and Potential Development Impact(s):

- Habitat loss.
- Predation by feral animals.
- Anthropological impacts on nesting areas.

Proposed Impact Mitigation Measures:
Most areas of potential habitat for this species located to the north of Proserpine-Shute Harbour Road will be surrendered to the State for potential incorporation into the adjoining Conway National Park.

The potential for impacts on this species may be further minimised by employing a survey for this species immediately prior to the commencement of clearing and construction (PLACE Environmental, 2008). Also, an appropriately experienced "spotter and catcher" should be employed prior to terrestrial vegetation clearing to ensure all fauna present in trees and other vegetation is relocated prior to the vegetation being cleared (Cardno, CEMP, 11/1/2008).

Relevant Environmental Management and Monitoring Linkages:
The following SHMR environmental management and monitoring programs, and the specific sections/elements noted, are designed to minimise adverse impacts on this species.

- Construction Environmental Management Plan (Cardno, 11 January 2008) - Section 15: Aquatic and Terrestrial Ecology
- Terrestrial Ecological Assessment (PLACE Environmental, 2008) - Section 4.7 Potential Effects and Management

Likelihood of Significant Impacts:

Low: Most areas of potential habitat for this species located to the north of Proserpine-Shute Harbour Road will be surrendered to the State for potential incorporation into the adjoining Conway National Park.

Common Sandpiper (*Actitis hypoleucos*)

Conservation Status:

NC Act - Common
EPBC Act – Migratory

Species Profile:

The Common Sandpiper is a small sandpiper with a rather long body, short greyish-olive to a yellowish-brown legs, plumage is grey-brown above and white below, and the bill is dark grey with yellow at the base. The Common Sandpiper breeds in Europe and Asia and is an annual visitor to northern and western Australia where it is usually found in coastal or inland wetlands, both saline or fresh, on muddy edges or rocky shores. The Common Sandpiper hunts by day, eating small molluscs, aquatic and terrestrial insects. It is a very active bird and will follow its prey over rocks and has also been known to swim under water.

Critical Habitat Resources:

Fresh and saline wetlands.

Site Observations/Habitat Values:

Site Observations:		EPA database record:		DEWHA database record:	✓

According to the criteria, there is moderate probability of occurrence for this species on the site given its habitat requirements.

Recognised Threats and Potential Development Impact(s):
The SHMR development will result in the loss of some areas of potential forage habitat associated with the inter-tidal flats of Shute Bay. The extent of this habitat loss is considered to be minor relative to the extent of available habitat of this type in the locality.

Proposed Impact Mitigation Measures:

Habitat modification shall not occur outside the surveyed bounds of the project area.

Relevant Environmental Management and Monitoring Linkages:
The following SHMR environmental management and monitoring programs, and the specific sections/elements noted, are designed to minimise adverse impacts on this species.

- Construction Environmental Management Plan (Cardno, 11 January 2008) - Section 15: Aquatic and Terrestrial Ecology
- Terrestrial Ecological Assessment (PLACE Environmental, 2008) - Section 4.7 Potential Effects and Management

Likelihood of Significant Impacts:
Low: The localised reduction in the extent of potential inter-tidal forage habitat for this species will not be likely to have a significant impact on any local population.

Great Egret (*Ardea alba*)

Conservation Status:

NC Act –
EPBC Act – Migratory

Species Profile:
Great Egrets occur throughout most of the world. They are common throughout Australia, with the exception of the arid areas. The bird's overall plumage is white, and, for most of the year, when not breeding, the bill and facial skin are yellow which turn to black and green when breeding. The preferred habitats include shallow water, but also occur in a variety of wetter habitats including damp grasslands, estuaries, waterways, creeks and rivers. The species will feed on molluscs, amphibians, aquatic insects, small reptiles, crustaceans and occasionally other small animals, but fish are the primary resource in its diet.

Critical Habitat Resources:
Floodwaters, rivers, shallows of wetlands, intertidal mudflats

Site Observations/Habitat Values:

Site Observations:		EPA database record:	✓	DEWHA database record:	✓

According to the criteria, there is a moderate probability of occurrence for this species on the site given its habitat requirements.

Recognised Threats and Potential Development Impact(s):
The SHMR development will result in the loss of some areas of potential forage habitat associated with the inter-tidal flats of Shute Bay. The extent of this habitat loss is considered to be minor relative to the extent of available habitat of this type in the locality.

No known roosting or nesting sites would be directly or indirectly affected

Proposed Impact Mitigation Measures:
Habitat modification shall not occur outside the surveyed bounds of the project area.

Relevant Environmental Management and Monitoring Linkages:
The following SHMR environmental management and monitoring programs, and the specific sections/elements noted, are designed to minimise adverse impacts on this species.

- Construction Environmental Management Plan (Cardno, 11 January 2008) - Section 15: Aquatic and Terrestrial Ecology
- Terrestrial Ecological Assessment (PLACE Environmental, 2008) - Section 4.7 Potential Effects and Management

Likelihood of Significant Impacts:
Low: The localised reduction in the extent of potential inter-tidal forage habitat for this species will not be likely to have a significant impact on any local population.

