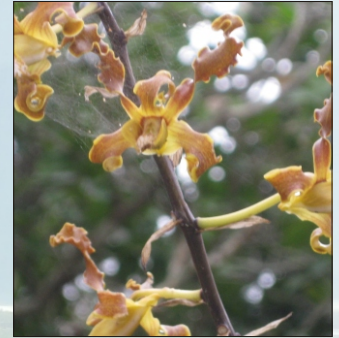


# **Great Keppel Island Environmental Impact Statement**

## **Flora and Fauna Technical Report**

**Prepared for  
Tower Holdings**



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## Executive Summary

The existing flora and fauna of Great Keppel Island were investigated as part of an Environmental Impact Statement (EIS) for the proposed revitalization of the former resort. Investigations were undertaken during both a dry season and wet season sampling period (September 2010 and February 2011) to allow for any seasonal differences.

A review of the flora related literature, existing databases and consultation with agencies, experts and the community identified vegetation communities/ regional ecosystems and threatened species currently occurring on the Island. Previous studies on the Island identified that historical land use had altered the structure and species composition and that there were high feral goat grazing pressures.

Regional ecosystem mapping was completed at a scale of 1: 10, 000 for the Island. Vegetation mapping and flora species information were gathered using methodology developed by the Queensland Herbarium and included quaternary, tertiary and secondary field data. Wetlands were also assessed based on the Department of Environment and Resource Management (DERM) Guidelines.

Three small areas of the nationally 'Critically Endangered' Ecological Community 'Littoral Rainforest and Coastal Vine Thickets of Eastern Australia' were mapped outside of the revitalisation area on the Island. The balance of the Island was mapped as supporting areas of 'Of Concern' and 'Least Concern' regional ecosystems (REs) as well as areas of non-remnant vegetation. DERM mapped 12 RE's and field investigations confirmed that 10 of these were present (RE 8.3.6c and 8.3.13c were not found during ground truthing) and 1 RE not previously mapped on the Island was identified (RE 8.11.8b). Mapping of regional ecosystems at a scale of 1:10,000 identified that a portion of the area previously mapped as remnant vegetation by DERM (2009) includes areas that had been historically cleared and now do not achieve remnant status. Application of the DERM Wetland Mapping Methodology confirmed the presence of wetland associated with drainage lines associated with RE 8.2.7e. All areas mapped as RE 8.1.1 or 8.1.2 also meet the definition of wetlands. All areas of RE 8.2.7b were mapped as potentially supporting palustrine wetlands.

This study confirmed the presence of 7 flora species of local significance, 6 of which were based on Batinoff & Dillewaard's 1988 study. Field investigations also confirmed the presence of 82 weed species of which 7 are declared pests.

A review of the fauna related literature and databases identified that an area surrounding Leeke's Estuary had been mapped as Essential Habitat for the Beach Stone Curlew by



DERM. Previous studies on the Island identified that few native marsupials or rodents are known from the area; however feral mammals including goats have altered vegetation communities and caused damage to habitats in the past. Community members, agencies and other experts were also consulted.

Fauna field investigations were undertaken in line with approved permits. Survey techniques used were diurnal/nocturnal bird searches, ground searches, Elliott trapping, pitfall trapping, hair funnel trapping, spotlighting, transect spotlight possum counts, Anabat detection, call playback and habitat assessment.

Field investigations confirmed the presence of 5 native mammal species and 4 native bats, 17 native reptile species, 9 frog species and 67 bird species. In addition 3 non-native mammal and 1 exotic reptile species were identified. Of note, no introduced amphibian species (i.e. Cane Toads) were recorded from the Island. The broad scale investigation into Brushtail Possum population density on the Island confirmed that densities well exceed commonly observed densities of this species and is comparable to densities found in New Zealand where this species is an introduced pest. Of the fauna recorded, 15 significant bird species, 1 significant reptile species and 1 mammal of cultural significance were confirmed on the Island. Nesting, resting, breeding, foraging and seasonal influences on these significant species are reviewed.

Habitat assessments identified Leeke's Estuary as the most important habitat on the Island. No specific fauna movement corridors were identified and the Island is currently free of significant anthropogenic barriers.



## Acronyms

BPA	Biodiversity Planning Assessment
CQC	Central Queensland Coast
DERM	Department of Environment and Resource Management
DEWHA	Department of Environment, Water, Heritage and the Arts (now SEWPAC)
EPA	Environmental Protection Agency (now DERM)
EPBC Act	<i>Environmental Protection and Biodiversity Conservation Act 1999</i>
GBR	Great Barrier Reef
GBRWHA	Great Barrier Reef World Heritage Area
GKI	Great Keppel Island
LPA	<i>Land Protection (Pest &amp; Stock Route Management) Act 2002</i>
NC(W)R	<i>Nature Conservation (Wildlife) Regulation 2006</i>
NCA	<i>Nature Conservation Act 1992</i>
NES	National Environmental Significance
QLD	Queensland
RE	Regional Ecosystem
REDD	Regional Ecosystem Description Database
SEWPAC	Department of Sustainability, Environment, Water, Population and Communities
VMA	<i>Vegetation Management Act 1999</i>



## 1. INTRODUCTION

### 1.1 STUDY AREA

Great Keppel Island is part of a chain of Islands (the Keppel Group) located approximately 12km off shore from Yeppoon on the Central Queensland Coast. The 1,478ha Great Keppel Island is located within the Great Barrier Reef World Heritage Area.

The Study area for the purpose of this report is defined as the proposed disturbance footprint on Great Keppel Island and a minor area located at Emu Park where an undersea cable is to make landfall (Figure 1). For the purpose of understanding the Island from a holistic viewpoint additional data has been attained from areas located outside of the proposed revitalisation footprint.

The proposed development footprint includes:

- 750 eco-tourism villas;
- 300 eco-tourism apartments;
- A 250 suite hotel facility at Fisherman's Beach;
- New Marina at Putney Beach comprising 250 berths;
- Retail area around the marina;
- An 18 hole golf course and golf club;
- Sporting oval/park;
- Relocation of the existing airstrip runway;
- Associated service facilities and utilities (waste collection area, fire-fighting);
- Wastewater treatment plant and constructed wetlands;
- Scientific research centre;
- Installation of a sub-marine connection of power, water, telecommunications between the Island and mainland;
- Restoration work to the Leeke's homestead; and
- Creation of 545 ha of environmental protection areas, including marked walking tracks, compost toilets and picnic facilities.

In the interest of maintaining consistency amongst technical reports, references to the proposed revitalisation has been described with reference to three main precincts (illustrated in Figure 1) including the:

- Marine Services Precinct;
- Fisherman's Beach Resort Precinct; and
- Clam Bay Resort Precinct.



## **1.2 STUDY AIMS AND OBJECTIVES**

The aim of this study is to identify and describe the existing terrestrial environment (flora and fauna) of GKI. Secondly to determine the elements of these values that may be affected by the project. The significance of environmental values at a local, regional and national level is discussed.

Specifically, the study aims to address the specific information requirements of the State of Queensland's Terms of Reference and the Australian Government Guidelines for an Environmental Impact Statement as they relate to the existing terrestrial environment (flora and fauna).



## 2. TERRESTRIAL FLORA

### 2.1 REGULATORY FRAMEWORK

Major legislation pertaining to the protection and management of terrestrial vegetation are listed below in Table 1.

**Table 1 – Major legislation pertaining to the protection and management of terrestrial vegetation**

Type	Title	
Commonwealth Acts/Regulations	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (Cwth)	The <i>Environment Protection and Biodiversity Conservation Act 1999</i> (Cth) (EPBC Act) prescribes the Commonwealth's role in environmental assessment, biodiversity conservation and the management of protected areas. Under the environmental provisions of the EPBC Act, actions that are likely to have a significant impact on a matter of National Environmental Significance (NES) are identified as "controlled actions" and cannot be undertaken without approval under the EPBC Act.  The matters of NES that are relevant to the terrestrial flora component of the Project are listed threatened species and communities (of flora).
	<i>Great Barrier Reef Marine Park Act 1975</i> , <i>Great Barrier Reef Marine Park Regulations 1983</i> , and the <i>Great Barrier Reef Marine Park Zoning Plan 2003</i>	The <i>Great Barrier Reef Marine Park Act 1975</i> main object is to provide for the long term protection and conservation of the environment, biodiversity and heritage values of the Great Barrier Reef Region.
State Acts/Regulations	<i>Fisheries Act 1994</i> and <i>Fisheries Regulation 2008</i> (Also FHMOP 001 'Management and protection of marine plants and other tidal fish habitats' and FHG003 'Fisheries Guidelines for Fish Habitat Buffer Zones').	The disturbance of marine plants or tidal habitats for: <ul style="list-style-type: none"> <li>Reclamation or use of tidal lands for non-marine oriented purposes, including residential and commercial development;</li> <li>Alteration of natural waterways for drainage purposes;</li> <li>Revetment works where there is no substantial bank erosion or slumping threatening buildings or existing infrastructure;</li> <li>Development where alternatives of lesser impact exist;</li> <li>Development where rights cannot be demonstrated (i.e. commercial development on Unallocated State Land (USL) or tidal lands); and</li> <li>For aesthetic or view purposes.</li> </ul> Is contrary to the requirements of FHMOP 001.
	<i>Forestry Act 1959</i>	The <i>Forestry Act 1959</i> provides for forest reservations, the management, silvicultural treatment and protection of State forests, and the sale and disposal of forest products and quarry material, the property of the Crown on State forests, timber reserves and on other lands.
	<i>Land Protection (Pest and Stock Route Management) Act 2002</i> and <i>Land Protection (Pest and Stock Route Management) Regulation 2003</i>	The <i>Land Protection (Stock and Pest Route Management) Act 2002</i> (LPA) and the <i>Land Protection (Pest and Stock Route Management) Regulation 2003</i> provides for management of declared pests in Queensland. Landholders have an obligation to control declared pests that are known to occur on their property.
	<i>Nature Conservation Act 1992</i> and <i>Nature Conservation (Wildlife) Regulation 2006</i>	The <i>Nature Conservation Act 1992</i> (Qld) (NCA) provides for the conservation and management of Queensland's native wildlife, amongst other things. The Act prohibits the taking or destruction, without authorisation, of certain listed species.  The <i>Nature Conservation (Wildlife) Regulation 2006</i> (NC Regulation) lists the wildlife considered extinct in the wild, endangered, vulnerable, near threatened, least concern, international and prohibited. It states the declared management intent and the principles to be observed in any taking of or destruction for each group.
	<i>Vegetation Management Act 1999</i> and <i>Vegetation Management Regulation 2000</i>	The <i>Vegetation Management Act 1999</i> (VMA) regulates clearing of vegetation in order to: <ul style="list-style-type: none"> <li>conserve remnant endangered, of concern and not of concern regional ecosystems;</li> </ul>



Type	Title	
	(Also the Regional Vegetation Management Codes for Coastal Regions; and Policy for vegetation management offsets)	<ul style="list-style-type: none"> <li>▪ conserve vegetation in declared areas;</li> <li>▪ ensure clearing does not cause land degradation,</li> <li>▪ prevent the loss of biodiversity; maintain ecological process;</li> <li>▪ manage the environmental effects of clearing; and</li> <li>▪ reduce greenhouse gas emissions.</li> </ul> <p>The VMA also regulates particular regrowth vegetation. Under the VMA 'regulated regrowth' is vegetation identified on the regrowth vegetation map as high value regrowth vegetation or located within 50m of a watercourse identified on the regrowth map as a regrowth watercourse or contained in a category C area shown on a Property Map of Assessable Vegetation.</p>
	<i>Water Act 2000 and Water Regulation 2002</i>	The <i>Water Act 2000</i> protects vegetation within watercourses.

## 2.2 METHODOLOGY

### 2.2.1 Desktop Assessment and Literature Review

To assist in identifying likely regional ecosystems and flora species that could be encountered and those that would need to be targeted during field work, a search of relevant literature and databases was undertaken prior to undertaking field investigations.

The following databases and assessments were assessed to provide a basis for assessment of flora community and species distribution:

- Commonwealth's EPBC Online Protected Matters Search Tool (SEWPAC, 2010) (Appendix A);
- Queensland Herbarium's Herbrecks (Queensland Herbarium, 2010a) & Corveg database (Queensland Herbarium, 2010b);
- Regional Ecosystem mapping ver. 6.0 (DERM, 2009b);
- DERM's WildNet database (EPA, 2010);
- Creighton, 1984;
- Melzer and Plumb, 2007; and
- Batianoff and Dillewaard, 1988.

The literature and databases identified a number of species of conservation significance that may occur within the study area. The study area for this purpose is defined according to Figure 1 and includes the Marine services precinct, Fisherman's Beach Resort Precinct and Clam Bay Resort Precinct. Based on a review of the habitat requirements of species, the likelihood that a species or community is present was categorised according to the following definitions:

- **Known** - species positively recorded by this survey or other survey by qualified ecologists during past 30 years;
- **Likely** - based on the presence of suitable habitat and proximate records;
- **Possible** - suitable habitat present for the species, but no recent records from the study area or proximate areas; and



- **Unlikely** - based on a lack of suitable habitat and lack of proximate records.

## 2.2.2 Vegetation Mapping

### 2.2.2.1 Scale

The TOR for the Great Keppel Island EIS indicates 1:10,000 scale vegetation mapping as a data requirement. In vegetation survey, scale is determined by sampling intensity, influenced by vegetation complexity and the areal extent of remnant vegetation.

Neldner *et al.*, (2005) recommends 25 ground observations/km<sup>2</sup> for a 1:10,000 scale map. The frequency of secondary site observations is dependant on the vegetation complexity, the amount of remnant vegetation present and the quantum of existing data for nearby areas.

The mapping scale for the current study is based on the combined extent of mapped remnant vegetation and non remnant vegetation within the investigation area rather than the total study area, which contains large tracts of cleared land. The entire Island covers 14.78 km<sup>2</sup> which contains approximately 13.22 km<sup>2</sup> of remnant and non-remnant woody vegetation. This necessitates approximately 370 observations to map the entire island at a 1:10,000 scale. The footprint is approximately 3 km<sup>2</sup> which necessitates 75 observations.

### 2.2.2.2 Regional Ecosystems

The mapping of vegetation categories across the entire study area was based on the regional ecosystem framework (Sattler & Williams, 1999). Regional ecosystems are coded with a three-part number:

- The first number is the bioregion in which the site occurs. In some instances the combination of vegetation and geology typical of a certain bioregion may occur outside the bioregional boundary. In this instance the Regional Ecosystem is assigned to the Bioregion in which it typically occurs, rather than the Bioregion in which the site is located. The site vegetation in this case is within the Central Queensland Coast and is therefore numbered “8”.
- The second number is the geomorphic category or “Land Zone” that the ecosystem falls within (e.g. all Regional Ecosystems occurring on “Hills and lowlands on metamorphosed sedimentary rocks are Land Zone ‘11’).
- The third number is the ecosystem number, and relates to the dominant vegetation.

### 2.2.2.3 Land Zones

Regional Ecosystem mapping ver. 6.0 (DERM, 2009) indicated the presence of 5 land zones on Great Keppel:

- 1 - deposits subject to periodic tidal inundation;
- 2 - Quaternary coastal sand deposits;



- 3 - Quaternary alluvial systems;
- 11 - hills and lowlands on metamorphosed sedimentary rocks; and
- 12 - hills and lowlands on granitic and other pre Cainozoic igneous rocks.

The latter relates to a particular regional ecosystem (RE 8.12.14x2c) which in its description notes “Occurs on metamorphic rocks on islands and headlands”. Therefore, the presence of this regional ecosystem does not denote the actual presence of land zone 12 on GKI.

Review of 1:100,000 Geological Series Sheet 9051 “Rockhampton” (DNRW, 2006) indicates that large portions of the island include “Quartzose sandstone, mudstone; local quartz-muscovite- biotite schist” of the Shoal water formation and small area of Quaternary alluvium.

Observations made during the dry season survey found the land zones ascribed in Regional Ecosystem mapping ver. 6.0 and geology described in (DNRW, 2006) to be in part in error. As such, land zones were remapped using a combination of resources including:

- On ground observations (quaternary sites);
- Aerial photographic review (see 2.2.2.4 following);
- Review of contour information (Schlencker Surveying Pty Ltd, 2006);
- Review of bore hole information prepared by Douglas and Partners Pty Ltd (2011); and
- Consultation with project geologists (Douglas and Partners).

#### ***2.2.2.4 Aerial Photograph Analysis and Site Location***

Interpretation of orthorectified aerial photography (Schlencker Surveyin Pty Ltd, 2006) allowed the establishment of preliminary vegetation line work and polygon attribution directly in a GIS application (MapInfo). Review of imagery also facilitated the delineation of land zones. The line work was completed initially with reference to the available remnant regional ecosystem mapping to assign anticipated regional ecosystems.

Historical aerial photography from 1961, 1973, 1984, 1988, 1995 and 1999 were reviewed to ascertain areas that had been historically cleared (see Figure 2). Imagery from 1961 and 1973 illustrated broad areas that had been historically cleared or thinned. Whilst this imagery could be registered in GIS, it was not orthorectified and as such could only be used as a tool to assist in identifying where clearing had occurred.

Polygons of both remnant and regrowth vegetation were identified through aerial photographic review. To verify this mapping it was necessary to undertake intensive field survey. Prior to field investigations, a number of target locations were identified including:



- a representative range of habitats within the study area;
- communities that could not be adequately categorised through air photo interpretation;
- some areas of non-remnant to assess species composition & structure (to ascertain whether the vegetation meets remnant status); and
- areas that were considered highly likely to provide habitat for threatened plant species.

Additional opportunistic sites were added during the field survey.