Cattle Egret (*Ardea ibis*)

Conservation Status:

NC Act –
EPBC Act – Migratory

Species Profile:

This species is widespread throughout the world, including Australia. Most numerous in the north and east, but recorded in all states. The Cattle Egret is usually seen in small groups on grazing land, stalking through the grass for large insects. It frequently perches on fence posts or the backs of grazing animals.

Critical Habitat Resources:

Pasture among stock, occasionally shallow wetlands.

Site Observations/Habitat Values:

Site Observations:		EPA database record:		DEWHA database record:	√

According to the criteria, there is a low probability of occurrence for this species on the site given its habitat requirements.

Recognised Threats and Potential Development Impact(s):

The SHMR development will not affect any areas of preferred habitat for this species.

Proposed Impact Mitigation Measures:
None applicable.

Relevant Environmental Management and Monitoring Linkages:
None applicable.

Likelihood of Significant Impacts:
None. The proposed development would significantly impact on this species.

Lesser Sand Plover (*Charadrius mongolus*)

Conservation Status:

NC Act – Common
EPBC Act – Migratory

Species Profile:

The Lesser sand plover is distinguishable from the Greater sand plover by it's smaller body with a more upright stance, more compact appearance and dark grey, and rather greenish legs. This species breeds in central and northeastern Asia migrating further south for the winter. In Australia, this species is found around the entire coast but is most common in the Gulf of Carpentaria and along the east coast of Queensland and northern New South Wales. Lesser sand plovers are highly gregarious, frequently seen in flocks exceeding 100 individuals or in scattered groups on wet ground at low tide, usually away from the waters edge. The primary diet consists of crustaceans, insects, molluscs and marine worms.

Critical Habitat Resources:

Large intertidal mud flats or sand flats, sandy beaches, spits and rocky shores.

Site Observations/Habitat Values:

Site Observations:		EPA database record:		DEWHA database record:	✓

According to the criteria, there is moderate probability of occurrence for this species on the site given its habitat requirements.

Recognised Threats and Potential Development Impact(s):
The SHMR development will result in the loss of some areas of potential forage habitat associated with the inter-tidal flats of Shute Bay. The extent of this habitat loss is considered to be minor relative to the extent of available habitat of this type in the locality.

Proposed Impact Mitigation Measures:

Habitat modification shall not occur outside the surveyed bounds of the project area.

Relevant Environmental Management and Monitoring Linkages:
The following SHMR environmental management and monitoring programs, and the specific sections/elements noted, are designed to minimise adverse impacts on this species.

- Construction Environmental Management Plan (Cardno, 11 January 2008) - Section 15: Aquatic and Terrestrial Ecology
- Terrestrial Ecological Assessment (PLACE Environmental, 2008) - Section 4.7 Potential Effects and Management

Likelihood of Significant Impacts:
Low: The localised reduction in the extent of potential inter-tidal forage habitat for this species will not be likely to have a significant impact on any local population.

Latham's Snipe (*Gallinago hardwickii*)

Conservation Status:

NC Act –
EPBC Act – Migratory

Species Profile:

Latham's Snipe is a non-breeding migrant to the south east of Australia including Tasmania. Latham's Snipe is the largest snipe in Australia, with brown plumage. The bill is long and straight, the wings short and pointed and the tail long. Latham's Snipe are seen in small groups or singly in freshwater wetlands on or near the coast, generally among dense cover. They are found in any vegetation around wetlands, in sedges, grasses, lignum, reeds and rushes and also in saltmarsh and creek edges on migration where their primary diet consists of seeds and other plant material (mainly from species in families such as *Cyperaceae, Poaceae, Juncaceae, Polygonaceae, Ranunculaceae and Fabaceae*), and on invertebrates including insects, earthworms and spiders and occasionally molluscs, isopods and centipedes.

Critical Habitat Resources:
Wet grassland, open wooded wetlands supporting Cyperaceae, Poaceae, Juncaceae, Polygonaceae, Ranunculaceae and Fabaceae species.

Site Observations/Habitat Values:

Site Observations:		EPA database record:		DEWHA database record:	√

According to the criteria, there is a low probability of occurrence for this species on the site given its habitat requirements.

Recognised Threats and Potential Development Impact(s):
The SHMR development will result in the loss of some areas of potential forage habitat associated with the inter-tidal flats of Shute Bay. This form of wetland habitat is not favoured by the Latham's Snipe and the extent of this habitat loss is considered to be minor relative to the extent of available habitat of this type in the locality.

Proposed Impact Mitigation Measures:

Habitat modification shall not occur outside the surveyed bounds of the project area.

Relevant Environmental Management and Monitoring Linkages:
The following SHMR environmental management and monitoring programs, and the specific sections/elements noted, are designed to minimise adverse impacts on this species.

- Construction Environmental Management Plan (Cardno, 11 January 2008) - Section 15: Aquatic and Terrestrial Ecology
- Terrestrial Ecological Assessment (PLACE Environmental, 2008) - Section 4.7 Potential Effects and Management

Likelihood of Significant Impacts:
Low: The localised reduction in the extent of potential and not preferred inter-tidal forage habitat for this species will not be likely to have a significant impact on any local population.

Bar-tailed Godwit (*Limosa lapponica*)

Conservation Status:

NC Act - Common
EPBC Act – Migratory

Species Profile:

Bar-tailed Godwits arrive in Australia each year in August from breeding grounds in the northern hemisphere particularly north-east Siberia and north-west Alaska. The birds migrate to Indonesia, Papua New Guinea and Australia. They are quite large waders ranging in size from 38-46cm and generally are mottled brown above and lighter and more uniform buff below. It has dull white under wings, and a long, slightly upturned bill. Bar-tailed Godwits inhabit tidal mudflats, beaches and mangroves. They are common in coastal areas around Australia. Bar-tailed Godwits feed on molluscs, worms and aquatic insects.

Critical Habitat Resources:

Tidal mudflats, beaches and Mangroves.

Site Observations/Habitat Values:

Site Observations:		EPA database record:		DEWHA database record:	✓

According to the criteria, there is moderate to low probability of occurrence for this species on the site given its habitat requirements.

Recognised Threats and Potential Development Impact(s):
The SHMR development will result in the loss of some areas of potential forage habitat associated with the inter-tidal flats of Shute Bay. The extent of this habitat loss is considered to be minor relative to the extent of available habitat of this type in the locality.

Proposed Impact Mitigation Measures:

Habitat modification shall not occur outside the surveyed bounds of the project area.

Relevant Environmental Management and Monitoring Linkages:
The following SHMR environmental management and monitoring programs, and the specific sections/elements noted, are designed to minimise adverse impacts on this species.

- Construction Environmental Management Plan (Cardno, 11 January 2008) - Section 15: Aquatic and Terrestrial Ecology
- Terrestrial Ecological Assessment (PLACE Environmental, 2008) - Section 4.7 Potential Effects and Management

Likelihood of Significant Impacts:
Low: The localised reduction in the extent of potential inter-tidal forage habitat for this species will not be likely to have a significant impact on any local population.

Australian Cotton Pygmy-goose (*Nettapus coromandelianus albipennis*)

Conservation Status:

NC Act -
EPBC Act – Migratory

Species Profiles:
This species congregates in flocks of up to 350 individuals, on freshwater lakes, swamps and other large water impoundments. The distribution of the species encompasses Dawson, Fitzroy, Burdekin and Barron River catchments. They are also locally common in the Brisbane area but are now vagrant outside Queensland. They spend the dry season at a permanent water body and during breeding season will lay up to nine eggs in tree hollows located close to, or in the water. Their diet consists of Pondweed seeds, *Potamogeton*, and other aquatic vegetation.

Additional details:

http://www.environment.gov.au/biodiversity/threatened/publications/action/birds2000/pubs/cotton-pygmy-goose.pdf

Critical Habitat Resources:
Permanent water bodies containing pondweed seeds, *Potamogeton*.

Site Observations/Habitat Values:

Site Observations:		EPA database record:		DEWHA database record:	✓

According to the criteria, there is a low probability of occurrence for this species on the site given its habitat requirements.

Recognised Threats and Potential Development Impact(s):
No areas of suitable habitat for this species will be affected by the SHMR development.

Proposed Impact Mitigation Measures:
None applicable.

Relevant Environmental Management and Monitoring Linkages:
None applicable.

Likelihood of Significant Impacts:
None.

Eastern Curlew (*Numenis madagascariensis*)

Conservation Status:

NC Act – Rare
EPBC Act – Migratory

Species Profile:

This species is a non-breeding summer resident of the Australian coastline, where it is usually encountered around estuaries, salt-marshes, mudflats and sandy beaches. Two important habitat types exist for this species, one within the tidal zone and the other above it. Majority of birds leave Australia over the period of April to May and return to their northern hemisphere breeding grounds.

Additional details:
http://www.epa.qld.gov.au/nature_conservation/wildlife/az_of_animals/eastern_curlew/

Critical Habitat Resources:

Estuaries, mudflats, mangroves, and sandy beaches are all important habitats for this species. Intertidal zones and zones above the tidal areas are both important habitat types for the Eastern Curlew.

Site Observations/Habitat Values:

Site Observations:		EPA database record:		DEWHA database record:	✓

According to the criteria, there is a moderate probability of occurrence of the Eastern Curlew at this site given the species habitat requirements.

Recognised Threats and Potential Development Impact(s):
The SHMR development will result in the loss of some areas of potential forage habitat associated with the inter-tidal flats of Shute Bay. The extent of this habitat loss is considered to be minor relative to the extent of available habitat of this type in the locality.

Proposed Impact Mitigation Measures:

Habitat modification shall not occur outside the surveyed bounds of the project area.

Relevant Environmental Management and Monitoring Linkages:
The following SHMR environmental management and monitoring programs, and the specific sections/elements noted, are designed to minimise adverse impacts on this species.