#### 2.2.2.5 Vegetation Mapping

Vegetation was mapped at a scale of 1:10,000 as per methodology developed by the Queensland Herbarium (Neldner *et al.*, 2005). The methods prescribed include a combination of secondary, tertiary and quaternary level sampling procedures. Additional informal site observations were also made but not documented. In some untraversed areas outside of the development footprint, there was insufficient information to make a judgment, and as such Regional Ecosystem mapping ver 6.0 (DERM, 2009b) was utilised as a default. In these areas mapping scale may not achieve a scale of 1:10,000.

Secondary sites consisted of a 50m x 10m plot located along the contour (or rarely across the contour in an endeavor to avoid areas where there was a change in ecosystem) within vegetation communities that displayed homogeneity in terms of floristics, structure and age. Canopy cover was determined by extending the plot a further 50m to generate a 100m transect. A Mobile Mapper GPS was used to record the coordinates of the beginning and end of the 50m Secondary plot and at the end of the 100m transect. Data collected in Secondary sites was in accordance with Nelder *et al.*, 2005 and broadly included:

- Representative sample of species present;
- Canopy height using a hypsometer;
- Canopy cover was recorded in using measured crown intercept over the 100m transects;
- Bitterlich measurements, as described in Grosenbaugh (1952), were used to record community basal area at the 25m point within the plots; and
- The abundance of all woody species within the 50m x 10m plot was recorded by stem counts; and
- All ground cover species, vines, epiphytes and mistletoes within the 50m x 10m plot were recorded.

For Secondary and Tertiary site field data was captured according to pro formas included in Neldner *et al.*, (2005). In order to adequately capture structural data from 100m transects information was recorded on additional field sheets.



Tertiary sites were conducted in a similar manner, but did not incorporate the full 50m x 10m plot or necessitate a full species list. In some instances, such as in grasslands or saltmarsh, Bitterlich measurements were not recorded due to the absence of trees.

Quaternary data primarily involved the recoding of dominant canopy elements for locations recorded by GPS. Frequently canopy median heights was also recorded in addition to species in other strata, particularly where these species had not been encountered previously during the survey.

Wherever a vegetation community was considered to be potential habitat for a threatened species scheduled under the EPBC Act or the *Nature Conservation (Wildlife) Regulation 2006* (NCWR), the search area was broadened. Frequently this involved broad searches of broad areas on foot to establish the range of a species if encountered in the field. In the instance of one suspected new species where identification was not possible owing to the absence of fertile material the collection site was re-assessed during the subsequent wet season survey.

Where species could not be readily identified in the field or where a specimen was known to be a threatened species, botanical voucher specimens were collected. Specimens of a sufficient size and quality (where possible) was pressed and labeled for future identification by the author or by the Queensland Herbarium.

The field survey was completed in a number of phases to capture seasonal variation in floristics. Field surveys were undertaken in dry season (20 – 24 September, 2010), and wet season (12 – 17 February, 2011).

Broad portions of the Island have been mapped as supporting a heterogeneous polygon of REs 8.11.10/8.12.14x2c. Whilst aerial photographic review and ground observations were useful in delineating a boundary between these ecosystems, the continuity of canopy in some locations hindered the task. This was resolved within the resort footprint by utilising a combination of quaternary observations and modeling of habitat of wind-sheared RE 8.11.10 based on the prevailing winds. The program Vertical Mapper was used to model the location of 'shrubland' vegetation by utilising contour (Schlencker Surveying Pty Ltd, 2006), aspect and prevailing winds as inputs. Given reduced number of quaternary sites outside of the proposed resort footprint, the splitting of these ecosystems could not always be achieved. However, the model proved useful in refining the boundary of heterogeneous polygons.

#### **2.2.2.6 Conservation Significance of Mapped Vegetation**

Under the *Vegetation Management Act 1999* (VMA), three levels of conservation status are defined for regional ecosystems:



- “Least concern regional ecosystem” means a regional ecosystem that is prescribed under a regulation and has either more than 30% of its pre-clearing extent remaining and the remnant vegetation remaining is more than 10,000 ha;
- “Of Concern regional ecosystem” means a regional ecosystem that is prescribed under a regulation and has either:
  - (a) 10% to 30% of its pre-clearing extent remaining; or
  - (b) more than 30% of its pre-clearing extent remaining and the remnant vegetation remaining is less than 10,000 ha.
- “Endangered regional ecosystem” means a regional ecosystem that is prescribed under a regulation and has either:
  - (a) less than 10% of its pre-clearing extent remaining; or
  - (b) 10% to 30% of its pre-clearing extent remaining and the remnant vegetation remaining is less than 10,000 ha.

For this study the current conservation status (Queensland Herbarium, 2009) was applied to remnant polygons.

In addition to remnant patches of Littoral Rainforest and Coastal Vine Thickets of Eastern Australia, areas of regrowth also require further consideration under the EPBC Act as a Threatened Ecological Community. Advice prepared for SEWPAC (Threatened Species Scientific Committee, 2008) identifies the following in relation to this community:

*The listed Littoral Rainforest and Coastal Vine Thickets of Eastern Australia ecological community comprises those patches that meet the key diagnostic characteristics and the condition thresholds must be:*

*Small patches can be resilient and viable, but the minimum size of a patch needs to be 0.1 ha;*

*AND*

*The cover of transformer weed species (as identified in Threatened Species Scientific Committee, 2008) is 70% or less. Transformer weeds are highly invasive taxa with the potential to seriously alter the structure and function of the ecological community. This threshold recognises the relative resilience and recoverability of the ecological community to invasion by weed species;*

*AND*

*The patch must have:*

*at least 25% of the native plant species diversity characteristic of this ecological community in that bioregion (Threatened Species Scientific Committee, 2008);*

*OR*



*at least 30% canopy cover of one rainforest canopy (either tree or shrub) species (found on the indicative bioregional plant species list), excluding Banksia and Eucalyptus species that may be part of the ecological community.*

Littoral Rainforest and Coastal Vine Thickets of Eastern Australia occur as a series of naturally disjunct and localised stands. Vegetation is generally structurally diverse (SEWPAC, 2009). This community generally occurs within 2km of the coast or large salt water body and can occur on a variety of geological strata (SEWPAC, 2008). Where remnant areas of these communities were encountered they were also attributed with their status under the EPBC Act.

#### **2.2.2.7 Reference Sites**

Reference sites are established in undisturbed or lightly disturbed vegetation communities within the vicinity of the Project area. Data collected from secondary plots at reference sites allow an assessment of the remnant/non-remnant status of a specific regional ecosystem against vegetation height, cover and floristics. The data also provides a reference point for the assessment of vegetation community condition.

The location of Reference sites was determined through review of existing and working regional ecosystem mapping and where aerial photography displayed an intact canopy pattern in current and historical aerial photography.

The value of an area as a Reference site could sometimes only be determined through field assessment. The presence of remnant canopy trees were used as indicators of original canopy composition and structure and the presence of significant disturbance employed to discount the value of an area as a Reference site.

In some instances, where variability was observed in a regional ecosystem owing to topographical variability (e.g. toe of slope versus crest), a number of Reference sites for the one regional ecosystem were attained.

#### **2.2.2.8 Remnant / Non remnant vegetation**

A regional ecosystem can only be regarded as 'remnant' provided it meets the following criteria as defined by the DERM (2011e):

*“Woody vegetation is mapped as remnant where the dominant canopy has greater than 70% of the height and greater than 50% of the cover relative to the undisturbed height and cover of that stratum and is dominated by species characteristic of the vegetation's undisturbed canopy”.*



Therefore to adequately classify areas as remnant or non-remnant it is necessary to have a thorough understanding of the structural and floristic elements of Reference sites. These sites must be established in communities or locations where disturbance has been minimal and are representative of environmental conditions of the community being assessed. Reference sites can be utilised to provide a transparent and repeatable method of comparing relative canopy height and canopy cover data of target sites with a remnant condition.

The classification of remnant vegetation is based solely on the nature and floristic composition of the original canopy layer (T1). Sub-canopy and shrub layers (T2, S1 etc) are not considered in the assessment of non-remnant vegetation communities in this exercise.

Non-remnant areas were initially delineated utilising aerial photographic interpretation (current and historic) in addition to historical text (e.g. Ganter, 1985) to delineate areas that demonstrate past disturbance. These areas were then ground truthed using a combination of secondary and quaternary sites to ascertain canopy composition, height and cover.

Some areas were mapped as non-remnant because they do not meet necessary height or cover thresholds. Only areas that are likely to achieve remnant status within the next 20 years on the basis of floristics, cover and height were mapped as non-remnant vegetation polygons. Each non-remnant polygon has been assigned with the regional ecosystem they would achieve if they were managed toward achieving remnant status.

#### ***2.2.2.9 Wetland Assessment and Mapping***

A broad area of RE 8.2.7e mapped (DERM, 2009) in the vicinity of the existing resort has been mapped as a palustrine system (DERM, 2009b). Other areas on GKI were mapped as estuarine systems. Preliminary observations of vegetation type and soils in these areas during the dry season indicated that this broad delineation may be incorrect.

Methods described in Part B of the draft Queensland Wetland Definition and Delineation Guideline (DERM, 2010) were subsequently employed during the wet season survey to refine the boundary of wetlands. The guideline uses criteria for hydrology, biota and substrate factors to test if the feature is a wetland or not (DERM, 2010). The pro formas for 'Wetland Hydrology Assessment' and 'Wetland Vegetation Assessment – Quantitative' were used in the field to gather data.

The sampling intensity required at a property level to map wetlands minimum size of 0.25-0.5ha is a site every 1-4 hectares with at least one site per feature (DERM, 2010). The method indicates that the best approach when undertaking an investigation is to collect as much evidence from as many different reliable sources about as many of the attributes as



possible (DERM, 2010). For this study 2 transects were undertaken in addition to 11 quaternary points within the western most patch of RE 8.2.7e.

In order to map all palustrine and estuarine systems of GKI, additional sites were assessed. Whilst this resulted in an area of wetland being mapped associated with RE 8.2.7e in the centre of GKI, it is likely that further comprehensive assessment would result in a contraction of the mapped outer boundary.

### **2.2.3 Assessment of Floristics**

Secondary site selection was based on surveying representative vegetation communities within the study area. Floristic data was initially recorded on secondary site pro formas (Neldner *et al.*, 2005) and subsequently transferred to excel spreadsheets to compile a consolidated species list giving a representative sample of species for GKI. As previously noted, where new species were encountered a quaternary site noted its presence. The conservation status and vegetation community in which the species had been recorded is also tabulated for each species. Nomenclature follows Bostock & Holland (2010).

Reference to lists derived from Herbrechts, Corvege, Batianoff & Dillewaard (1988) and Creighton (1984) were assessed to assist in predictive analysis of species distribution.

State significant species are defined as those listed as Endangered, Vulnerable or Near Threatened under the NC(W)R and nationally significant species are those listed as Endangered or Vulnerable under the EPBC Act. Species were regarded as otherwise significant based on species at their range limit in Batianoff & Dillewaard (1988) or species listed in DERM's Back on Track (2010c) (excluding threatened species).

Species were targeted on the basis of review of preferred habitat types and correlation of this with habitats mapped and encountered in the field.

### **2.2.4 Species of Cultural, Commercial and Recreational Significance**

#### ***2.2.4.1 Species of Cultural and Recreational Significance***

Species that may have been used for food, medicine or materials historically are listed based on the author's knowledge and Creighton (1984).

#### ***2.2.4.2 Commercial significance - Cropping***

Areas of cropping were identified from aerial photographic interpretation and historic records (i.e. reports including Creighton, 1984). This included land that is cleared and were historically grazed.



#### **2.2.4.3 Commercial significance – Timber Resource Assessment**

The assessment of commercial timber resource is based the presence/absence and dominance of species regarded as commercially valuable. Species were regarded as suitable timber species if identified as such in Lazarides & Hince (1993).

No quantitative assessment of volume of timber resource was made, a qualitative assessment based on mapped regional ecosystems and presence/absence and dominance of suitable timber species is given.

### **2.3 DESCRIPTION OF ENVIRONMENTAL VALUES FLORA**

#### **2.3.1 Literature Review**

To establish the extent of existing information and determine information gaps a number of studies, reports, maps and databases relevant to the project area were reviewed.

These studies are summarised in Table 2 along with ranking indicating their relevance to the project, where:

**Rank 1** = High. These studies have generally been completed within the project area or were a directly relevant regional study and therefore includes data specific to the project area. The methodology included in the study is robust and may be applied to the terrestrial flora study process.

**Rank 2** = Moderate. These studies have generally been completed within the same bioregional area however they may not be specific to the project area. The data may be provided in a way that limits the basis of interpretation (e.g. Herbrechts records may include a level of precision that is relatively coarse).

**Rank 3** = Low. Although the study was not directly relevant to the area of proposed impact because it was completed outside of the project area the broad interpretations and methods can be applied to the current investigation.



**Table 2: Relevance ranking of Literature Reviewed**

Title	Author (s)	Relevance Rank
<b>Project Specific Studies</b>		
<i>Keppel Islands Environmental Survey A Baseline for Archaeological Reconstructions and Resource Management,</i>	Creighton, C. (1984)	1
<i>Rapid Assessment of Terrestrial Regional Ecosystems in relation to the proposed resort development on Great Keppel Island</i>	CQ Environmental (2009)	1
<i>Biodiversity Planning Assessment Central Queensland Coast Flora, Fauna and Landscape Expert Panel Report</i>	EPA (2006)	3
<i>Anthropogenic Modification of Vegetation on Continental Islands: Southern Section Great Barrier Reef</i>	Brennan (1986)	1
<i>Floristic Analysis of the Great Barrier Reef continental islands, Queensland</i>	Batianoff, G.N. and H.A. Dillewaard (1997)	1
<i>Port Curtis District Flora and Early Botanists</i>	Batianoff, G.N. and H.A. Dillewaard (1988)	1
<i>The History and Development of the Keppel Islands</i>	Ganter, R.J. (1985)	1
<i>Plants of Capricornia</i>	Melzer, R. and Plumb, J. (2007)	1
<i>The Effect of Airborne Salt Deposition on Acacia Regeneration North Keppel Island</i>	Underhill (1987)	2
<b>Databases</b>		
<i>Protected Matters Database Environmental Reporting Tool - 23.14788, 150.92548; -23.19957, 150.92548; -23.19957, 150.99574; -23.14788, 150.99574</i>	SEWPAC (2010)	1
<i>Littoral Rainforest and Coastal Vine Thickets of Eastern Australia - EPBC Act policy statement 3.9 - Nationally threatened species and ecological communities</i>	SEWPAC (2009)	3
<i>Wildlife Online Extract for 23.1478 – 23.199; 150.9274 – 150.9969</i>	EPA and QPWS (2010)	2
<i>Regional Ecosystem Map ver 6.0</i>	DERM (2011b)	1
<i>HERBRECS</i>	Queensland Herbarium (2010a)	1
<i>CORVEG</i>	Queensland Herbarium (2010b)	1
<i>Biodiversity Planning Assessment Map ver 3.0 &amp; associated Expert Panel Report "Central Queensland Coast Flora, Fauna and Landscape Expert Panel Report November 2006"</i>	EPA (2006)	1
<i>Queensland Wetland Map</i>	DERM (2009b)	1

**2.3.1.1 Creighton (1984)**

Creighton (1984) was prepared for the specific purpose of establishing data on environmental features of the Keppel Group in order to assist in the interpretation of spatial patterning, content and management of archaeological sites on the islands.

An important component of the study was the mapping of land units described in terms of its geology, landform, soils, hydrology and vegetation. Table 3 below summarises vegetation types mapped by Creighton (1984) along with addition notes relating to disturbance in these areas.

**Table 3: Creighton (1984) Land Units**

Code	Description	Notes relating to disturbance
CS-1 <sub>9</sub>	Foredune Landforms (Siliceous Sands – Holocene) – Putneys Beach Fore dune	"The unit has been disturbed (camping area and tourist resort)"
CS-1 <sub>10</sub>	Foredune Landforms (Siliceous Sands – Holocene) – Leeke's Beach Fore dune	
CS-1 <sub>11</sub>	Foredune Landforms (Siliceous Sands – Holocene) – Little Svedsons Beach Fore dune	



Code	Description	Notes relating to disturbance
CS-1 <sub>12</sub>	Foredune Landforms (Siliceous Sands – Holocene) – Svedsons Beach Fore dune	
CS-1 <sub>13</sub>	Foredune Landforms (Siliceous Sands – Holocene) – Big Sandhills Beach Fore dune	
CS-1 <sub>14</sub>	Foredune Landforms (Siliceous Sands – Holocene) – Wreck Beach Fore dune	“...grazing by feral goats has resulted in land degradation.”
CS-1 <sub>15</sub>	Foredune Landforms (Siliceous Sands – Holocene) – Little Wreck Beach Fore dune	“...degradation of the land areas as a result of grazing by feral goats is obvious.”
CS-1 <sub>16</sub>	Foredune Landforms (Siliceous Sands – Holocene) – Long Beach - Monkey Beach Fore dune	
CS-2 <sub>2</sub>	Foredune Landforms (Calcareous Sands) – Clam Bay Beach Fore dune	“The unit has been grossly disturbed by feral goats.”
CS-3 <sub>2</sub>	Hindune Landforms (Siliceous Sands – Holocene) – Hindune Landforms, Putneys Beach	“Portions of this unit have been disturbed. Infrastructural development includes the Camping Area and the Tourist resort.”
CS-4 <sub>3</sub>	Intertidal and Supratidal Wetlands – Leeke’s Creek Wetland	
CS-4 <sub>4</sub>	Intertidal and Supratidal Wetlands – Putneys Creek Wetland	“The unit has been subject to disturbance with sediments from upstream smothering the benthos. These sediments have originated from the garbage dump and associated roads.”
CS-4 <sub>5</sub>	Intertidal and Supratidal Wetlands – Wreck Beach Creek Wetland	
CS-6	Long Beach Creek and Associated Landforms	
CS-7	Red Beach Pleistocene Landforms	
CS-8	Pleistocene – Aged High Dunes	“The unit has been disturbed by the construction of the airstrip.”
CS-9	Wreck Beach Pleistocene Remnants	“As with adjacent land units, the area has been denuded of vegetation by goats.”
SF-10 <sub>3</sub>	Xanthorrhoea Heathlands and Low Closed Woodlands – Great Keppel Complex	“Large areas of this unit have been grossly disturbed by goats.”
SF-12 <sub>1</sub>	Great Keppel Eucalypt – Dominated Open Woodland to Forest – Shelving Beach Headland and Hinterland	
SF-12 <sub>2</sub>	Great Keppel Eucalypt – Dominated Open Woodland to Forest – Putneys Beach Headland and Hinterland	
SF-12 <sub>3</sub>	Great Keppel Eucalypt – Dominated Open Woodland to Forest – Svedsons Beach Headland and Hinterland	
SF-13	Leeke’s Creek Melaleuca – Dominated Seasonal Wetland (Freshwater)	“The unit is dominated by <i>M. quinquenervia</i> . This appears to have been selectively cleared.”