- Construction Environmental Management Plan (Cardno, 11 January 2008) - Section 15: Aquatic and Terrestrial Ecology
- Terrestrial Ecological Assessment (PLACE Environmental, 2008) - Section 4.7 Potential Effects and Management

Likelihood of Significant Impacts:
Low: The localised reduction in the extent of potential inter-tidal forage habitat for this species will not be likely to have a significant impact on any local population.

Little Curlew (*Numenius minutus*)

Conservation Status:

NC Act -
EPBC Act – Migratory

Species Profiles:

This species is generally seen to occupy extensive swamps and billabongs of the coastal black-soil plains of northern Australia, down the east coast of Queensland and, scatterings into northern New South Wales. They congregate at these sites in flocks of hundreds or thousands. The habitat consists of dry grasslands of clay, river floodplain, woodland with grassy understorey and occasionally artificial environments such as airports, pastures and sports fields. They are often seen foraging in groups probing the ground busily in recently burnt grasslands or open woodland.

Additional Details:
Morecombe, M. [2004] Field Guide to Australian Birds, Steve Parish Publishing Pty Ltd

Critical Habitat Resources:

Site Observations/Habitat Values:

Site Observations:		EPA database record:		DEWHA database record:	✓

According to the criteria, there is a low probability of occurrence for this species on the site given its habitat requirements.

Recognised Threats and Potential Development Impact(s):
No areas of suitable habitat for this species will be affected by the SHMR development.

Proposed Impact Mitigation Measures:
None applicable.

Relevant Environmental Management and Monitoring Linkages:
None applicable.

Likelihood of Significant Impacts:
None.

Terek sandpiper (Xenus cinereus)

Conservation Status:

NC Act – Common
EPBC Act – Migratory

Species Profile:

The Terek Sandpiper is a small sandpiper with short orange legs. The long slightly up-turned bill is orange at the base. The body is brownish-grey above and on the sides of the breast, and white below. This species is more common on the northern and eastern Australian coasts than in the south, but large populations are considered uncommon. Terek Sandpipers are found on the coast in mangrove swamps, tidal mudflats and the seashore. The primary diets consists of crustaceans and insects, adding seeds, molluscs and spiders in their breeding ground

Critical Habitat Resources:

Tidal mudflats, estuaries, shores and reefs of islands, coastal swamps.

Site Observations/Habitat Values:

Site Observations:		EPA database record:		DEWHA database record:	✓

According to the criteria, there is moderate probability of occurrence for this species on the site given its habitat requirements.

Recognised Threats and Potential Development Impact(s):
The SHMR development will result in the loss of some areas of potential forage habitat associated with the inter-tidal flats of Shute Bay. The extent of this habitat loss is considered to be minor relative to the extent of available habitat of this type in the locality.

Proposed Impact Mitigation Measures:

Habitat modification shall not occur outside the surveyed bounds of the project area.

Relevant Environmental Management and Monitoring Linkages:
The following SHMR environmental management and monitoring programs, and the specific sections/elements noted, are designed to minimise adverse impacts on this species.

- Construction Environmental Management Plan (Cardno, 11 January 2008) - Section 15: Aquatic and Terrestrial Ecology
- Terrestrial Ecological Assessment (PLACE Environmental, 2008) - Section 4.7 Potential Effects and Management

Likelihood of Significant Impacts:
Low: The localised reduction in the extent of potential inter-tidal forage habitat for this species will not be likely to have a significant impact on any local population.
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MIGRATORY MARINE SPECIES

MAMMALS

Bryde's Whale (*Balaenoptera edeni*)

Conservation Status:

NC Act –
EPBC Act – Migratory

Species Profile:

This species is a member of the baleen whale family. This species is generally a solitary animal unless there is a concentrated food source, and then many individuals will gather. Bryde's whales are most common in tropical and sub-tropical waters, rarely venturing outside 40º north or south.

Additional details:
http://www.acsonline.org/factpack/SeiBrydesWhales.htm

Critical Habitat Resources:

Habitat which is utilised by the species for foraging, resting or breeding grounds is considered to be important habitat.

Site Observations/Habitat Values:

Site Observations:		EPA database record:		DEWHA database record:	✓

According to the criteria, there is a low probability of occurrence for this species in the site locality given its habitat requirements.

Recognised Threats and Potential Development Impact(s):
Not Applicable.

Proposed Impact Mitigation Measures:
Not Applicable.

Relevant Environmental Management and Monitoring Linkages:
None Applicable.

Likelihood of Significant Impacts:
None.

Dugong (*Dugong dugon*)

Conservation Status:

NC Act – Vulnerable
EPBC Act – Migratory

Species Profile:

Dugongs are a predominantly tropical species and rarely travel into temperate waters. Dugongs are highly migratory, and may travel between Australia and other neighbouring countries. Populations exist throughout northern Australia between Moreton Bay and Shark Bay in the west. The population in Moreton Bay is geographically isolated from the closest population, Hervey Bay,

Additional details:
http://www.environment.gov.au/coasts/species/dugongs/index.html
Lanyon, J.M. (2003). Distribution and abundance of dugongs in Moreton Bay, Queensland, Australia. Wildlife Research, 30 (397-409).

Critical Habitat Resources:

Dugongs live and breed in the shallow coastal waters where seagrass (their food) is found and where there is protection from large waves and storms. They surface only to breathe. Moreton Bay supports a large population of Dugongs of between about 500 and 1200 individuals. However, recent surveys found that only a small proportion of the population (i.e. generally a few individuals only) occurs in the area of Moreton Bay adjacent to the Caboolture River. The majority of the population occurs in other parts of Moreton Bay where seagrass is prevalent.

Site Observations/Habitat Values:

Observations:		EPA database record:	✓	DEWHA database record:	✓

According to the criteria, there is a high probability of occurrence for this species on the site given its habitat requirements.

Natural Solutions (2008) report that "the project site at Shute Bay does not appear to provide regionally significant habitat or feeding resource to dugong". While the site contains preferred species of seagrass that dugong feed on, their cover is sparse (<0.5 %) within Shute Bay, with only small patches up to 5% cover, and Feeding trails have not been observed by previous marine ecological studies within the bay (FRC Environmental 1999, 2008). While significant habitat and food sources may not be present in Shute Bay, the project site may have indirect significance given its location between the Repulse Bay and Edgecumbe Bay Dugong Protection Areas. Dugong travelling between the two areas may be subject to boat strike or boating disturbance from general boating traffic within the increasingly popular Whitsunday region.

Recognised Threats and Potential Development Impact(s):
Threats to Dugongs with potential to be associated with the proposed development are:

- increases in vessel traffic speeds or volumes in dugong habitat resulting in increased risk of boat strike;
- increase in debris load from the marina resulting in Dugong becoming injured or killed through entanglement or ingestion;
- the release of environmental contaminants have the potential to cause harm to dugongs (e.g. oil from oil spills and the subsequent use of dispersants, heavy metals and pesticides);
- acoustic pollution associated with increased boat traffic; and
- loss and degradation of seagrass beds that are dugong feeding habitats.

Proposed Impact Mitigation Measures:
Shute Harbour Marina will become a key stake holder in the region and will therefore contribute to the development of a regional approach to managing increasing boating traffic in the Whitsunday area that is

being developed by the Department of State Development. A key outcome of this regional approach will be methods to manage the potential for boat strike on a regional basis.

Waste at marina will be managed through provision of bins and litter collection program. Litter from stormwater will be minimised through use of gross pollutant traps.

Relevant Environmental Management and Monitoring Linkages:

The following SHMR environmental management and monitoring programs, and the specific sections/elements noted, are designed to minimise adverse impacts on this species.

- Construction Environmental Management Plan (Cardno, 11 January 2008):
    - Section 16: Marine Megafauna
    - Section 19: Waste Management
    - Section 22: Traffic (including Navigation)

- SHMR Site Based Management Plan (Cardno, 10 July 2008):
    - Section 5.6.1.1: Litter Control
    - Section 5.7: Flora and Fauna Management

- Marine Megafauna Impact Assessment and Management Plan (Natural Solutions, 28 July 2008):
    - Section 10: Conclusions and Management Recommendations

Likelihood of Significant Impacts:

The project site at Shute Bay is highly unlikely to provide significant habitat or feeding resource to Dugong. While the site contains preferred species of seagrass that Dugong feed on, their cover is sparse (<0.5 %) within Shute Bay, with only small patches up to 5% cover. Dugongs have not been observed within Shute Bay and there have been no observations of feeding trails.

However, the project site may have indirect significance given its location between the Repulse Bay and Edgecumbe Bay Dugong Protection Areas. Dugong travelling between the two areas may be subject to boat strike or boating disturbance from general boating traffic within the increasingly popular Whitsunday region.

Potential indirect impacts attributable to boating activity are recognised and will be appropriately mitigated through the management regimes proposed.

Irrawaddy dolphin (*Orcaella brevirostris*) / Australian Snubfin Dolphin (*Orcaella heinsohni*)

Conservation Status:

NC Act – Rare
EPBC Act – Migratory

Species Profile:

This dolphin was assumed to be the Irrawaddy dolphin (*Orcaella brevirostris*) until 2005 when genetic tests proved that it was a separate species now described as the Australian Snubfin Dolphin (*Orcaella heinsohni*). It is currently only known from Australia and its status in Queensland waters is very poorly known. It has been recorded across northern Australia (Qld, NT, WA) where it inhabits riverine, estuarine and coastal waters, but the distribution has been poorly documented. The Australian snubfin dolphin is a generalist feeder, taking food from the bottom and the water column. Its diet consists primarily of fish, but includes cephalopods (such as squid and octopus) and crustaceans (such as prawns and crabs). The Australian snubfin dolphin is usually seen in groups of 5 to 6 animals, but groups of up to 15 animals have been observed. When undisturbed they typically make short dives, surfacing quietly at 30-60 sec intervals. They can submerge for up to 12 minutes when disturbed. Tail-slapping and partial jumps have been observed, but they do not leap clear of the water or bow-ride.