Code	Description	Notes relating to disturbance
SF-14	Clam Bay Ridgeland – Low Closed Woodland	“Significant portions of this unit have been previously cleared and are presently exhibiting a regrowth pattern. Recent fires have led to further complexities in the structure and composition. It is suggested that the unit was probably a low closed woodland dominated by <i>C.littoralis</i> , <i>Acacia spp.</i> , <i>B. integrifolia</i> and <i>Melaleuca spp.</i> With a bracken ( <i>P.esculentum</i> ) understorey.”; “The unit, having been grossly disturbed in the past, supports a number of weeds.”
SF-15 <sub>1</sub>	Creek – Associated Flats – Eucalypt Dominated Open Forest – Leeke’s Creek Flat	
SF-15 <sub>2</sub>	Creek – Associated Flats – Eucalypt Dominated Open Forest – Feeder Creeks, Leeke’s Tidal Wetland Flats	
SF-15 <sub>3</sub>	Creek – Associated Flats – Eucalypt Dominated Open Forest – Little Svedsons Beach Creek Flats	
SF-15 <sub>4</sub>	Creek – Associated Flats – Eucalypt Dominated Open Forest – Svedsons Beach Creek Flats	
SF-15 <sub>5</sub>	Creek – Associated Flats – Eucalypt Dominated Open Forest – Putneys Creek Flats	“The unit is disturbed by roads and the dump.”
SF-15 <sub>6</sub>	Creek – Associated Flats – Eucalypt Dominated Open Forest – Wreck Beach Creek Flats	“The unit and surrounding sand areas have been grossly disturbed by feral goats.”

The study included field work, but it is unclear how extensive this work was. Creighton notes in the report there was “...limited time available for field work...”. The land unit map is of value; however it does not appear to be exhaustive. For instance the area of vine forest mapped by DERM (2011b) at the northern end of Long Beach is absent from the mapping.

Creighton notes “Land use has altered the structure and species composition of significant areas of the islands particularly Great Keppel. For example, land clearing on Great Keppel has altered the structure and composition of what were previously Eucalypt - dominated open forests...” and the fire regime has “...resulted in changes to the vegetative communities – at least structurally if not also with respect to composition.”

Creighton also records several plant species within the individual descriptions of Land Units. Whilst for the most part these are a useful resource, it is unclear whether all the species recorded represent accurate records for the island. For instance *Elaeocarpus grandis* was identified as occurring along the Wreck Beach creek flats and Long Beach Creek, but had not recorded in Herbreys (DERM, 2010) for the island or in Batianoff and Dilleward (1988) for any of the Keppel Group. Furthermore, *Corymbia dichromophloia* (then *Eucalyptus*) was recorded as an element of some of the eucalypt associations. This species has not been recorded elsewhere in Queensland (Bostock and Holland, 2010). He



makes the observation that “*Livistona decipiens* is limited to North Keppel (apart from a small stand on Corroboree Island)”.

In remarking about the limitations of his study, Creighton notes that a freshwater wetland once occurred behind Fisherman’s Beach and that it was a component of the Putney Creek system “holding fresh water for extended, possibly permanent periods”. It was known that this wetland contained waterlilies that he presumed to be *Nymphaea capensis*.

#### **2.3.1.2 CQ Environmental (2009)**

A rapid assessment of terrestrial regional ecosystems was undertaken in December 2009. A two day field trip was undertaken to identify ‘no-go’ areas on the Island. The outcomes included identification of possible discrepancies between mapped regional ecosystems and on ground communities. A more detailed vegetation assessment was recommended in order to support this observation. Regrowth mapping by DERM is also recommended to be investigated in further detail.

As part of the assessment three declared weeds were identified (*Opuntia stricta*, *Cryptostegia grandiflora*, *Lantana camara*) in addition to one environmental weed (*Megathyrus maximus*).

#### **2.3.1.3 Brennan (1986)**

The study constitutes a thesis undertaken through the University of Queensland on the impacts of grazing on Keppel Islands. Great Keppel Island was identified as under the highest grazing pressure mainly by feral goats. It was determined that the feral goats were not responsible for the patterns of grassland on the islands. The goats were however responsible for significant damage to vegetation and the landscape. Brennan does caution the removal of goats without weed control as evidence from Brampton and South Percy Islands showed an increase in *Lantana camara* following goat eradication. He recommends enclosure experiments to monitor vegetation with the exclusion of goats.

Brennan (1986) notes “Total fire bans on some of the islands would enable the vegetation to revert to a completely natural state.” Although it appears this comment was made mainly in relation to islands supporting Hoop Pine communities.

#### **2.3.1.4 Batianoff and Dillewaard (1988)**

The report provides a synopsis of the flora of the Port Curtis region along with discussion of the botanists who had made early contributions to the region’s flora. The report includes a number of lists including “endemic, rare and endangered species” of the region and those species at the limit of their range. A complete catalogue of species of the region is included based on herbarium records, some recordings by the authors and NR Gibson



collections. The catalogue identifies which species had been recorded in the Keppel Bay Continental Islands.

#### **2.3.1.5 Batianoff and Dillewaard (1995)**

The document represents a paper presented at the State of the Great Barrier Reef World Heritage Area Workshop in Townsville, 1995 that reviews the floristics of continental islands within the Great Barrier Reef, Queensland.

Batianoff and Dillewaard note that the relationship between species richness and island area is determined mainly by increasing size of the island. Great Keppel Island was known to support 386 species of plant over the island area of 1,454ha at the time. The Keppel Bay Islands contained approximately 65% of open forest species. The relatively low rainforest representation was, in the author's view, owing to an ongoing recolonisation process with an anticipated increase in rainforest with time.

The paper reports that the flora of islands sometime differ to the mainland vegetation communities owing to restricted island dispersal mechanisms; such as in species of *Acacia* and *Eucalypt*. Great Keppel Island supported one such example of a local contraction of widely dispersed taxa, *Eucalyptus robusta* which is limited to six or seven trees.

The authors state that amongst the GBR continental islands, the most widespread invasive exotic is *Lantana camara*. As a strategy to decrease the possibility of establishment and/or further spread of exotics like *Lantana*, the authors recommend that where unavoidable, disturbance of native island vegetation must be kept to a minimum.

#### **2.3.1.6 Melzer and Plumb (2007)**

The document is a guide to the flora of the Capricornia region. The primary value of the report is identification of some of the flora species likely to be encountered on GKI.

#### **2.3.1.7 Ganter (1985)**

Ganter's 1985 thesis explored the history of development of the Keppel Islands. Whilst not discussing biodiversity issues directly she makes a number of references that assist in interpreting the natural environment of GKI. Some points of note include:

- Prickly Pear has been present on the Island since 1911. It was reported that eradication attempts were made using bushfires, cactoblastis moth and cochineal;
- Owing to the airstrip being built over a semi-permanent waterholes and lagoons the natural drainage was blocked. Thus when the resort was flooded in the 1970 cyclone the owners successfully managed to claim damages from TAA; and
- John Nott had tenure of the Island between 1968 and 1971, during this time a large area of the grazing lease land was cleared with a bulldozer and then reseeded using



aerial seeding and fertilising (Ganter, 1985). It was noted that all John managed to achieve was “a crop of wattle”.

### 2.3.1.8 Underhill (1987)

Identifies the impact of salt spray on vegetation establishment on North Keppel Island. The thesis has relevance in that it provides lists of species from nearby island and background regarding the structure of some vegetation communities.

### 2.3.1.9 Regional Ecosystem Mapping

The Queensland Herbarium, as part of the Environmental Protection Agency (EPA), has mapped the Regional Ecosystems (RE) of the project area at a scale of 1:100,000. This mapping underpins the VMA. The VMA defines a “Regional Ecosystem” as a vegetation community in a bioregion that is consistently associated with a particular combination of geology, landform and soil.

A total of 12 regional ecosystems were mapped within the study area by DERM. These are listed below in Table 4 and mapped in Figure 3.

**Table 4: DERM Mapped Regional Ecosystems within the study area.**

Regional Ecosystem	Status	Area on GKI (ha)	Long Description (Queensland Herbarium, 2009)
8.1.1	Least concern	27.48	Closed-forest to open-shrubland of mangrove species forming a variety of associations, depending on their position in relation to tidal channels and the amount of freshwater input they receive. The seaward edge and fringe of waterways is often dominated by <i>Rhizophora</i> spp. Landward of the <i>Rhizophora</i> spp. zone a variety of species occur together or in a mosaic and include <i>Avicennia marina</i> , <i>Bruguiera</i> spp., <i>Rhizophora</i> spp., <i>Excoecaria agallocha</i> , <i>Xylocarpus moluccensis</i> , <i>Lumnitzera racemosa</i> , <i>Ceriops</i> spp. and <i>Osbornia octodonta</i> (pure stands of <i>Avicennia marina</i> often occur within this). Higher tide and spring tide areas adjacent to saltpans often support pure stands of <i>Ceriops</i> spp. The mistletoe <i>Lysiana maritima</i> is common throughout the mangrove associations, and occasional epiphytes include <i>Dendrobium discolor</i> , <i>Drynaria rigidula</i> , and <i>Platyterium bifurcatum</i> . The ground layer includes <i>Sporobolus virginicus</i> , <i>Acrostichum speciosum</i> , and <i>Crinum pedunculatum</i> . Occurs on intertidal flats which are often dissected by tidal streams. Includes communities on the seaward edge of the tidal flats as a pioneer, and on the landward edge in areas bordering saltpans and that are inundated by the highest spring tides.
8.1.2	Least concern	22.08	Saltpans and mudflats with clumps of saltbush including one or several of the following species; <i>Sesuvium portulacastrum</i> , <i>Halosarcia indica</i> subsp. <i>julacea</i> , <i>H. indica</i> subsp. <i>leiostachya</i> , <i>H. halocnemoides</i> subsp. <i>tenuis</i> , <i>H. pergranulata</i> subsp. <i>queenslandica</i> , <i>Sarcocornia quinqueflora</i> subsp. <i>quinqueflora</i> , <i>Suaeda australis</i> , <i>S. arbusculoides</i> , <i>Tecticornia australasica</i> and <i>Sporobolus virginicus</i> and sedges including <i>Cyperus polystachyos</i> var. <i>polystachyos</i> , <i>C. scariosus</i> , <i>Fimbristylis ferruginea</i> , <i>F. polytrichoides</i> . Occurs on plains adjacent to mangroves with soils consisting of marine sediments. There is salt accumulation at the soil surface from evaporation of sea water which inundates these areas during the higher tides.



8.2.1	Of concern	131.94	<i>Casuarina equisetifolia</i> open-forest, to woodland, to isolated clumps of trees, with a secondary tree layer of <i>Thespesia populnea</i> , <i>Sophora tomentosa</i> , <i>Pandanus tectorius</i> , <i>Hibiscus tiliaceus</i> , <i>Terminalia muelleri</i> , <i>Alphitonia excelsa</i> , and <i>Caesalpinia bonduc</i> , and shrub layer of <i>Vitex trifolia</i> , <i>Clerodendron inerme</i> , <i>Cupaniopsis anacardioides</i> and <i>Argusia argentea</i> . The ground layer usually includes <i>Thuarea involuta</i> , <i>Ipomoea pes-caprae</i> , <i>Spinifex sericeus</i> , <i>Canavalia rosea</i> and <i>Cyperus pedunculatus</i> . Includes the upper beach zone which consists of a low herbland of <i>Ipomoea pes-caprae</i> , <i>Spinifex sericeus</i> , and <i>Canavalia rosea</i> . In subregions 4 and 5 this unit includes small areas of wind-sheared heathland ( <i>Casuarina equisetifolia</i> , <i>Pandanus tectorius</i> , <i>Petalostigma pubescens</i> , <i>Phebalium woombye</i> , and shrublands dominated by <i>Acacia aulacocarpa</i> ). Occurs on Quaternary coastal foredunes and beaches.
8.2.2	Of concern	3.35	Microphyll vine forest (beach scrub). Characteristic species include <i>Mimusops elengi</i> , <i>Ganophyllum falcatum</i> , <i>Diospyros geminata</i> , <i>D. compacta</i> , <i>Pouteria sericea</i> , <i>Pleiogynium timorense</i> , <i>Drypetes deplanchei</i> , <i>Eugenia reinwardtiana</i> , <i>Cupaniopsis anacardioides</i> . Includes small patches of <i>Pisonia grandis</i> shrubland, woodland and open forest on coral rubble on some islands. Occurs on coastal dunes.
8.2.7e	Of concern	22.14	Complex of dune swales and low lying sandy/swampy wetlands which include pure stands of <i>Melaleuca leucadendra</i> in swamps adjacent to parabolic dunes, parabolic dune swales with <i>M. leucadendra</i> and other <i>Melaleuca</i> spp., broad swampy areas on sand with <i>M. leucadendra</i> , <i>Corymbia tessellaris</i> , <i>C. intermedia</i> , <i>Eucalyptus tereticornis</i> and <i>Livistona decora</i> , and buried swales with <i>Melaleuca leucadendra</i> . Also includes areas dominated by <i>Lophostemon suaveolens</i> . Also includes small perched wetlands. Occurs on parabolic dunes, low lying undulating areas with sandy soil consisting of mixtures of beach sand and alluvial material. Major vegetation communities include: ..... 8.2.7e: Palustrine wetland (e.g. vegetated swamp). <i>Melaleuca leucadendra</i> and/or <i>M. quinquenervia</i> and/or <i>M. dealbata</i> and/or <i>M. sp.aff. viridiflora</i> open-forest. Occurs in near -coastal wetlands and swales associated with parabolic dunes (all coastal subregions).
8.2.8a	Least concern	97.1	<i>Corymbia</i> spp. and/or <i>Eucalyptus</i> spp. open-forest to low woodland (3-22m tall). Dominants usually include one or several of the following eucalypts; <i>Corymbia intermedia</i> , <i>Eucalyptus portuensis</i> , <i>E. exserta</i> , <i>E. drepanophylla</i> , <i>C. tessellaris</i> , <i>Syncarpia glomulifera</i> , <i>E. latisinensis</i> and <i>C. clarksoniana</i> , and there is sometimes a co-dominance or subdominance of other species such as <i>Acacia disparrima</i> subsp. <i>disparrima</i> , <i>Banksia integrifolia</i> subsp. <i>compar</i> , <i>Allocasuarina littoralis</i> and <i>Lophostemon suaveolens</i> . On South Percy Island the canopy dominants are usually <i>E. exserta</i> and <i>E. drepanophylla</i> , or <i>C. clarksoniana</i> , and sometimes <i>C. xanthope</i> . Lower tree layers are very sparse to absent. The shrub layers range from sparse to mid-dense and are typically dominated by heath species such as <i>Lithomyrtus obtusa</i> , <i>Acacia julifera</i> subsp. <i>curvinervia</i> , <i>A. flavescens</i> , <i>Xanthorrhoea latifolia</i> subsp. <i>latifolia</i> , <i>Persoonia virgata</i> , <i>Leucopogon leptospermoides</i> , <i>Leptospermum neglectum</i> and <i>Grevillea banksii</i> . The ground layer is usually sparse, and dominated by species such as <i>Themeda triandra</i> , <i>Pteridium esculentum</i> , <i>Xanthorrhoea latifolia</i> subsp. <i>latifolia</i> , <i>Dianella caerulea</i> , <i>Imperata cylindrica</i> , <i>Eriachne pallescens</i> and <i>Trachystylis stradbrokeensis</i> . Occurs on high parabolic dunes, mainly of Pleistocene age (subregions 4 and 5). Geology is Qpd (Pleistocene high parabolic quartz sand dunes). Soils are dune sands, mainly podzols and rudimentary podzols.
8.3.6c	Of concern	7.1	<i>Eucalyptus tereticornis</i> , <i>Corymbia intermedia</i> (or <i>C. clarksoniana</i> ) and <i>Lophostemon suaveolens</i> open-forest, or sometimes dominated by <i>C. tessellaris</i> . A sparse secondary tree layer of <i>Albizia procera</i> and sometimes <i>Melaleuca</i> spp. and <i>Livistona decora</i> is often present. Rainforest species are occasionally present and include <i>Cupaniopsis anacardioides</i> , <i>Jagera pseudorhus</i> , <i>Acronychia laevis</i> , <i>Litsea glutinosa</i> and <i>Mallotus philippensis</i> . There is a sparse shrub layer of <i>Planchonia careya</i> and <i>Timonius timon</i> . The ground layer is commonly composed of <i>Imperata cylindrica</i> , <i>Sorghum nitidum</i> forma <i>aristatum</i> , <i>Heteropogon triticeus</i> , <i>H. contortus</i> , <i>Lomandra longifolia</i> and <i>Oplismenus burmannii</i> . Occurs on very fertile alluvial levees and lower terraces. Major vegetation communities include: ..... 8.3.6c: Floodplain (other than floodplain wetlands). <i>Eucalyptus tereticornis</i> and/or <i>Corymbia tessellaris</i> and/or <i>Lophostemon suaveolens</i> and/or <i>E. platyphylla</i> +/- rainforest spp. open-woodland to open-forest. Occurs on alluvial terraces (subregions 4 and 5).
8.3.13c	Of concern	35.19	Vary variable community, usually adjacent to estuarine communities. Ranges from open-woodland to closed-forest. Includes open-woodlands with <i>Melaleuca viridiflora</i> and/or <i>M. leucadendra</i> over <i>Imperata cylindrica</i> ,