Critical Habitat Resources:

Very little is known about Australian Snubfin Dolphin but they are thought to have a similar habitat requirements to Humpback Indo-Pacific Dolphins (i.e. the species primary habitat is the shallow (<20 m) turbid waters near the mangrove and mudbank areas of estuaries, including the tidal reaches of rivers). This species typically feeds on fish, cephalopods and crustaceans.

Site Observations/Habitat Values:

Observations:		EPA database record:		DEWHA database record:	√

According to the criteria, there is a low probability of occurrence for this species on the site given its habitat requirements.

Recognised Threats and Potential Development Impact(s):
Threats to this species with a potential to be associated with the proposed development are:

- boat strike; and
- increase in debris load, particularly plastics that can result in injury through entanglement or ingestion.

Proposed Impact Mitigation Measures:
Shute Harbour Marina will become a key stake holder in the region and will therefore contribute to the development of a regional approach to managing increasing boating traffic in the Whitsunday area that is being developed by the Department of State Development. A key outcome of this regional approach will be methods to manage the potential for boat strike on a regional basis.

Waste at marina will be managed through provision of bins and litter collection program. Litter from stormwater will be minimised through use of gross pollutant traps.

Relevant Environmental Management and Monitoring Linkages:
The following SHMR environmental management and monitoring programs, and the specific sections/elements noted, are designed to minimise adverse impacts on this species.

- Construction Environmental Management Plan (Cardno, 11 January 2008)
  - Section 16: Marine Megafauna
  - Section 19: Waste Management
  - Section 22: Traffic (including Navigation)

- SHMR Site Based Management Plan (Cardno, 10 July 2008)
  - Section 5.6.1.1: Litter Control

- Section 5.7: Flora and Fauna Management

- Marine Megafauna Impact Assessment and Management Plan (Natural Solutions, 28 July 2008)
  - Section 10: Conclusions and Management Recommendations

Likelihood of Significant Impacts:

Low: This species has not been recorded in the vicinity of Shute Bay however available habitat in the area is considered to be suitable for the Australian snubfin dolphin. Potential indirect impacts attributable to water pollution and boating activity are recognised and will be appropriately mitigated through the management regimes proposed.

Indo-Pacific Humpback Dolphin (*Sousa chinensis*)

Conservation Status:

NC Act – Rare
EPBC Act – Migratory

Species Profile:

This species has a range extending from southern Africa along the continental coastlines of the Indian Ocean, through southeast Asia to the South China Sea. In Australia, they have been recorded in tropical and subtropical coastal waters as far south as Coral Bay on the west coast and the Tweed River in the east. Large populations of Indo-Pacific humpback dolphins are thought to occur in Moreton Bay, with the species being more prevalent in the western and southern parts of the bay where there preferred habitat is more common.

Additional details:
Hale, P., Long, S. and Tapsall, A. (1998). Distribution and Conservation of Dephinids in Moreton Bay. *In*: Tibbetts, I.R., Hall, N.J., and Dennison, W.C. (eds). Moreton Bay and Catchment. School of Marine Science, University of Queensland, Brisbane, pp. 477-486.

Critical Habitat Resources:

The species primary habitat has been described as the shallow (<20 m) turbid waters near the mangrove and mudbank areas of estuaries, including the tidal reaches of rivers. Indo-Pacific humpback dolphins feed on pelagic shoaling fish including mullet (*Mugil* spp.) and Tailor (*Pomatomus salatrix*) and cephalopods.

Site Observations/Habitat Values:

Observations:		EPA database record:	√	DEWHA database record:	√

According to the criteria, there is a low probability of occurrence for this species on site given its habitat preference.

Recognised Threats and Potential Development Impact(s):
Possible threats to Indo-Pacific humpback dolphins that have potential to be associated with the proposed marina development are:

- increase in debris load from marina results in turtles, cetaceans or Dugong becoming injured or killed through entanglement or ingestion; and
- boat strike.

Proposed Impact Mitigation Measures:
Shute Harbour Marina will become a key stake holder in the region and will therefore contribute to the development of a regional approach to managing increasing boating traffic in the Whitsunday area that is being developed by the Department of State Development. A key outcome of this regional approach will be methods to manage the potential for boat strike on a regional basis.

Waste at marina will be managed through provision of bins and litter collection program. Litter from stormwater will be minimised through use of gross pollutant traps.

Relevant Environmental Management and Monitoring Linkages:
The following SHMR environmental management and monitoring programs, and the specific sections/elements noted, are designed to minimise adverse impacts on this species.