			<p><i>Ischaemum</i> spp. and <i>Leersia hexandra</i>. Also includes woodland and open-forest of <i>Corymbia tessellaris</i> and/or <i>Eucalyptus tereticornis</i> (and frequently <i>E. tereticornis</i> and <i>E. platyphylla</i> hybrids) often with <i>Melaleuca dealbata</i> (sometimes pure stands of <i>M. dealbata</i>), over a dense grassy layer of <i>Sorghum nitidum</i> forma <i>aristatum</i>, <i>Ischaemum</i> spp, <i>Chrysopogon filipes</i> and <i>Leersia hexandra</i>. Occurs on marine and alluvial plains adjacent to estuarine areas.</p> <p>Major vegetation communities include:</p> <p>.....</p> <p>8.3.13c: Floodplain (other than floodplain wetlands). <i>Eucalyptus tereticornis</i> and/or <i>Corymbia tessellaris</i> woodland with a secondary tree layer of <i>Melaleuca</i> spp. Occurs on marine and alluvial plains commonly adjacent to estuarine areas.</p> <p>.....</p>
8.11.3a	Least concern	430.74	<p>Open-forest to woodland with a variable species dominance. Species usually include a number of the following species; <i>Corymbia intermedia</i>, <i>C. intermedia</i> x <i>clarksoniana</i> (<i>intermediates</i>), <i>C. clarksoniana</i>, <i>Eucalyptus portuensis</i>, <i>E. platyphylla</i>, <i>E. drepanophylla</i>, <i>E. tereticornis</i>, <i>C. tessellaris</i>, <i>E. exserta</i> and <i>Lophostemon suaveolens</i>. A sparse secondary tree layer of <i>Lophostemon suaveolens</i>, <i>Planchonia careya</i> and <i>Banksia integrifolia</i> subsp. <i>compar</i> is sometimes present, or there may be a relatively dense layer of <i>Lophostemon confertus</i>. There is often a sparse to dense shrub layer of <i>Cycas media</i>, <i>Xanthorrhoea latifolia</i> subsp. <i>latifolia</i>, <i>Acacia leptocarpa</i> and <i>Hibiscus heterophyllus</i>. The ground layer usually includes <i>Imperata cylindrica</i>, <i>Themeda triandra</i>, <i>Heteropogon triticeus</i>, <i>Mnesithea rottboellioides</i>, <i>Eragrostis brownii</i>, <i>Alloteropsis semialata</i> and <i>Aristida queenslandica</i> var. <i>queenslandica</i>. Occurs on low to medium hills formed from metamorphosed sediments.</p> <p>Major vegetation communities include:</p> <p>8.11.3a: <i>Corymbia intermedia</i> and/or <i>Eucalyptus portuensis</i> and/or <i>C. clarksoniana</i> and/or <i>E. platyphylla</i> and/or <i>E. drepanophylla</i> open-forest to woodland. Occurs on low hills on metamorphosed sediments (subregion 2).</p> <p>.....</p>
8.11.9a	Of concern	50.47	<p><i>Themeda triandra</i> +/- <i>Imperata cylindrica</i> grassland, or <i>Heteropogon contortus</i>, <i>Imperata cylindrica</i> and <i>Heteropogon triticeus</i> grassland, or <i>Xanthorrhoea latifolia</i> subsp. <i>latifolia</i> shrubland/heathland with <i>Themeda triandra</i>. Small clumps of wind sheared vine thicket and sclerophyllous species may be present, including shrubby species such as <i>Acacia leiocalyx</i> or <i>Acacia flavescens</i>, <i>Allocasuarina littoralis</i>, <i>Banksia integrifolia</i> subsp. <i>compar</i>, <i>Dodonaea lanceolata</i>, <i>Jacksonia scoparia</i> and <i>Wikstroemia indica</i>. Other ground-stratum species may include <i>Dichanthium sericeum</i>, <i>Aristida</i> spp., <i>Cassytha pubescens</i>, <i>Oxalis perennans</i>, <i>Glycine tomentosa</i>, <i>Scleria mackaviensis</i>, <i>Crotalaria montana</i> and <i>Phyllanthus</i> spp. Occurs on coastal exposed rocky headlands on metamorphosed sediments and Cretaceous quartzose sediments, subject to strong sea-breezes and salt-laden winds.</p> <p>Major vegetation communities include:</p> <p>8.11.9a: <i>Themeda triandra</i> +/- <i>Imperata cylindrica</i> grassland, or <i>Heteropogon contortus</i>, <i>Imperata cylindrica</i> and <i>Heteropogon triticeus</i> grassland, or <i>Xanthorrhoea latifolia</i> subsp. <i>latifolia</i> shrubland/heathland with <i>Themeda triandra</i>. Small clumps of wind sheared vine thicket and sclerophyllous species may be present, including shrubby species such as <i>Acacia leiocalyx</i> or <i>Acacia flavescens</i>, <i>Allocasuarina littoralis</i>, <i>Banksia integrifolia</i> subsp. <i>compar</i>, <i>Dodonaea lanceolata</i>, <i>Jacksonia scoparia</i> and <i>Wikstroemia indica</i>. Occurs on coastal exposed rocky headlands on metamorphosed sediments, subject to strong sea-breezes and salt-laden winds.</p> <p>.....</p>
8.11.10	Of concern	325.55	<p><i>Lophostemon confertus</i> and/or <i>Acacia leptostachya</i> and/or <i>Acacia leiocalyx</i> and/or <i>Acacia aulacocarpa</i> and/or <i>Allocasuarina littoralis</i> +/- <i>Acacia flavescens</i> +/- <i>Corymbia dallachiana</i> +/- <i>Eucalyptus drepanophylla</i> +/- <i>E. exserta</i> +/- <i>Melaleuca viridiflora</i> low woodland to low open-forest. More open communities may have a moderately dense shrub layer with species such as <i>Acacia leptostachya</i>, <i>Xanthorrhoea latifolia</i> subsp. <i>latifolia</i>, <i>Dodonaea lanceolata</i> and <i>Melaleuca viridiflora</i>. The ground layer usually includes <i>Xanthorrhoea latifolia</i> subsp. <i>latifolia</i>, <i>Eriachne glauca</i> var. <i>glauca</i>, <i>Eriachne pallescens</i>, <i>Themeda triandra</i>, <i>Eragrostis brownii</i>, <i>Aristida holathera</i>, <i>Gahnia aspera</i> and <i>Abildgaardia ovata</i>. Occurs on exposed hill slopes of islands and headlands usually with rock at surface, on metamorphosed sediments. Headlands in the Emu Park-Yeppon area, Keppel Island Group, and also other offshore islands.</p>
8.12.14x2c	Least concern	120.51	<p>Complex of eucalypt woodland to closed-forest communities. Includes woodland to open-forest of <i>Eucalyptus drepanophylla</i> (or <i>E. crebra</i> in southern areas), <i>Lophostemon confertus</i>, <i>E. exserta</i>, <i>Acacia spirorbis</i> subsp. <i>solandri</i> <i>Corymbia clarksoniana</i> and <i>Corymbia intermedia</i> (some areas with <i>E. moluccana</i>), OR closed-forest of <i>Acacia spirorbis</i> often with <i>E. drepanophylla</i>, and <i>E. tereticornis</i>, OR closed-forest of <i>Lophostemon</i></p>



		<p><i>confertus</i>. There is often a secondary tree to shrub layer of <i>Drypetes deplanchei</i>, <i>Euroschinus falcatus</i> <i>Pouteria sericea</i>, and <i>Dodonaea lanceolata</i> var. <i>subsessilifolia</i>, and a low shrub of <i>Xanthorrhoea latifolia</i> subsp. <i>latifolia</i>. The ground layer is typically dominated by <i>Gahnia aspera</i>, <i>Themeda triandra</i>, <i>Oplismenus</i> spp., and <i>Dianella caerulea</i>. Occurs on islands and rocky headlands on Mesozoic to Proterozoic igneous rocks and Tertiary acid to intermediate volcanics (land zone 8). Major vegetation communities include:</p> <p>.....</p> <p>8.12.14x2c: <i>Eucalyptus crebra</i> and/or <i>E. exserta</i> and/or <i>Corymbia clarksoniana</i> and/or <i>C. dallachyana</i> and/or <i>Lophostemon confertus</i> and/or <i>Lophostemon suaveolens</i> open-forest to woodland with <i>Acacia</i> spp. +/- rainforest species. Occurs on metamorphic rocks on islands and headlands.</p>
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GKI was mapped as supporting areas of 'Of Concern' and 'Least concern' regional ecosystems, as indicated in Table 4 above, in addition to areas mapped as non-remnant. The total area of RE categorised by status is listed in the Table 5 below.

**Table 5: Area of mapped RE's by Status**

Regional Ecosystem Status	Area (ha)
Of Concern	575.74
Least concern	697.91
Non-remnant	48.65



### 2.3.1.10 CORVEG

CORVEG is a dataset prepared by the Queensland Herbarium and is utilised to inform regional ecosystem descriptions and mapping. There are no Queensland Herbarium Secondary or Quaternary sites on Great Keppel Island.

### 2.3.1.11 Protected Matters database

A search of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC) Protected Matters database identified one threatened community listed as 'Critically Endangered' located within the Study Area. This is summarised in Table 6 below.

**Table 6: EPBC Protected Matters search for Threatened Communities for Great Keppel Island**

Community Name	Status	Associated Regional Ecosystems in the Bioregion
Littoral Rainforest and Coastal Vine Thickets of Eastern Australia	Critically Endangered	8.2.2

Note: The search area was bounded by the following coordinates -23.14788,150.92548, -23.19957,150.92548, -23.19957,150.99574, -23.14788,150.99574.

Flora species returned in the search are discussed in Section 2.3.1.14.

### 2.3.1.12 BPA Mapping (EPA, 2006)

Biodiversity Planning Assessment (BPA) for the Central Queensland Coast (CQC) incorporates continental Islands including Great Keppel Island (Figure 4). The mapping is prepared in a two part process, first involving desktop analysis of existing information ('first cut' mapping) followed by expert panel review.

With regard to flora, the expert panel (EPA, 2006) did not identify any values specific to GKI, they did nominate all remnant areas of low microphyll/notophyll thicket or beach scrub (RE 8.2.2) as State significance on the basis of having a high flora diversity, high concentrations of disjunct populations and a high threat from development.

Parts of Great Keppel Island are also mapped as 'State' and 'Regionally' significant on through the first cut mapping. No areas were identified as 'of significance' on the basis of the presence of threatened flora species. The status of some areas is based on the 'Endangered' Biodiversity Status of 8.2.2, 8.2.7e, 8.3.6c and 8.3.13c; one of the largest example of a RE for the bioregion (being either 8.11.10 or 8.12.14x2c); and because of the presence of 'Of Concern' regional ecosystems.

### 2.3.1.13 Wetland Mapping

Queensland Wetland Map (DERM, 2009), reproduced herein as Figure 5, shows that there are a number of areas mapped as wetlands include:



- Estuarine wetland systems, associated with regional ecosystem 8.1.1 and 8.1.2 on Putney Creek and a large complex behind Leeke's Beach;
- A Palustrine wetland system associated with 8.2.7e; and
- Several Riverine/Drainage systems associated drainage lines.

#### **2.3.1.14 Summary of databases – threatened flora**

Several databases and reports were reviewed to identify species scheduled under either the *Nature Conservation (Wildlife) Regulation 2006* or the *Environment Protection and Biodiversity Conservation Act 1999* that are known to occur within, or within the vicinity, of the project area. Specifically these included:

- **HerbreCs** (Queensland Herbarium, 2010). This is the state wide Queensland Herbarium database of all specimens held in their collection along with a location. Although some records have a low spatial precision (generally older records predating GPS technology) the dataset for a defined location provides assistance as to species potentially encountered during field work including threatened species;
- **Wildnet** (EPA, 2010). This database incorporates information from a number of datasets held by the EPA. The reliability of some of the data is variable depending on the original source (e.g. HerbreCs data is more reliable than data collected from community based programs);
- **Corveg** (EPA, 2000). This database includes raw data from Queensland Herbarium field sites. The data provides, amongst other things, an indication of the level of previous survey effort in an area and the species encountered;
- **EPBC Protected Matters Database** (SEWPAC, 2008; SEWPAC, 2010a). The database provides an indication of species likely to occur in an area, in part, based on habitat modeling; and
- **Creighton (1984).**

Table 7 below summarises threatened species identified in these databases/studies along with the habitat requirements of each species.



Table 7: Potential Threatened Flora based on review of databases/literature

Species Name	Common Name	Status		Reference of Record	Habitat Description and Regional Ecosystems in the vicinity where species might occur	Regional Ecosystems on the Island where the species may occur.
		NCA	EPBC			
<i>Cycas megacarpa</i>		Endangered	Endangered	EPBC database	Occurs in woodland, open woodland and open forests, often in conjunction with a grassy understorey. Usually found in habitat dominated by <i>Eucalyptus crebra</i> and <i>Corymbia citriodora</i> as well as <i>Corymbia erythrophloia</i> , <i>Eucalyptus melanophloia</i> and <i>Lophostemon confertus</i> . May also be found in or on the edge of rainforest. Often grows on undulating to hilly terrain at an altitude of 40–680 m on a typically well draining rocky or shallow clay, clay/loam, derived from acid volcanic, ironstone or mudstone (SEWPAC, 2010).	8.2.2, 8.11.10, 8.12.14x2c
<i>Cycas ophiolitica</i>	Marlborough blue	Endangered	Endangered	EPBC database	<i>C. ophiolitica</i> occurs within an altitudinal range of 80-400m, in woodland or open woodland dominated by eucalypts, often on serpentinite substrates (with <i>Corymbia dallachiana</i> , <i>C. erythrophloia</i> , <i>C. xanthope</i> , <i>Eucalyptus fibrosa</i> ), but also on mudstone (with <i>Corymbia dallachiana</i> , <i>C. erythrophloia</i> and <i>Eucalyptus crebra</i> ) and on alluvial loams (with <i>Corymbia intermedia</i> , <i>Eucalyptus drepanophylla</i> and <i>E. tereticornis</i> ). The species may co-occur with either <i>Macrozamia serpentina</i> (serpentinites) or <i>M. miquelii</i> (mudstone or alluvial loams). Other rare and endemic species are associated with the serpentinite communities in which <i>C. ophiolitica</i> occurs. This species occurs in habitats that are subjected to periodic fires of varying intensities (Queensland Herbarium, 2007).	8.11.3a, 8.11.10, 8.12.14x2c
<i>Taeniophyllum muelleri</i>	Minute Orchid, Ribbon-root Orchid	-	Vulnerable	EPBC database	This species is epiphytic, favouring littoral rainforest, subtropical rainforest, wet sclerophyll forests and riparian (stream-side) areas (Logan River Branch SGAP (Qld Region), 2008).	8.2.2, 8.12.14x2c, 8.11.9b, 8.11.9a, 8.3.13c



The specific location of these species records is not known as all were attained from the EPBC Protected Matters Database which does not provide co-ordinates for threatened species records. Threatened species had not previously been recorded in Herbrecks, Corveg or Creighton (1984).

Whilst these databases identify the potential for a few threatened species to occur on GKI, this does not rule out the potential for other species to occur. Batianoff & Dillewaard (1988) and Melzer & Plumb (2007) identify several species of conservation significance occurring in the broader Port Curtis region.

#### *2.3.1.15 Summary of databases – exotic flora*

Literature searched to establish a list of known exotic or likely species include Herbrecks (Queensland Herbarium, 2010a), Corveg database (Queensland Herbarium, 2010b), Wildnet, Creighton (1984) and CQ Environmental (2009). The results are presented in Table 8.

Most studies reviewed confirm the presence of exotic on GKI, with a total of 42 species described. Three species are declared Class 3 weeds and three are declared as Class 2 under the *Land Protection (and Stock Route Management) Act 2002* (LPA).

The declared plants are identified according to their status under the LPA:

**Class 1** - It is not commonly present or established in the State; and has the potential to cause an adverse economic, environmental or social impact in the State; if established they are subject to eradication; reasonable steps must be taken to keep land free of Class 1 pests;

**Class 2** - Are established in the State and have, or could have, an adverse economic, environmental or social impact; reasonable steps must be taken to keep land free of Class 2 pests. It is a serious offence to introduce, keep or supply a Class 2 pest without a permit issued by Biosecurity Queensland;

**Class 3** - Are established in the State and have, or could have, an adverse economic, environmental or social impact; their impact is primarily environmental; control notices can be issued for land that is, or is adjacent to an environmentally significant area. It is a serious offence to introduce, feed or supply a Class 3 pest without a permit issued by Biosecurity Queensland.



Table 8: Exotic Flora Known or Likely to Occur on GKI

Family Name	Status	Botanical Name	Data Source
Asteraceae		<i>Ageratum conyzoides</i> subsp. <i>conyzoides</i>	H, W
Apocynaceae		<i>Asclepias curassavica</i>	H, W
Asparagaceae	Class 3	<i>Asparagus africanus</i>	W
Asteraceae		<i>Aster subulatus</i>	H
Asteraceae		<i>Bidens pilosa</i>	W, Cr
Crassulaceae	Class 2	<i>Bryophyllum delagoense</i>	W
Apocynaceae		<i>Cascabela thevetia</i>	H, W
Poaceae		<i>Cenchrus echinatus</i>	W
Poaceae		<i>Chloris inflata</i>	H, W
Poaceae		<i>Chloris gayana</i>	W
Asteraceae		<i>Cirsium vulgare</i>	H, W
Apocynaceae	Class 2	<i>Cryptostegia grandiflora</i>	H, W, CQ, Cr
Arecaceae		<i>Cocos nucifera</i>	Cr
Asteraceae		<i>Conyza bonariensis</i>	W
Asteraceae		<i>Conyza canadensis</i>	W
Poaceae		<i>Cynodon dactylon</i> var <i>dactylon</i>	W
Poaceae		<i>Digitaria violascens</i>	H, W
Asteraceae		<i>Emilia sonchifolia</i> var. <i>javanica</i>	H, W
Amaranthaceae		<i>Guilleminea densa</i>	H
Asteraceae		<i>Helianthus argophyllus</i>	H, W
Lamiaceae		<i>Hyptis suaveolens</i>	H, W
Verbenaceae	Class 3	<i>Lantana camara</i>	W, CQ, Cr
Malvaceae		<i>Malvastrum coromandelianum</i> subsp. <i>coromandelianum</i>	H, W
Fabaceae		<i>Macroptilium atropurpureum</i>	W
Poaceae		<i>Melinis minutiflora</i>	H, W
Poaceae		<i>Melinis repens</i>	W
Poaceae		<i>Megathyrsus maximus</i>	W, CQ, Cr
Cactaceae	Class 2	<i>Opuntia stricta</i>	W, CQ, Cr
Passifloraceae		<i>Passiflora foetida</i>	H, W, Cr
Passifloraceae		<i>Passiflora suberosa</i>	W, Cr
Poaceae		<i>Pennisetum ciliare</i>	H, W
Rubiaceae		<i>Richardia brasiliensis</i>	H, W
Caesalpiniaceae		<i>Senna pendula</i>	Cr
Malvaceae		<i>Sida cordifolia</i>	H, W
Solanaceae		<i>Solanum nodiflorum</i>	H, W
Solanaceae		<i>Solanum torvum</i>	H, W
Asteraceae	Class 3	<i>Sphagneticola trilobata</i>	H, W
Verbenaceae		<i>Stachytarpheta jamaicensis</i>	W, Cr
Asteraceae		<i>Xanthium occidentale</i>	H, W
Asteraceae		<i>Xanthium pungens</i>	Cr
Asteraceae		<i>Tridax procumbens</i>	W, Cr
Malvaceae		<i>Urena lobata</i>	W, Cr

Data Source: H = Herbreces; W = Wildnet; CQ = CQ Environmental (2009); Cr = Creighton (1984). NB Creighton (1984) records species for the entire Keppel Group.

### 2.3.2 Consultation

Consultation primarily occurred with DERM officers. This included staff at the Queensland Herbarium at Mt Coot-tha and Townsville regarding the existing regional ecosystem mapping, regional ecosystem descriptions and some potential changes this study had identified to regional ecosystem mapping for GKI. Confirmed during discussions was that little work had been conducted on GKI and regional ecosystem mapping had relied on Creighton (1984) to inform mapping outputs.

Discussions with DERM officer John McCabe (pers. comm, 2011) revealed that a small population of locally significant *Eucalyptus resinifera* existed on the Island



prior to the 1960's. These trees were in the vicinity of the existing resort buildings and were likely lost as a result of its construction.

Residents of the island were consulted during the field work to ascertain whether they had previously observed any species of cycad or orchid in order to assist with targeted searches. Whilst no cycads had previously been observed, a confirmed record of the orchid *Cymbidium canaliculatum* was made.

### 2.3.3 Regional Ecosystems

#### 2.3.3.1 Ground Observations

Flora field surveys were undertaken on 20 Sept – 24 Sept 2010 (dry season) and 12 February – 18 February 2011 (wet season). Table 9 below summarises the total number of observations made on Great Keppel Island during these visits:

**Table 9: Number of Ground Observations**

Site	Number of Observations	
	Wet Season	Dry Season
Secondary	16	15
Tertiaries	2	9
Quaternaries	147	84
<b>TOTAL</b>	<b>165</b>	<b>108</b>
<b>GRAND TOTAL</b>	<b>273</b>	

The location of all sites is illustrated in Figure 6. All Secondary and Tertiary site proformas are presented in Appendix B and a summary of Quaternary sites is presented in Appendix C.

#### 2.3.3.2 Reference Sites

Although transects were established throughout the Island for the purposes of mapping vegetation, condition and floristics only some were regarded as suitable for use as reference sites. The suitability of sites was based largely on the condition of the remnant (i.e. was it clearly remnant and/or subject to little disturbance) and whether they represented the best type example of the regional ecosystem in the immediate vicinity.



Furthermore, where variability was observed within a regional ecosystem additional Reference sites were taken. Perhaps the most striking example of such variability is within RE 8.2.8a where there was variability depending on the location within the dune system. Transects 9 (dry) and 61(wet) were located on the same dune, with 9 capturing vegetation at the peak of the dune and 61 capturing vegetation mid slope. Median height values for the upper canopy (T1) on mid slope achieving 16m whilst that on the ridge achieving only 10m. Given the difference in aspects of dunes in the east of the Island compared with the variability observed in the west (which was mostly northwest), an additional reference transect for 8.2.8a was undertaken in the east.

Tertiary sites were undertaken for REs 8.1.1, 8.1.2 and 8.11.9a in favour of secondary sites owing to their occurrence largely outside of the development footprint and ease to which they could be delineated from aerial photography.

Table 10 below summarises floristic data for each reference site used as indicators for remnant status. The location of reference sites are illustrated in Figure 7.

**Table 10: Reference Sites for Regional Ecosystems recorded within the Entire Study Area**

Regional Ecosystem	Site Number	Dominant Canopy Species (T1)	Dominant Sub-canopy Species (T2)	Canopy Height (T1)	Canopy Cover (T1)	Sub-canopy Height (T2)	Sub-canopy Cover (T2)	70% Height (T1)	50% Cover (T1)
8.1.1	80 (wet)	<i>Avicenna marina</i> var. <i>eucalyptifolia</i>	n/a	3	n/a	n/a	n/a	2.1	n/a
8.1.2	59 (dry)	<i>Aegiceras corniculatum</i>	n/a	n/a	n/a	n/a	n/a	n/a	n/a
8.2.1	1 (dry)	<i>Casuarina equisetifolia</i>	<i>Allocasuarina littoralis</i>	7	6	4.5	33.5	4.9	3
8.2.7e	2 (dry)	<i>Melaleuca dealbata</i>	<i>Allocasuarina littoralis</i>	15	55.5	7	58.5	10.5	27.75
8.2.7b	71 (wet)	<i>Melaleuca quinquenervia</i>	<i>Alphitonia excelsa</i>	15	68	8	52	10.5	47.6
8.2.8a Lower slope - west	98 (dry)	<i>Eucalyptus tereticornis</i>	<i>Lophostemon confertus</i>	15	54.5	7	66	10.5	27.25
8.2.8a Ridge line - west	9 (dry)	<i>Corymbia clarksoniana</i>	<i>Allocasuarina littoralis</i>	10	53.5	7	53	7	26.75
8.2.8a Mid slope (west)	61(wet)	<i>Corymbia clarksoniana</i>	<i>Banksia integrifolia</i>	16	72.3	7	55.5	11.2	36.15



Regional Ecosystem	Site Number	Dominant Canopy Species (T1)	Dominant Sub-canopy Species (T2)	Canopy Height (T1)	Canopy Cover (T1)	Sub-canopy Height (T2)	Sub-canopy Cover (T2)	70% Height (T1)	50% Cover (T1)
8.2.8a East	31 (dry)	<i>Corymbia clarksoniana</i>	<i>Alphitonia excelsa</i>	10	63.5	7	44	7	31.75
8.11.8a Lower slope	42 (dry)	<i>Corymbia citriodora</i>	<i>Acacia disparrima</i>	18	93	5	12.5	12.6	65.1
8.11.8a Upper slope	61 (dry)	<i>Eucalyptus drepanophylla</i>	n/a	5	72.5	-	-	3.5	36.25
8.11.8b	60 (dry)	<i>Eucalyptus moluccana</i>	<i>Eucalyptus moluccana</i>	14	97	6	-	9.8	48.5
8.11.9a	165 (wet)	Grassland	n/a	n/a	n/a	n/a	n/a	n/a	n/a
8.11.10	52 (wet)	<i>Lophostemon confertus</i>	<i>Diospyros geminata</i>	5	90.5	1.5	n/a	3.5	45.25
8.12.14	142 (wet)	<i>Eucalyptus crebra</i>	<i>Alphitonia excelsa</i>	7	78.5	3	10.5	4.9	39.25

Data for Reference sites is presented in Appendix B.

No reference data was attained for REs 8.11.3a and 8.2.2. Whilst these area have been included on the current mapping, their occurrence was based off Queensland Herbarium (DERM, 2009) mapping only. Access to these areas was not permitted or was not targeted owing to their location outside of the proposed resort footprint. As no quaternary data was collected within these areas, it was assumed the Herbarium mapping was accurate.

### 2.3.3.3 Mapped Regional Ecosystems

Following ground-truthing, a total of 11 regional ecosystems were mapped for the Island, in addition to 2 subtypes. The conservation significance of vegetation communities was identified according to its status under the VMA. No mapped regional ecosystems are listed as 'Endangered' under the VMA.

Listed below in Table 11 are the regional ecosystems and associated area (in hectares). Figure 8 maps their spatial extent.

**Table 11: Regional Ecosystems as mapped at a scale of 1:10,000**

Regional Ecosystem	Status	Area (ha)
8.1.1	Least Concern	26.75
8.1.2	Least Concern	32.02
8.2.1	Of Concern	117.89



Regional Ecosystem	Status	Area (ha)
8.2.2	Of Concern	3.94
8.2.7b	Of Concern	14.98
8.2.7e	Of Concern	11.7
8.2.8a	Least Concern	145.33
8.11.3a	Least Concern	101.49
8.11.8a	Least Concern	423.34
8.11.8b	Least Concern	14.03
8.11.9a	Of Concern	71.32
8.11.10	Of Concern	258.69
8.12.14x2c	Least Concern	84.69

Whilst, some of the vegetation in Figure 9 has been mapped as 'Non-remnant' these areas can be attributed with a regional ecosystem type should, if allowed to regenerate, attain remnant status. As some areas contain no regrowth vegetation they are not ascribed with a regional ecosystem and are mapped as non-remnant 'Clear'. Non-remnant areas are mapped according to their potential regional ecosystem in Figure 9 and listed below in Table 12 along with their associated area.

**Table 12: Non-remnant associations**

Regional Ecosystem	Area (ha)
Non Remnant (8.2.1)	0.44
Non Remnant (8.2.7b)	7.4
Non Remnant (8.2.8a)	50.35
Non Remnant (8.11.8a)	16.11
Non Remnant (8.11.8b)	3.62
Non Remnant Clear	52.04

The following regional ecosystems were mapped by the Queensland Herbarium and not mapped in the current investigation:

- **8.3.6c** – bore holes in this area indicated that there was sand to depth. The vegetation was consistent with RE 8.2.7e which occurs elsewhere on the Island; and
- **8.3.13c** – Ground truthing in this area found the land form and soils were consistent with colluvial fanning and were derived from the upper slopes of land zone 11. As the upper canopy was dominated by Spotted Gum (*Corymbia citriodora*), RE 8.11.8a was assigned to this area.



## 2.3.3.4 Regional Ecosystem Descriptions

<b>Regional Ecosystem</b>	8.1.1
<b>Short Description (as per Queensland Herbarium, 2009)</b>	Mangrove vegetation of marine clay plains and estuaries. Estuarine wetland
<b>VMA Status</b>	Least Concern
<b>EPBC Act Status</b>	Not applicable
<b>Number of Secondary sites</b>	nil
<b>Number of Tertiary Sites</b>	1 dry
<b>Number of Quaternary Sites</b>	1 wet
<b>Additional Notes</b>	The floristics of this community was not studied in detail. Technical studies by FRC Environmental include comprehensive description of the community.

<b>Regional Ecosystem</b>	8.1.2
<b>Short Description (as per Queensland Herbarium, 2009)</b>	Samphire open forbland to isolated clumps of forbs on saltpans and plains adjacent to mangroves
<b>VMA Status</b>	Least Concern
<b>EPBC Act Status</b>	Not applicable
<b>Number of Secondary sites</b>	nil
<b>Number of Tertiary Sites</b>	1 dry, 1 wet
<b>Number of Quaternary Sites</b>	1 wet
<b>Additional Notes</b>	The floristics of this community was not studied in detail. Technical studies by FRC Environmental include comprehensive description of the community.

<b>Regional Ecosystem</b>	8.2.1
<b>Short Description (as per Queensland Herbarium, 2009)</b>	<i>Casuarina equisetifolia</i> open forest to woodland with <i>Ipomoea pes-caprae</i> and <i>Spinifex sericeus</i> dominated ground layer on foredunes
<b>VMA Status</b>	Of Concern
<b>EPBC Act Status</b>	Not applicable
<b>Number of Secondary sites</b>	1 dry
<b>Number of Tertiary Sites</b>	nil
<b>Number of Quaternary Sites</b>	2 dry, 1 wet
<b>Additional Notes</b>	The community matched the Queensland herbarium description. The reference site location was disturbed as evident by a camp site being established adjacent to the plot shortly after the site was established. The occurrence of the community in the vicinity of Clam Bay is devoid of trees, and includes several exotic species and was evidently grazed by goats.

<b>Regional Ecosystem</b>	8.2.2
<b>Short Description (as per Queensland Herbarium, 2009)</b>	Microphyll vine forest on coastal dunes.
<b>VMA Status</b>	Of Concern
<b>EPBC Act Status</b>	Critically Endangered



Number of Secondary sites	nil
Number of Tertiary Sites	nil
Number of Quaternary Sites	nil
Additional Notes	Not assessed during the investigation owing to lack of access.

Regional Ecosystem	8.2.7b
Short Description (as per Queensland Herbarium, 2009)	Palustrine wetland (e.g. vegetated swamp). <i>Eucalyptus robusta</i> , <i>Melaleuca quinquenervia</i> open-forest to open-woodland (7-16m tall).
VMA Status	Of Concern
EPBC Act Status	Not applicable
Number of Secondary sites	1 dry, 1 wet, 2 wet (nonrem)
Number of Tertiary Sites	nil
Number of Quaternary Sites	1 dry, 2 dry (nonrem), 4 wet (nonrem)
Additional Notes	The presence of <i>Eucalyptus robusta</i> is a defining element of this major vegetation community. Whilst some areas remain relatively integral in the vicinity of Leeke's and Blackall Creeks, it is evident that many areas have either been entirely cleared or thinned. The community appears to have retracted in part over time.

Regional Ecosystem	8.2.7e
Short Description (as per Queensland Herbarium, 2009)	Palustrine wetland (e.g. vegetated swamp). <i>Melaleuca quinquenervia</i> and/or <i>M. leucadendra</i> and/or <i>M. dealbata</i> and/or <i>M. viridiflora</i> var. <i>attenuata</i> open-forest to open-scrub (to closed forest) (5-18m tall).
VMA Status	Of Concern
EPBC Act Status	Not applicable
Number of Secondary sites	1 dry, 1 wet
Number of Tertiary Sites	nil
Number of Quaternary Sites	11 wet
Additional Notes	This major vegetation community is predominantly defined by the presence of <i>Melaleuca dealbata</i> . Assessment of associated vegetation and soil properties in areas where <i>Melaleuca dealbata</i> was the dominant canopy element indicated that the community did not represent a palustrine wetland. Drainage corridors dominated by a canopy of <i>Melaleuca quinquenervia</i> supported wetland soils and hence were regarded as palustrine wetlands. The <i>Melaleuca dealbata</i> dominated element of 8.2.7e often supported a shrub layer of dense <i>Lantana camara</i> or <i>Senna pendula</i> .

Regional Ecosystem	8.2.8a
Short Description (as per Queensland Herbarium, 2009)	Corymbia spp. And/or Eucalyptus spp. Open-forest to low woodland (3-22m tall).
VMA Status	Least Concern
EPBC Act Status	Not applicable
Number of Secondary sites	6 dry, 2 dry (nonrem), 2 wet, 4 wet (nonrem)
Number of Tertiary Sites	1 dry
Number of Quaternary Sites	39 dry, 7 dry (nonrem), 29 wet, 1 wet (nonrem)
Additional Notes	This regional ecosystem occurred over a greater area than previously mapped owing to the identification of a greater extent of land zone 2. It is variable in structure across GKI and frequently supported a taller



	canopy at the toe of sand dunes. This community was historically subjected to significant clearing in the area bound by Clam Bay, the old homestead and Blackall Creek.
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<b>Regional Ecosystem</b>	8.11.3a
<b>Short Description (as per Queensland Herbarium, 2009)</b>	Corymbia intermedia and/or Eucalyptus portuensis and/or C. clarksoniana and/or E. platyphylla and/or E. drepanophylla open-forest to woodland (15-32m tall).
<b>VMA Status</b>	Least Concern
<b>EPBC Act Status</b>	Not applicable
<b>Number of Secondary sites</b>	nil
<b>Number of Tertiary Sites</b>	nil
<b>Number of Quaternary Sites</b>	nil
<b>Additional Notes</b>	As no ground truthing of this area was conducted owing to restricted access, the Queensland Herbarium mapping (v. 6) was taken to be accurate.