- Construction Environmental Management Plan (Cardno, 11 January 2008)
  - Section 16: Marine Megafauna
  - Section 19: Waste Management
  - Section 22: Traffic (including Navigation)

- SHMR Site Based Management Plan (Cardno, 10 July 2008)
  - Section 5.6.1.1: Litter Control
  - Section 5.7: Flora and Fauna Management

- Marine Megafauna Impact Assessment and Management Plan (Natural Solutions, 28 July 2008)
    - Section 10: Conclusions and Management Recommendations (including Table 10.1 – Design Phase Management Recommendations)

Likelihood of Significant Impacts:
Low: Indo-Pacific humpback dolphins have not been recorded in the vicinity of Shute Bay. Given that they range up to 20 km from river mouths and the nearest river (Proserpine River) is about 40 km away, their presence in Shute Bay is not likely. Potential indirect impacts attributable to water pollution and boating activity are recognised and will be appropriately mitigated through the management regimes proposed.

Killer Whale (*Orcinus orca*)

Conservation Status:

NC Act –
EPBC Act – Migratory

Species Profile:

This species is the biggest member of the dolphin family and is found in all oceans and seas across the world. They inhabit a wide range of different habitat types, from coastal to deep sea regions across both tropic and polar environments. Generally associating in highly social, territorial family groups, they cooperatively hunt vertebrate prey such as whales, seals and penguins. The family group size depends on the dominance of the female line, with all members contributing to group activities, including care of the young and hunting.

Additional details:
http://www.amonline.net.au/factsheets/killer_whale.htm

Critical Habitat Resources:
Habitat which is utilised by the species for foraging, resting or breeding grounds is considered to be important habitat.

Site Observations/Habitat Values:

Site Observations:		EPA database record:		DEWHA database record:	✓

According to the criteria, there is a low probability of occurrence for this species on site given its habitat preference for cold, deep waters and associated with seal colonies.

Recognised Threats and Potential Development Impact(s):
None applicable.

Proposed Impact Mitigation Measures:
None applicable.

Relevant Environmental Management and Monitoring Linkages:
None applicable.

Likelihood of Significant Impacts:
None:

BIRDS

Little Tern (*Sterna albifrons*)

Conservation Status:

NC Act – Endangered
EPBC Act – Migratory

Species Profile:

This species migrates from Asia to Australia each year and establishes breeding colonies along the east Australian coastline, from Cape York to Tasmania. Throughout this range it is primarily encountered in coastal environments. The species breeds on undisturbed, unvegetated sites near estuaries and adjacent fresh water lakes, on estuarine and continental islands and on coral cays. Nesting occurs between the high tide mark and shore vegetation.

Additional details:
http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10769

Critical Habitat Resources:

Coastal estuaries are considered to be important breeding site habitats for this species.

Site Observations/Habitat Values:

Site Observations:		EPA database record:	✓	DEWHA database record:	✓

According to the criteria, there is a moderate probability of occurrence for this species in the site locality given its habitat requirements.

Recognised Threats and Potential Development Impact(s):

- Anthropological activities affecting flood levels or hydrological regimes resulting in the flooding of nesting sites.
- Disturbance to coastal nesting and feeding as a result of increased traffic near roosting sites.

Proposed Impact Mitigation Measures:

- Vegetation clearing, including disturbance to coastal wetlands (including seagrass communities) shall not occur outside the surveyed bounds of the project area.

Relevant Environmental Management and Monitoring Linkages:
The following SHMR environmental management and monitoring programs, and the specific sections/elements noted, are designed to minimise adverse impacts on this species.

- Construction Environmental Management Plan (Cardno, 2008) - Section 15: Aquatic and Terrestrial Ecology.

Likelihood of Significant Impacts:
Low: It is unlikely that the proposed development would have any significant adverse impacts on this species.

Bridled Tern (*Sterna anaethetus*)

Conservation Status:

NC Act – Common
EPBC Act – Migratory

Species Profile:

The Bridled Tern is superficially similar to the Sooty Tern, but distinctive in many details. In distance, lacks the strongly contrasting, crisp black and white pattern of the Sooty and instead has brown upper parts with dulled, faintly grey-tinted whites of underbody and under-wing coverts. The Bridled Tern is usually seen foraging on open seas but does frequent breeding islands, reefs and occasionally inshore waters.

Critical Habitat Resources:

Open seas, islands and reefs.

Site Observations/Habitat Values:

Site Observations:		EPA database record:		DEWHA database record:	✓

According to the criteria, there is low probability of occurrence for this species on the site given its habitat requirements.

Recognised Threats and Potential Development Impact(s):
Not Applicable.

Proposed Impact Mitigation Measures:
Not Applicable.

Relevant Environmental Management and Monitoring Linkages:
The following SHMR environmental management and monitoring programs, and the specific sections/elements noted, are designed to minimise adverse impacts on this species.

- Construction Environmental Management Plan (Cardno, 11 January 2008) - Section 15: Aquatic and Terrestrial Ecology

Likelihood of Significant Impacts:
Negligible.

Black-naped Tern (*Sterna sumatrana*)

Conservation Status:

NC Act –
EPBC Act – Migratory

Species Profile:

This species occupies offshore coral cays and reef islets on the Great Barrier Reef. Occasionally it is also seen to inhabit harbours, estuaries and continental coasts. Their diet consists of small fish which are snatched from below the surface of both barrier reefs and the open ocean beyond the outer reef. The species is generally seen resting on sandspits, beaches and rocks at the waters edge.