<b>Regional Ecosystem</b>	8.11.8a
<b>Short Description (as per Queensland Herbarium, 2009)</b>	Corymbia citriodora woodland to open-forest (14-28m tall).
<b>VMA Status</b>	Least Concern
<b>EPBC Act Status</b>	Not applicable
<b>Number of Secondary sites</b>	2 dry, 2 wet (nonrem)
<b>Number of Tertiary Sites</b>	nil
<b>Number of Quaternary Sites</b>	21 dry, 1 dry (non-rem), 17 wet, 12 wet (nonrem)
<b>Additional Notes</b>	The location of this community on a slope was a strong influencing factor on the height of this vegetation. Upper slopes on shallow soils were lower in stature than lower slopes and colluvial deposits.

<b>Regional Ecosystem</b>	8.11.8b
<b>Short Description (as per Queensland Herbarium, 2009)</b>	Eucalyptus moluccana woodland to open-forest (15-28m tall).
<b>VMA Status</b>	Least Concern
<b>EPBC Act Status</b>	Not applicable
<b>Number of Secondary sites</b>	1 dry, 1 wet (non-rem)
<b>Number of Tertiary Sites</b>	nil
<b>Number of Quaternary Sites</b>	2 dry, 3 wet, 5 wet (non-rem)
<b>Additional Notes</b>	This variant of 8.11.8 occurs in a discrete area largely on colluvium on the southern edge of the Leeke's Creek estuarine area.

<b>Regional Ecosystem</b>	8.11.9a
<b>Short Description (as per Queensland Herbarium, 2009)</b>	<i>Themeda triandra</i> and/or <i>Heteropogon contortus</i> tussock grassland (0.3-1.2m tall), or <i>Xanthorrhoea latifolia</i> subsp. <i>latifolia</i> dwarf shrubland to open-heath (0.7- 1.2m tall).
<b>VMA Status</b>	Of Concern
<b>EPBC Act Status</b>	Not applicable
<b>Number of Secondary sites</b>	nil



<b>Number of Tertiary Sites</b>	1 wet
<b>Number of Quaternary Sites</b>	1 wet
<b>Additional Notes</b>	Field assessment confirmed the presence of this regional ecosystem and its presence on wind battered slopes around Clam Bay.

<b>Regional Ecosystem</b>	8.11.10
<b>Short Description (as per Queensland Herbarium, 2009)</b>	<i>Lophostemon confertus</i> and/or <i>Acacia spp.</i> And/or <i>Allocasuarina littoralis</i> +/- <i>Corymbia spp.</i> +/- <i>Eucalyptus spp.</i> +/- <i>Melaleuca viridiflora</i> open scrub to open forest on exposed hillslopes of islands, on metamorphosed sediments
<b>VMA Status</b>	Of Concern
<b>EPBC Act Status</b>	Not applicable
<b>Number of Secondary sites</b>	1 wet
<b>Number of Tertiary Sites</b>	1 wet
<b>Number of Quaternary Sites</b>	2 dry, 9 wet
<b>Additional Notes</b>	Large portions of GKI had been mapped as supporting a heterogeneous polygon of 8.11.10/8.12.14x2c. The current investigation split this mixed polygon in part, when ground truthing confirmed the presence of 8.11.10 on wind exposed south-east facing slopes. The RE gave way to areas of 8.11.9a in some locations.

<b>Regional Ecosystem</b>	8.12.14x2c
<b>Short Description (as per Queensland Herbarium, 2009)</b>	<i>Eucalyptus crebra</i> and/or <i>E. exserta</i> and/or <i>Corymbia clarksoniana</i> and/or <i>Lophostemon confertus</i> and/or <i>Corymbia trachyphloia</i> low woodland to open-forest (2.5-15m tall).
<b>VMA Status</b>	Least Concern
<b>EPBC Act Status</b>	Generally not applicable. Minor areas of vine scrub occurring in the vicinity of Clam Bay meet the definition of the Critically Endangered community – see Section 2.3.4.
<b>Number of Secondary sites</b>	1 wet, 2 dry
<b>Number of Tertiary Sites</b>	nil
<b>Number of Quaternary Sites</b>	25 wet, 2 dry
<b>Additional Notes</b>	This community was confirmed on the leeward side of hills supporting 8.11.10.



#### **2.3.4 EPBC Listed Communities**

The ToR and the Commonwealth's EPBC Online Protected Matters Search Tool (SEWPAC, 2010a) identified the potential presence of 'Littoral Rainforest and Coastal Vine Thickets of Eastern Australia' regarded as a threatened ecological community under the EPBC Act.

Three areas were found to meet SEWPAC's (2008) definition for the threatened ecological community as illustrated in Figure 10. Whilst the patch of regional ecosystem 8.2.2 was not accessible as part of the study, it was generally accepted that its extent was accurate based on aerial photographic interpretation and a quaternary attained from the beach adjacent to the patch.

#### **2.3.5 Local, Regional and National representation of Vegetation Communities**

Table 13 below summarises the Local, Regional and National representation of Vegetation Communities.



Table 13: National, State, Regional and Local Representation of the Broad Vegetation Groups of GKI

Regional Ecosystem	Regional Ecosystem Conservation Status	Broad Vegetation Group (BVG)	BVG Description (DERM, 2011)	Area (ha) GKI (as mapped by CEPLA)	Extent of RE within Protected Estate (in Qld) (DERM,2009 )	Remnant representation within State *	Remnant representation in Bioregion (regional) Central Queensland Coast *	Remnant representation within Subregion (local) Byfield *	Representation in Great Barrier Reef Marine Park Islands *	EPBC Communities (National) (Threatened Species Scientific Committee, 2008afi)
8.2.2	Of Concern	3b	Evergreen to semi-deciduous, notophyll to microphyll vine forest/ thicket on beach ridges and coastal dunes, occasionally <i>Araucaria cunninghamii</i> microphyll vine forest on dunes. <i>Pisonia grandis</i> on coral cays. (land zone 2)	3.94	Medium	51,483.35; (0.008%)	2,087.38; (0.19%)	34.05; (11.57%)	1,402.08; (0.3%)	3.94ha on GKI compared with total area in QLD 16,135ha & Total area Australia of 18,000ha.
8.11.3a	Least Concern	9d	Moist to dry open-forest to woodland dominated by <i>Eucalyptus portuensis</i> , <i>Corymbia intermedia</i> or <i>E. reducta</i> +/- <i>Syncarpia glomulifera</i> +/- <i>E. cloeziana</i> on ranges. (Can occur on land zones 2, 3, 8, 11, and 12)	101.49	Medium	51,8432.27; (0.02%)	191,028; (0.05%)	64,404.65; (0.16%)	1,434.07; (7.1%)	N/A
8.12.14x2c	Least Concern	9c	Open-forests of <i>Corymbia clarksoniana</i> (or <i>C. intermedia</i> or <i>C. novoguineensis</i> ), <i>C. tessellaris</i> ± <i>Eucalyptus tereticornis</i> predominantly on coastal ranges, Other frequent tree species include <i>Eucalyptus drepanophylla</i> , <i>E. pellita</i> , <i>E. brassiana</i> and <i>Lophostemon suaveolens</i> . (Can occur on land zones 2, 3, 5, 8, 11 and 12).	84.69	High	294,650.9; (0.03%)	65,829.62; (0.13%)	9,807.08; (0.86%)	11,602.52; (0.73%)	A small portion (0.86ha) of the 8.12.14x2c could be regarded as the EPBC community



8.2.8a	Least Concern	9e	Open-forests, woodlands and open-woodlands dominated by <i>Corymbia clarksoniana</i> (or <i>C. novoguineensis</i> or <i>C. intermedia</i> or <i>C. polycarpa</i> ) frequently with <i>Erythrophleum chlorostachys</i> or <i>Eucalyptus platyphylla</i> predominantly on coastal sandplains and alluvia. (land zones 2, 3, 5)	145.33	High	1,280,075.21; (0.01%)	66,880.55; (0.22%)	13,169.2; (10.6%)	1,400.33; (10.4%)	N/A
8.11.8a	Least Concern	10b	Moist open-forests to woodlands dominated by <i>Corymbia citriodora</i> . Can occur on land zones 5, 10, 11, and 12.	423.34	Low	1108218.72; (0.04%)	195,137.9; (0.22%)	12603.98; (3.36%)	616.02; (68.72%)	N/A
8.11.8b	Least Concern	13d	Woodlands dominated by <i>Eucalyptus moluccana</i> (or <i>E. microcarpa</i> ) on a range of substrates. (land zone 3, 11, 12)	14.03	Low	272,778.47; (0.005%)	4,515.26; (0.31%)	1,255.74; (1.12%)	14.03; (100%)	N/A
8.2.7e	Of Concern	22a	Open-forests and woodlands dominated by <i>Melaleuca quinquenervia</i> in seasonally inundated lowland coastal areas and swamps. (land zones 2, 3)	11.7	High	80,592.91; (0.01%)	3,152.33; (0.37%)	173.41; (6.75%)	101.77; (11.5%)	N/A
8.2.7b	Of Concern	22b	Open-forests and low open-forests dominated by <i>Melaleuca</i> spp. ( <i>M. saligna</i> , <i>M. leucadendra</i> , <i>M. clarksonii</i> or <i>M. arcana</i> ) in seasonally inundated swamps. (land zones 2, 3)	14.98	High	240,327.13; (0.01%)	5,255.93; (0.29%)	761.81; (2%)	42.43; (35.31%)	N/A
8.2.1	Of Concern	28a	Complex of open-shrubland to closed-shrubland, grassland, low woodland and open-forest, on strand and foredunes. Includes pure stands of <i>Casuarina equisetifolia</i> . (land zone 2)	117.89	High	182,931.56; (0.06%)	771.15; (15.29%)	237.57; (49.6%)	1,465.77; (8%)	N/A



8.11.10	Of Concern	28e	Low open-forest to woodlands dominated by <i>Lophostemon suaveolens</i> (or <i>L. confertus</i> ) or <i>Syncarpia glomulifera</i> frequently with <i>Allocasuarina</i> spp. on rocky hill slopes. (land zones 3, 5, 11, 12)	258.69	High	105,594.34; (0.24%)	51,819.15; (0.5%)	2,023.51; (12.78%)	16,477.6; (1.6%)	N/A
8.11.9a	Of Concern	32b	Closed-tussock grasslands and open-woodlands on undulating clay plains and upland areas. Dominant species include <i>Heteropogon triticeus</i> or <i>Themeda arguens</i> or <i>Sarga plumosum</i> or <i>Imperata cylindrica</i> or <i>Mnesithea rottboellioides</i> / <i>Arundinella setosa</i> . With areas of open-woodland dominated by tree species such as <i>Corymbia papuana</i> / <i>Terminalia</i> spp. / <i>Acacia ditricha</i> / <i>Piliostigma malabaricum</i> . (land zones 3, 5, 8, 9, 12)	71.32	High	54,646.62; (0.13%)	5,224.75; (1.37%)	584.40; (12.2%)	5,308.41; (1.3%)	N/A
8.1.1	Least Concern	35a	Closed-forests and low closed-forests dominated by mangroves. (land zone 1)	26.75	High	476,403.03; (0.006%)	41,113.76; (0.07%)	78.71; (34%)	4,011.83; (0.7%)	N/A
8.1.2	Least Concern	35b	Bare salt pans ± areas of <i>Halosarcia</i> spp. sparse-forbland and/or <i>Xerochloa imberbis</i> or <i>Sporobolus virginicus</i> tussock grassland. (land zone 1)	32.02	High	651,233.99; (0.005%)	14,523.21; (0.22%)	38.02; (84.21%)	661.16; (4.8%)	N/A



### 2.3.6 Wetlands

Application of the Queensland Wetland Mapping methodology to the area of regional ecosystem 8.2.7e (see Appendix D) mapped in the vicinity of the existing resort confirmed the presence of minor areas of wetland associated with drainage lines (see Figure 11). One line follows the path of Putney Creek whilst two other lines drain southwards.

It is speculated that the semi-permanent waterholes and lagoons impacted in the past, as a result of the airstrip construction (Ganter, 1985), were the same as those described by Creighton (1984) that formed part of the Putney Creek system. If this is the case then it is likely the two southwardly draining areas identified in the current study in part fed this larger semi-permanent system. The connection between this area and the Putney Creek system has been lost as a consequence of past disturbance.

All areas of mapped RE 8.1.1 and 8.1.2 also meet the definition of wetlands.

Whilst the area of regional ecosystem 8.2.7b was not thoroughly assessed for the presence of palustrine wetlands, as a precautionary approach, all areas were mapped as potentially supporting wetlands. Further investigations may reduce their mapped extent.

### 2.3.7 Floristics

#### 2.3.7.1 General

Floristic data was initially recorded according to standard Queensland Herbarium methods for secondary, tertiary and quaternary sites (Neldner *et al.*, 2005) then compiled along with other reliable data sources (i.e. Herbreces) to generate a consolidated species list (Appendix E).

Based on species identified as part of the current study and previously by the Queensland Herbarium (2010a), a total of 396 species have been recorded. Whilst species recorded by Creighton (1984) may include some not considered in this list, the errors within Creighton's list have meant it has been disregarded for the purpose of the current study. This said, Creighton did not confirm the presence of any species regarded as threatened under the NCA or the EPBC Act.



### 2.3.7.2 Significant Species

State significant species are defined as those listed as Endangered, Vulnerable or Rare under the NCWR and nationally significant species are those listed as Endangered or Vulnerable under the EPBC Act. Species were targeted on the basis of review of literature on preferred habitat types and correlation of this with habitats mapped and encountered in the field. Species identified by database searches in Section 2.3.1.14 of this report were targeted during field surveys. Table 14 below presents an analysis of these species representation on the Island.

The likelihood that a species or community is present was determined according to:

- **Known** - Remnant vegetation or sites are known to support the species because there are a significant number of individuals present that are self-maintaining.
- **Likely** - Remnant vegetation or sites likely to support the species because there is habitat containing essential resources of a size capable of supporting a significant number of individuals. Available habitat which is proximal to and buffering a known occurrence of a population.
- **Possible** - Remnant vegetation may provide suitable habitat which is potentially important however may be known to be suboptimal and there have been no reported records or sightings.
- **Unlikely** - Remnant vegetation is unlikely to support the species because there have been no reported sightings of individuals and/or the habitat is considered unsuitable based on consideration of literature and field knowledge.
- **Absence Known or Suspected** - Absences consistently recorded based on intensive targeted survey and consideration of habitat and distribution from literature.

An index of confidence is applied to the assessment being:

- **High** – personal observations or records from other reputable sources (for example, 90% certainty);
- **Medium** – information from sources of reasonable/mixed reliability (location accuracy / taxa identification) (for example, 70% certainty); and
- **Low** – information from sources of unknown reliability (for example, 50% certainty).

Table 14: Ground-truth analysis of Threatened Species recorded from Databases

Likelihood of Occurrence (Confidence)	Species Name	Common Name	Status		Reference of Record	Likelihood of Occurrence Explanatory Notes
			NCA	EPBC		



<b>Absence known or suspected (High)</b>	<i>Cycas megacarpa</i>		Endangered	Endangered	EPBC database	<ul style="list-style-type: none"> <li>▪ Batianoff &amp; Dilleward, (1988) did not record this species for any of the Keppel Bay Islands;</li> <li>▪ Cycads had not been recorded on GKI as part of any previous study or were noted during consultation; and</li> <li>▪ Thorough targeted searches did not record any species of cycad.</li> </ul>
<b>Absence known or suspected (High)</b>	<i>Cycas ophiolitica</i>	Marlborough blue	Endangered	Endangered	EPBC database	<ul style="list-style-type: none"> <li>▪ Batianoff &amp; Dilleward, (1988) did not record this species for any of the Keppel Bay Islands;</li> <li>▪ Cycads had not been recorded on GKI as part of any previous study or were noted during consultation; and</li> <li>▪ Thorough targeted searches did not record any species of cycad.</li> </ul>
<b>Absence known or suspected (Medium)</b>	<i>Taeniophyllum muelleri</i>	Minute Orchid, Ribbon-root Orchid	-	Vulnerable	EPBC database	<ul style="list-style-type: none"> <li>▪ Batianoff &amp; Dilleward, (1988) did not record this species for any of the Keppel Bay Islands;</li> <li>▪ This orchid had not been recorded on GKI; and</li> <li>▪ Targetted searches of tree trunks and branches in drainage lines for orchids did not record this species.</li> </ul>

The study did however confirm the presence of 7 species of local significance based on Batianoff & Dilleward (1988) including *Acacia leiocalyx subsp. leiocalyx*, *Canavalia sericea*, *Cyperus stradbokensis*, *Eucalyptus robusta*, *Ficus hispida*, *Hibbertia linearis* var. *floribunda* and *Pouteria sericea*. It should be noted that these are frequently very common species and significance is only attributed owing to the range extent of the species. This said *Eucalyptus robusta* is of local interest given it was previously only known from only 6-7 trees from GKI (Batianoff & Dilleward, 1995). The current study confirmed the presence of many more trees occurring as a co-dominant canopy element in one location.

The current study also confirmed the presence of the grass *Eriachne stipacea* which represents the southern most occurrence of this species based on the current Queensland Census (Bostock & Holland, 2010).



### 2.3.7.3 Species of Cultural, Commercial and Recreational Significance

Creighton (1984) lists a number of species that may have been exploited by the local Aboriginal people for food, medicines or material culture.

Table 15 below lists the species (recorded during the current study or Herbrechts) of plant used as food, medicine and material (as described by Creighton, 1984) and timber (as described by Lazarides and Hince, 1993).

**Table 15: Species of Cultural, Commercial and Recreational Significance Recorded within the Study Area.**

Species	Cultural resource (Creighton, 1984)	Commercial/recreational (Lazarides and Hince, 1993)
<i>Aegiceras corniculatum</i>	Medicine	
<i>Acronychia laevis</i>	Food	
<i>Allocasuarina littoralis</i>		Timber
<i>Alphitonia excelsa</i>	Medicine, Material	Fodder, Timber
<i>Allopteris semialata</i>	Material	
<i>Argusea argentea</i>	Food	
<i>Arundinella nepalensis</i>		Fodder
<i>Avicenna marina</i> var <i>eucalyptifolia</i>	Food	Fodder, Timber
<i>Banksia integrifolia</i>		Timber
<i>Blechnum indicum</i>	Food	
<i>Bulbostylis barbarata</i>		Fodder
<i>Capparis arborea</i>	Food	
<i>Calotis lappulacea</i>		Fodder
<i>Canavalia rosea</i>	Medicine	
<i>Capparis canescens</i>	Food	
<i>Carpobrotus glaucescens</i>	Food	
<i>Casuarina equisetifolia</i>	Food	Fodder, Timber
<i>Cenchrus ciliaris</i>		Fodder
<i>Cereops tagal</i>	Material	
<i>Chrysopogon fallax</i>		Fodder
<i>Clematocissis opaca</i>	Food	
<i>Clerodendrum floribundum</i>		Timber
<i>Clerodendrum inerme</i>	Food, Medicine, Material	
<i>Cordia dichotoma</i>	Food, Medicine, Material	
<i>Corymbia intermedia</i>	Food	Timber
<i>Corymbia citriodora</i>		Timber, Oil
<i>Corymbia tessellaris</i>	Medicine	Timber
<i>Cyclosorus interruptus</i>	Food	
<i>Dodonaea lanceolata</i>	Medicine	
<i>Dodonaea viscosa</i>	Medicine	Fodder, Timber
<i>Elaeocharis equisetina</i>		Fodder
<i>Eragrostis curvula</i>		Fodder
<i>Eriachne pallescens</i>		Fodder
<i>Eucalyptus camaldulensis</i>		Timber, Oil



Species	Cultural resource (Creighton, 1984)	Commercial/recreational (Lazarides and Hince, 1993)
<i>Eucalyptus crebra</i>	Material	Timber
<i>Eucalyptus drepanophylla</i>		Timber
<i>Eucalyptus exserta</i>		Timber
<i>Eucalyptus fibrosa</i>		Timber
<i>Eucalyptus moluccana</i>		Timber
<i>Eucalyptus robusta</i>		Timber
<i>Eucalyptus tereticornis</i>		Timber, Oil
<i>Excoecaria agallocha</i>	Medicine, Material	
<i>Evolvulus alsinoides</i>		Fodder
<i>Ficus obliqua</i>	Food, Material	Fodder
<i>Ficus opposita</i>	Food, Medicine, Material	
<i>Ficus racemosa</i>	Food, Material	
<i>Ficus platypoda</i>		Fodder
<i>Gahnia aspera</i>	Food	
<i>Geodorum densiflorum</i>	Food	
<i>Hibiscus tiliaceus</i>	Food, Material	
<i>Ipomoea pes-caprae</i>	Food, Medicine	
<i>Imperata cylindrica</i>	Material	Fodder
<i>Jasminum didymum</i>		Fodder
<i>Lomandra longifolia</i>	Food, Medicine, Material	
<i>Lophosetmon confertus</i>		Timber
<i>Lophostemon suaveolens</i>		Timber
<i>Meleleuca quinquenervia</i>	Medicine, Material	Timber, Oil
<i>Pandanus tectorius</i>	Food, Medicine, Material	
<i>Pandorea pandorana</i>		Fodder
<i>Paspalidium gracile</i>		Fodder
<i>Phragmites australis</i>	Food, Material	
<i>Planchonia careya</i>	Food, Medicine, Material	
<i>Pouteria sericea</i>	Food	
<i>Pteridium esculentum</i>	Food	
<i>Rhizophora stylosa</i>	Food, Material	
<i>Suaeda australis</i>	Food	
<i>Stephania japonica</i>	Medicine, Material	
<i>Themeda triandra</i>		Fodder
<i>Trema tomentosa</i>		Fodder
<i>Typha domingensis</i>	Food	

#### 2.3.7.4 Weed Species

Field investigations identified 81 weed species occurring within the study area, of these 8 were declared pests under the LPA. These species are largely concentrated in areas of current or previous disturbance delineated by non-remnant areas evident in Figure 8. Of particular note is the occurrence of the species *Sporobolus pyramidalis* recorded as a clustering of 4-5 plants in the west of the Island outside of the study



area. Whilst species such as this are currently isolated, they have the potential to spread widely if left unmanaged.

### 3.0 TERRESTRIAL FAUNA

#### 3.1 REGULATORY FRAMEWORK

Major legislation pertaining to the protection and management of terrestrial fauna are listed below in Table 16.

**Table 16 – Major legislation pertaining to the protection and management of terrestrial fauna**

Type	Title	
Commonwealth Acts/Regulations	<i>Environment Protection and Biodiversity Conservation Act 1999 (Cwth)</i>	<p>The <i>Environment Protection and Biodiversity Conservation Act 1999</i> (Cth) (EPBC Act) prescribes the Commonwealth's role in environmental assessment, biodiversity conservation and the management of protected areas. Under the environmental provisions of the EPBC Act, actions that are likely to have a significant impact on a matter of National Environmental Significance (NES) are identified as "controlled actions" and cannot be undertaken without approval under the EPBC Act.</p> <p>The matters of NES that are relevant to the terrestrial fauna component of the Project are listed threatened species and migratory species.</p>
	<i>Great Barrier Reef Marine Park Act 1975, Great Barrier Reef Marine Park Regulations 1983, and the Great Barrier Reef Marine Park Zoning Plan 2003</i>	The <i>Great Barrier Reef Marine Park Act 1975</i> main object is to provide for the long term protection and conservation of the environment, biodiversity and heritage values of the Great Barrier Reef Region.
State Acts/Regulations	<i>Land Protection (Pest and Stock Route Management) Act 2002 and Land Protection (Pest and Stock Route Management) Regulation 2003</i>	The <i>Land Protection (Stock and Pest Route Management) Act 2002</i> (LPA) and the <i>Land Protection (Pest and Stock Route Management) Regulation 2003</i> provides for management of declared pests in Queensland. Landholders have an obligation to control declared pests that are known to occur on their property.
	<i>Nature Conservation Act 1992 and Nature Conservation (Wildlife) Regulation 2006</i>	<p>The <i>Nature Conservation Act 1992 (Qld)</i> (NCA) provides for the conservation and management of Queensland's native wildlife.</p> <p>The <i>Nature Conservation (Wildlife) Regulation 2006</i> (NC Regulation) lists the wildlife considered extinct in the wild, endangered, vulnerable, near threatened and least concern. It states the declared management intent for each class of wildlife. This also includes management intent for prohibited wildlife.</p>
	<i>Vegetation Management Act 1999 and Vegetation Management Regulation 2000</i>	<p>The <i>Vegetation Management Act 1999</i> (VMA) regulates clearing of vegetation in order to:</p> <ul style="list-style-type: none"> <li>▪ conserve remnant endangered, of concern and not of concern regional ecosystems;</li> <li>▪ conserve vegetation in declared areas;</li> <li>▪ ensure clearing does not cause land degradation,</li> <li>▪ prevent the loss of biodiversity; maintain ecological process;</li> <li>▪ manage the environmental effects of clearing; and</li> <li>▪ reduce greenhouse gas emissions.</li> </ul> <p>The VMA also regulates particular regrowth vegetation. Under the VMA 'regulated regrowth' is vegetation identified on the regrowth vegetation map as high value regrowth vegetation or located within 50m of a watercourse identified on the regrowth map as a regrowth watercourse or contained in a category C area shown on a Property Map of Assessable Vegetation.</p>



### 3.2 Nomenclature, Terminology and Species Conservation Status

Fauna refers to all vertebrate fauna (excluding fish and marine mammals). The nomenclature used in this chapter follows Van Dyck and Strahan (2008) for mammals, Readers Digest (1986) for birds and Wilson and Swan (2010) for reptiles and amphibians. The terms shorebirds and waders are generic terms used to describe both resident and Migratory species that commonly feed by wading in shallow water or saturated substrates along shores of lakes, rivers and the ocean (Geering *et. al.*, 2007). These terms refer specifically to birds within 13 families of the order Charadiiformes (Geering *et. al.*, 2007).

The conservation status of fauna refers to species listed under the NC Regulation and the EPBC Act. Species that have a conservation status of Critically Endangered, Endangered, Vulnerable or Near Threatened are listed as species of conservation significance under the NC Regulation and the EPBC Act.

Species of “State” or “Regional” significance are those identified by DERM (EPA, 2008d) as threatened priority taxa for the Central Queensland Coast bioregion.

### 3.3 METHODOLOGY

#### 3.3.1 Desktop Assessment and Literature Review

To assist in identifying likely fauna species and habitat that could be encountered and those that would need to be targeted during field work, a search of relevant literature and databases were undertaken. The following databases were assessed to provide a basis for assessment of fauna species distribution and habitat that should be targeted:

- Commonwealth’s EPBC Online Protected Matters Search Tool (SEWPAC, 2010);
- EPA’s WildNet database (EPA and QPWS, 2010);
- Queensland Museum (Queensland Museum, 2010); and
- Birds Australia (Birds Australia, 2007).

The literature and databases identified a number of species of conservation significance that may use the study area. The study area for this purpose is defined according to Figure 1 and includes the Marine services precinct, Fisherman’s Beach Resort Precinct and Clam Bay Resort Precinct. Figure 1 also illustrates landmarks on the Island that are referred to throughout. Based on a review of the habitat requirements, distribution, movement and breeding patterns of species, the likelihood that a species or community is present was categorised according to the following definitions:



- **Known** - species positively recorded by this survey or other survey by qualified ecologists during past 30 years;
- **Likely** - based on the presence of suitable habitat and high precision proximate records;
- **Possible** - suitable habitat present for the species, but no recent or precise GIS based records from the study area or proximate areas; and
- **Unlikely** - based on a lack of suitable habitat and lack of proximate records.

### 3.3.2 Consultation

CEPLA sought expert advice on issues relating to both scheduled species and general fauna inhabitation of the Island. This was in the form of phone conversations, face-to-face meeting and email communication with DERM officers and other experts. CEPLA also sought residents input when encountered, specifically relating to their knowledge of fauna species identified, photographic records and other observations they had made.

### 3.3.3 Field Survey

CEPLA undertook the fauna field investigation in line with approved permitting as follows:

- DPI Scientific User Registration 319;
- EPA Queensland Parks and Wildlife Service Scientific Purposes Permit WISP05496608; and
- Animal Ethics Approval CA 2008/07/285.

In order to assess the suite of species present on site the methodology described in the sections below was employed. Over the duration of the survey, vegetation communities within the proposed development footprint and greater environments were assessed for fauna biodiversity. Two survey periods, one in September 2010 (dry season survey) and one in February 2011 (wet season survey) were undertaken to sample across seasons and therefore increase the probability of detecting the range of migratory species identified in database searches. The following survey techniques were used:

- Diurnal/nocturnal bird searches;
- Ground searches;
- Elliott trapping;
- Pitfall trapping;
- Hair funnel trapping;
- Spotlighting;



- Transect spotlight counts (Possum densities);
- Anabat bat detection;
- Call playback; and
- Habitat assessment.

Opportunistic observations (of mammals, birds, reptiles, amphibians and insects) were also recorded as were observations outside of the disturbance footprint while moving between survey locations.

In order to systematically sample the habitats present on the Island, 10 sampling sites were established across the Project footprint. Within each sampling site (referred to as area 1, area 2 etc) a 100m transect was established for Elliott traps and hair funnel traps. The wet season survey sampling sites were slightly modified (area 9 and 10 were added) to respond to refinement of the Project footprint. These areas (1-10) formed the focus points for the survey techniques discussed in detail in the following paragraphs.

#### ***3.3.3.1 Diurnal/Nocturnal Bird Survey***

Dedicated bird watching was undertaken for 20 minutes per area (Figure 12) every morning in the early morning and late afternoon on each day of the survey (equating to approximately 3 hours each day). During this time, two observers walked quietly over selected areas (point surveys) of the site to detect birds present both through direct observation and through calls. Birds were also recorded when opportunistically observed during other survey activities. Nocturnal birds were searched for as part of spotlighting and call playback activities on site (described below).

Migratory shorebird searches were undertaken along the beach-front and tidal creeks. Point surveys of these areas were undertaken on foot for 20 minutes and sampled across a range of tide heights. A survey from a boat of the beaches at low tide was undertaken for a total of 2.5 hours during the dry season survey on 26 September 2010 between 2:00pm – 04:30pm. Leeke's Estuary (Figure 1) was walked during the wet season survey on 21 February 2011 at low tide (incoming) between 06:20am – 09:30am. A portion of the Estuary from the mouth to the shed was surveyed over a period of 3 hours to actively search for feeding and roosting waders.

Techniques used to target key threatened and/or migratory species are also detailed in Appendix H. Searches for threatened species followed EPBC Guidelines (SEWPAC, 2010) where the likelihood of occurrence was regarded as 'Possible' - 'Known'.



### 3.3.3.2 Ground Searches

Ground searches were undertaken at each area (Figure 12) as part of morning and afternoon survey activities. This entailed the following:

- Active searches for cryptic fauna (such as reptiles) were undertaken including turning over logs, disturbing woodpiles, lifting loose bark on trees, investigating hollow logs and disturbing leaf litter;
- Tracks, scats, animal remains, movement pathways, feeding signs and any other traces of animal presence were recorded when observed. Where practical, scats and other traces were collected and sent to 'Dead Finish' for further analysis; and
- Trees were closely observed for scratch marks, nests and hollows to determine their value as habitat.

### 3.3.3.3 Elliott Trapping

18 size A Elliot traps and 2 size B Elliot traps were distributed along 100 metre transects in areas 1, 2, 3, 4, 5, 6, 7, 8, 9 and 10 for 4 nights in each season (20 traps per transect). Areas 9 and 10 were only surveyed during the wet season. Traps were positioned approximately 5 metres apart and baited alternately with a peanut butter and oat mixture, sweet potato or salami. Traps were positioned in a secure sheltered position and insulated by piling leaf litter on top of the trap. Traps were checked each morning, closed and then opened each afternoon. Figure 12 indicates the locations of Elliott trap lines.

### 3.3.3.4 Pitfall Trapping

Pitfall trap lines were positioned in areas 1, 2, 3, 4, 5, 6, 7, 8, 9 and 10 (areas 9 and 10 only during the wet season). The pitfalls lines consisted of 3 x 10L buckets or 3x 20L buckets spaced at 7m apart. Cover including sticks, larger pieces of wood (that may act as floating platforms to prevent drowning) and leaf litter were placed in the bottom of each bucket. Pieces of wet sponge were also placed in the bottom of buckets to ensure a source of drinking water was available. Pitfall traps were checked in the morning, midday, early evening and during spotlighting. Traps were closed (i.e. lids placed on buckets) when inclement weather prevented the safe use of the traps. Figure 12 indicates the locations of pitfall trap lines.

### 3.3.3.5 Hair Funnels

A total of 40 hair funnels were located in trees and on the ground along Elliott trap transects over areas on site (10 funnels per transect line). The hair funnels were baited with peanut butter, honey and oat mix. Hair funnels were left *in situ* over the 5 days / 4 nights of the survey after which they were collected and inspected for animal hairs. Funnels containing hairs were analysed by the specialist consultancy 'Dead Finish'.



### 3.3.3.6 Spotlighting

Spotlighting was carried out on each night of the survey for 2 hours each night with each survey area covered over the study duration. Over 8 nights in each wet and dry season surveys, 2 observers surveyed areas on site on foot using headtorches and a spotlight. Fauna were detected through direct sightings and via calls.

### 3.3.3.7 Spotlight Transect (Possum Densities)

Following similar methodology to Cooke *et. al.* (2006), two ecologists undertook walked or driven transects over four nights during the wet season survey (refer to Figure 13 for transect location). The length and width of each transect was measured and the number of possums sighted from the start to end of each transect were counted. Transect length and width was used to calculate transect area in hectares. The number of possums per hectare was then calculated for each transect. Transect length; width and area are presented below in Table 17:

**Table 17: Transect length, width and area**

Transect	Transect Distance (m)	Transect width (m)	Count Area (ha)
T1	390	25	0.97
T2	360	15	0.54
T3	320	15	0.48
T4	700	25	1.75

### 3.3.3.8 Anabat Bat Detection

Microchiropteran bat activity on site was surveyed using an ANABAT II Ultrasonic Bat Call detection unit. The ANABAT unit was placed in areas nearby potential flyways and left to record during the night (Figure 12). The unit was retrieved each morning. Recordings were sent to Greg Ford, a Toowoomba based ANABAT echolocation and call analysis specialist, for analysis.

### 3.3.3.9 Call Playback

Call playback was carried out following spotlighting on 5 nights of the dry season survey and 6 nights of the wet season survey. Over the course of the survey, call playback was undertaken in areas 1, 2, 3, 4, 5, 6, 7, 8, 9 and 10 (Figure 12). Calls of the species listed below were played on each night for 3 minutes, followed by a 3 minute listening period to detect any responses elicited.

- Southern Boobook (*Ninox novaeseelandiae*);
- Tawny frogmouth (*Podargus strigoides*)
- White-throated Nightjar (*Eurostopodus mystacalis*);
- Powerful Owl (*Ninox strenua*);
- Barking Owl (*Ninox connivens*); and
- Grass Owl (*Tyto capensis*) (grassland sites only).