Additional details:
Morecombe, M. [2004] Field Guide to Australian Birds, Steve Parish Publishing Pty Ltd

Critical Habitat Resources:
Barrier reef systems

Site Observations/Habitat Values:

Site Observations:		EPA database record:	✓	DEWHA database record:	

According to the criteria, there is a moderate probability of occurrence for this species on the site given its habitat requirements.

Recognised Threats and Potential Development Impact(s):
Not Applicable.

Proposed Impact Mitigation Measures:
Not Applicable.

Relevant Environmental Management and Monitoring Linkages:
The following SHMR environmental management and monitoring programs, and the specific sections/elements noted, are designed to minimise adverse impacts on this species.

- Construction Environmental Management Plan (Cardno, 11 January 2008) - Section 15: Aquatic and Terrestrial Ecology

Likelihood of Significant Impacts:
Negligible.

REPTILES

Estuarine Crocodile (*Crocodylus porosus*)

Conservation Status:

NC Act – Vulnerable
EPBC Act – Migratory

Species Profile:

C.porosus is found from India to northern Australia and across to Vanuatu and the Solomon Islands. Within Queensland, this species range extends from Gladstone to Cape York Peninsula, and throughout the Gulf of Carpentaria. Generally this species inhabits tidal river systems but it may also occur along beaches, offshore islands, freshwater swamps and lagoons, up to hundreds of kilometers inland. Different food sources are utilized depending on the size of the crocodile. Hatchling crocodiles are able to catch prey, such as small insects and crabs, almost immediately after hatching. Intermediate and large crocodile's diet consists of anything they can overpower, such as, turtle, wallaby, cattle and goanna. The species breeding season starts around October where the males become highly mobile in search of a mate and the female constructs a mound out of vegetation and soil no more than 10m from a permanent watercourse. Once mated, the female lays her eggs in the mound and guards the nest from predators. The female crocodile often assists the hatchlings to break out of the egg and, once hatched, the young form a tight group where the mother continues to protect them from predators for up to 5 weeks.

Additional details:

http://www.epa.qld.gov.au/nature_conservation/wildlife/native_animals/living_with_wildlife/crocodiles/estuarine_crocodile/

Critical Habitat Resources:

Vegetated habitats along permanent watercourses.

Site Observations/Habitat Values:

Site Observations:		EPA database record:		DEWHA database record:	✓

According to the criteria, there is a high probability of occurrence for this species in the site locality given its habitat preference.

Recognised Threats and Potential Development Impact(s):
Habitat destruction is considered a major threat to crocodile survival in Queensland, particularly urban development of and adjacent to swamps, mangroves and rivers which results in the displacement of crocodiles or conflict between humans and crocodiles.

Estuarine crocodiles are also susceptible to boat strike and injury through entanglement or ingestion of

Proposed Impact Mitigation Measures:
Shute Harbour Marina will become a key stake holder in the region and will therefore contribute to the development of a regional approach to managing increasing boating traffic in the Whitsunday area that is being developed by the Department of State Development. A key outcome of this regional approach will be methods to manage the potential for boat strike on a regional basis.

Waste at marina will be managed through provision of bins and litter collection program. Litter from stormwater will be minimised through use of gross pollutant traps. Patrons of the SHMR will be provided with appropriate information concerning the potential presence of estuarine crocodiles in the locality and the associated requirements to manage waste to avoid attracting crocodiles to the marina and to avoid injury/harm occurring to crocodiles due to the ingestion of/entanglement by waste material.

Relevant Environmental Management and Monitoring Linkages:

The following SHMR environmental management and monitoring programs, and the specific sections/elements noted, are designed to minimise adverse impacts on this species.

- Construction Environmental Management Plan (Cardno, 11 January 2008):
    - Section 16: Marine Megafauna
    - Section 19: Waste Management
    - Section 22: Traffic (including Navigation)

- SHMR Site Based Management Plan (Cardno, 10 July 2008):
    - Section 5.6.1.1: Litter Control
    - Section 5.7: Flora and Fauna Management

- Marine Megafauna Impact Assessment and Management Plan (Natural Solutions, 28 July 2008):
    - Section 10: Conclusions and Management Recommendations

Likelihood of Significant Impacts:

Low:

The project site is within the distribution range of crocodiles and therefore crocodiles may occur within the vicinity of the project site. It is understood that crocodiles have occasionally been sighted in the vicinity of the Laguna Quays marina near Proserpine, to the south of the Shute Harbour Marine Development. However the site locality is not known to support any important estuarine crocodile breeding site.

Potential indirect impacts attributable to boating activity and inappropriate waste management practices are recognised and will be appropriately mitigated through the management regimes proposed.

Any conflict that arises between patrons of the SHMR and estuarine crocodiles would be managed in accordance with the *Nature Conservation (Estuarine Crocodile) Conservation Plan 2007.*