### 3.3.3.10 Habitat Assessment

Habitat assessments were undertaken throughout the site in each vegetation community and further assessments were carried out where changes in vegetation structure were noted. Habitat mapping was applied across the site using a combination of the field verified RE mapping and habitat assessment proformas.

Habitat Assessments were undertaken at points across the site using a standard pro-forma (refer Appendix F) to allow a robust and repeatable assessment to gauge habitat values. Information relevant to habitat assessment including integrity, structural diversity, fauna refuge availability (i.e. tree hollows) and waterway types (as shown in the pro-forma in Appendix F) was collected for a 20 metre radius from a central point. Where a waterway was present an additional waterway assessment was also completed to identify additional habitat values. The results of the habitat assessments were applied to database search outputs and the findings of the detailed fauna survey in order to provide informed judgment on the use of the study area by both common and threatened fauna species.

Sites at which habitat assessments were completed are indicated in Figure 14. Habitat assessment site numbers relate to the completed habitat assessment proformas.

Habitat was value ranked according to the following criteria (Table 18) as well as ground truthed vegetation assessment and mapping (i.e. remnant/non-remnant/disturbed) in earlier sections of this report.

**Table 18: Habitat Value Rank and Description of Criteria**

Habitat Value Ranking	Description
<b>High - Very High</b>	<ul style="list-style-type: none"> <li>▪ Remnant integral vegetation; and</li> <li>▪ The community is not highly infested by weeds. Desirably, no exotic species are present, however some cover is acceptable as this can sometimes provide habitat values e.g. lantana provides good cover for small birds in the absence of the native shrub layer; and</li> <li>▪ Human disturbance minimal; and</li> <li>▪ Diversity in ground layer components – 3 or more ground layer components (e.g. logs and leaf litter and rocks) present; and</li> <li>▪ 2 or more hollows present in hollow forming species;</li> <li>▪ Well connected to other remnants; and</li> <li>▪ May contain integral waterway or wetland.</li> </ul>
<b>Moderate - High</b>	<ul style="list-style-type: none"> <li>▪ Regrowth vegetation; or</li> <li>▪ Remnant vegetation separated from other remnants by &gt;50metres; and</li> <li>▪ Disturbance to ground layer and understorey (e.g. ground layer mown and all shrubbery cleared).; and</li> <li>▪ Exotic species present, in low numbers; and</li> </ul>



	<ul style="list-style-type: none"> <li>▪ Human disturbance present, however not significantly degrading; and</li> <li>▪ 1 or no hollows present;</li> <li>▪ Connected to other remnants; and</li> <li>▪ May contain waterway with low levels of disturbance.</li> </ul>
<b>Very Low - Low</b>	<ul style="list-style-type: none"> <li>▪ Sparse or cleared vegetation (not remnant, not regrowth); or</li> <li>▪ Regrowth vegetation separated from other remnants by &gt;50metres; and</li> <li>▪ Significant disturbance evident in ground layer and understorey; and</li> <li>▪ Exotic species present, infestations of some weed species may also be present; and</li> <li>▪ No hollows present;</li> <li>▪ Significant human disturbance; and</li> <li>▪ May contain highly modified or degraded waterway.</li> </ul>

### 3.3.4 LIMITATIONS

Limitations that may have prevented the detection of some fauna include:

- Weather constraints (unusually high rainfall events for dry season survey and flooding events at the time of the wet season survey). This in combination with cyclonic events elsewhere may have disrupted the migration patterns of some species;
- Pitfall trapping was limited by rainfall events during both the dry season and the wet season survey resulted in necessary trap closure on a number of nights; and
- Rigorous insect surveys were not undertaken therefore observational records of species are likely to represent only a small portion of those actually utilising the Island.

## 3.5 DESCRIPTION OF ENVIRONMENTAL VALUES FAUNA

### 3.5.1 Literature Review

To establish the extent of existing information and determine information gaps a number of studies, reports, maps and databases relevant to the Project area were reviewed.

These studies are summarised in Table 19 along with ranking indicating their relevance to the Project, where:

**Rank 1** = High. These studies have generally been completed within the project area or were a directly relevant regional study and therefore includes data specific to the project area. The methodology included in the study is robust and may be applied to the terrestrial flora study process.

**Rank 2** = Moderate. These studies have generally been completed within the same bioregional area however they may not be specific to the project area. The



data may be provided in a way that limits the basis of interpretation (e.g. Herbrechts records may include a level of precision that is relatively coarse).  
**Rank 3** = Low. Although the study was not directly relevant to the area of proposed impact because it was completed outside of the project area the broad interpretations and methods can be applied to the current investigation.

Table 19 - Relevance ranking of Literature Reviewed

Title	Author (s)	Relevance Rank
<b>Project Specific Studies</b>		
Keppel Islands Environmental Survey A Baseline for Archaeological Reconstructions and Resource Management	Creighton (1984)	1
Spring Survey of Shorebirds at Great Keppel Island	Black and Houston (2010)	1
Autumn Survey of Shorebirds at Great Keppel Island	Black and Houston (2011)	1
The History and Development of the Keppel Islands, A thesis submitted in partial fulfilment for the Degree of Bachelor of Arts with Honours	Ganter (1985)	1
Community Environment and History Keppel Bay Studies and specifically Chapter 9 Coastal Intruders	Mullins, Danaher and Webster (2006) Danaher (2006) (in Mullins, Danaher and Webster eds)	1
Rapid Assessment of Terrestrial Regional Ecosystems in relation to the proposed resort development on Great Keppel Island	CQ Environmental (2009)	1
A concise field guide to the Birds of Great Keppel Island	Briggs (2006).	1
<b>Regional Fauna Investigations</b>		
Biodiversity Planning Assessment Central Queensland Coast Flora, Fauna and Landscape Expert Panel Report	Environmental Protection Agency (2006)	2
The outstanding universal value of the Great Barrier Reef World Heritage Area	Lucas <i>et al.</i> (1997)	2
Fitzroy Natural Resource Management Region Back on Track Actions for Biodiversity	DERM, 2010c	2
<b>Corridor/Habitat Mapping</b>		
Essential Habitat Mapping Version 3	DERM, 2011c	1
<b>Databases</b>		
Bird List for ten minute square containing point 150.93561, -23.17754	Birds Australia (2007)	1
Wildlife Online Extract for 23.1478 – 23.199; 150.9274 – 150.9969	EPA and QPWS (2010)	1
Queensland Museum Zoological Collections Database Extract	Queensland Museum (2010)	1
Protected Matters Database Environmental Reporting Tool -23.14788, 150.92548; -23.19957, 150.92548; -23.19957, 150.99574; -23.14788, 150.99574,	SEWPAC (2010)	1

### 3.5.1.1 Creighton 1984

Creighton (1984) observed that the macropod family has not been recorded previously from any of the Keppel Islands. Brushtail Possums (*Trichosurus vulpecula*) were observed to be common on Great Keppel Island and despite the contention that Possums were introduced, Creighton notes that there is no evidence to support or refute this claim. GKI previously supported a population of Koala's (*Phascolarctos*



*cinereus*), but was believed to be locally extinct with the last reported sighting in the late 1960's.

Of note, during field work in the 1984 report, no rodents or carnivorous marsupial or Bandicoot were observed, although they were speculated as likely to be present. Common reptiles were recorded including Sand Goanna (*Varanus gouldii*), Common Tree Snake (*Dendrelaphis punctulata*), Blue-tongue Lizard (*Tiliqua scincoides*) and Carpet Python (*Morelia spilota*).

GKI supported populations of Goat, Cattle, Sheep and Pigs both prior to and some also during 1984. Cattle and Pigs were only present prior to 1984. The feral Goat population of GKI in 1984 was difficult to estimate however, it was suggested that the population was in excess of 1,500 Goats. These Goats have altered the natural vegetation communities and caused localised erosion on the eastern and south-eastern to southern headlands and dunes of the Island.

#### **3.5.1.2 Ganter (1985)**

Ganter (1985) states that “*Opossums were introduced to the Keppel Islands by fishermen during the Depression to supplement their income*”. Other studies including Creighton (1984), Mullins *et al.* (2006) and Danaher (2006) also comment on whether possums were native to the Island or were introduced and it appears to be a point of contention.

#### **3.5.1.3 Mullins *et al.* (2006)**

Mullins *et al.* (2006) suggests that possums were introduced and present in higher than sustainable numbers. Mullins *et al.* (2006) states that:

*“...these possums have been destroying gum trees on the islands because of their relatively large populations. They eat all of the foliage and regrowth on certain trees and this eventually kills the tree.”*

Mullins *et al.* (2006) recognises goats as a destructive force on the Keppel Bay Islands and reports that goats caused erosion, localised extinction of flora as well as destruction of habitat for species such as quail.

In Chapter 9 Mullins *et al.* reports that brush-tail possums were once extinct on the Islands but were reintroduced by fishermen in the 1920's to North Keppel and Great Keppel. According to Mullins *et al.*, possums became extinct due to hunting by Aborigines and dingoes.



#### **3.5.1.4 Black and Houston 2010**

Black and Houston of Central Queensland University undertook a survey of Shorebirds on Great Keppel Island in October 2010. This survey was carried out within the proposed Project footprint. Surveys were taken at the “Leeke’s Creek Estuary” at low tide and one high tide as well as a boat survey of the Island. Over the two day survey a total of two Wandering Tattlers, two Grey-tailed Tattlers and three Whimbrels and two Sooty Oystercatchers (near threatened under the NCA).

#### **3.5.1.5 Black and Houston 2011**

Black and Houston of Central Queensland University undertook a follow up survey to their October 2010 survey, from 21-23 March 2011 intended to coincide with the northward passage of migrant shorebirds. This involved survey of “Leeke’s Creek Estuary” at low tide and high tide as well as Putney Beach at early morning and late afternoon. Surveys were also carried out within the proposed development footprint from “Leeke’s Creek estuary to Clam Bay”. Over the three day survey very small numbers of migrant shorebirds were recorded. A total of two Whimbrels (migratory shorebird), One Beach Stone-curlew (vulnerable NCA), four Pied Oystercatchers, two eastern Ospreys (migratory EPBC), three Nankeen Kestrels and two species of swifts were identified. A total of 37 bird species were recorded during the three day survey on Great Keppel Island.

#### **3.5.1.6 The outstanding universal value of the Great Barrier Reef World Heritage Area Lucas *et al.* 1997**

Appendix 4 of Lucas *et al.* (1997) document outlines a number of natural heritage attributes including birds, butterflies, crocodiles and terrestrial reptiles. The Great Barrier Reef World Heritage Area (GBRWHA) is a globally important area for seabirds particularly important as breeding colonies for 22 species on 25% of GBR Islands. Of particular relevance to GKI, the Beach Stone Curlew (*Esacus neglectus*), classed as Vulnerable, has been recorded from 134 islands in the north and south GBRWHA. Avifauna of the continental islands are comparable to the adjacent mainland (Stokes *et al.*, 1997 in Lucas *et al.*, 1997).

The butterflies of the GBRWHA are reported as the subject of limited study with good potential for future research. Several rare species of butterflies have been recorded from GBR islands and two endemic species (from more northern islands) have been described.

Crocodiles occur in coastal regions north of Rockhampton. At the time of writing, crocodile breeding had not been recorded from GBR Islands. Snakes and lizards of



the GBRWHA Islands recorded at the time of writing included 6 species of geckoes, 1 legless lizard, 2 goannas, 9 snakes, 1 python, 3 colubrids and 4 elapids.

#### **3.5.1.7 CQ Environmental 2009**

A rapid assessment of the Island was undertaken over two days. Several fauna values were identified. Feral goats were identified as abundant occurring around the old homestead.

Biodiversity and wildlife corridors were identified. One was identified along Leeke's Estuary and east west corridor and a north south corridor connecting hills to the sand wetland and across sand plains to terrestrial systems. A second corridor was identified "along the esplanade behind Leeke's Beach and encompassing the *Melaleuca* wetlands and associated ecosystems".

#### **3.5.1.8 Birds of Great Keppel Island (Briggs, 2006)**

The guide identifies that approximately 90 species of bird have been seen on GKI, however this is qualified by noting many are migratory visiting at a certain time of year or others that arrive when certain foods are available. The offshore islands are also included as habitats of GKI, including Halfway Island, Humpy Island, Middle Island and rocky outcrops such as Passage Rocks, Bald Rocks and Sykes Rocks. This guide (Briggs, 2006) provides a list of bird species by month that they have been sighted.

#### **3.5.1.9 Biodiversity Planning Assessment (EPA, 2006)**

With regard to fauna values the BPA maps portions of GKI as regionally significant due to the Beach Stone Curlew record in Leeke's Estuary (see Figure 1 for area identified as Leeke's Estuary) and an associated buffer to this record.

#### **3.5.1.10 Essential Habitat Mapping**

Essential habitat mapped by DERM (2011c) is present on the Island, and covers all of the Leeke's Estuary and a large area abutting Leeke's Beach. Figure 15 illustrates the extent of essential habitat. The mapped essential habitat is for Beach Stone Curlew (*Esacus magnirostris*). Essential habitat for this species is defined as "All regional ecosystems along ecotone with beach" (DERM, 2011c). The vegetation community includes undisturbed beaches, littoral habitat, including surf and sheltered areas especially near river mouths and mangrove backed areas.

#### **3.5.1.11 Fitzroy Natural Resource Management Region Back on Track Actions for Biodiversity**

DERM (2010c) identified Priority Species and Data Deficient species for the Fitzroy Natural Resource Management Region. This region includes GKI. This report



identifies one frog, eighteen reptiles, seven birds and eleven mammals as priority species in the region. Threats and management actions are also identified for priority species. Data Deficient species were those species in the region that were regarded as too poorly known to apply the priority species criteria to. These species are identified as a research priority (DERM, 2010c).

### **3.5.2 Consultation**

Communication with a number of the long term residents of the Island indicate that the island is home to various small mammal species often sighted. The beach stone curlew has been sighted in Leeke's Estuary. The black Whipsnake and Children's Python were mentioned by residents. Residents had observed that although some wader species use the island, their numbers were low.

Consultation with DERM officers indicate that DERM has not undertaken detailed fauna investigations on GKI. The rusty monitor has been recorded by DERM officers in the past in Leeke's Estuary (Mr. John McCabe, Pers. Comm, 10/03/2011). It is known that Great Keppel Island is not used by high numbers of seabirds compared to coastal numbers (Mr. John McCabe, Pers. Comm, 10/03/2011). On the nearby mainland there are a number of areas that have very high numbers of wader bird populations including shoalwater Bay, Corio Bay, Long Beach Streubers South Keppel Sands, Fitzroy Delta and Northern Curtis Island (Mr. John McCabe, Pers. Comm, 10/03/2011).

Consultation with several Island residents during the course of the dry and wet season surveys revealed local knowledge of Island inhabitation by a range of species. Several residents reported Black Rat as occurring on their properties and around the Resort Precinct. Mr C Svendsen and Ms L Malan were able to provide photographs of several fauna species they observed throughout the Island. These included Echidna, Blue-tongue Lizard, a few species of marine turtles, a land turtle that they identified as the Eastern Snake-necked Turtle (recorded from near the homestead), Rusty Monitor and several different species of amphibian. The frogs identified by Mr Svendsen and Ms Malan included the Green Stripe Frog, Green Tree Frog, Striped Rocketfrog, Striped Marsh Frog, Ruddy Tree Frog and Eastern Sedge Frog.

Ms K Christie was also able to provide some photographs of species she has observed on GKI. These included Pink Galahs (which she identified as occasional visitors to GKI), Brown Goshawk, and Rose-crowned Fruit Dove (identified as the only one she had seen on GKI). Ms Christie also identified a number of commonly occurring species on GKI as Lorikeets, Echidna, Kookaburra, Bar-shouldered Dove, Osprey, Bush-stone Curlew, "Fruit-bat" and Long-necked Turtle.



### 3.5.3 Records of Fauna

Several databases and reports were reviewed to identify species scheduled under either the *Nature Conservation (Wildlife) Regulation 2006* or the *Environment Protection and Biodiversity Conservation Act 1999* that are known to occur within, or within the vicinity, of the project area. Specifically these included:

- Wildnet (EPA, 2010). This database incorporates information from a number of datasets held by the EPA. The reliability of some of the data is variable depending on the original source (e.g. Herbrechts data is more reliable than data collected from community based programs);
- EPBC Protected Matters Database (SEWPAC, 2008; SEWPAC, 2010a). The database provides an indication of species likely to occur in an area, in part, based on habitat modelling;
- Birds Australia (Birds Australia, 2010). The database provides a bird list for a specified coordinate. This is based on Atlas data. Observers undertake repeat surveys at specific points allowing monitoring of bird populations over time; and
- Queensland Museum Zoological Collections Database (Queensland Museum, 2010). This is information based on the museums collection of vertebrates.

The review of existing databases returned a total of 42 species of scheduled fauna. Of these 10 are known to occur, 2 are likely to occur, 25 may possibly occur and 5 are unlikely to occur on Great Keppel Island. Assessment of the existing location information and data relating to the species is given in Table 20 below. Existing habitat requirements and distribution information is tabulated in Appendix H.

An analysis of the specimen-backed data (Queensland Museum) indicates no confirmed threatened species records in the Study Area. This may only be a reflection of the extent of existing surveys or alternatively may represent an accurate indication of a paucity of rare or threatened fauna species.



Table 20: Assessment of Scheduled Fauna Returned in Databases

Species	NCA Status	EPBC Status	Likelihood of Occurrence*
<i>Accipiter novae-hollandiae</i> Grey Goshawk	NT		Possible
<i>Actitis hypoleucos</i> Common Sandpiper		Marine, Migratory	Possible
<i>Apus pacificus</i> Fork-tailed Swift		Marine, Migratory	Known
<i>Ardea ibis</i> Cattle Egret		Marine, Migratory	Possible
<i>Ardea modesta</i> Great Eastern Cattle Egret		Marine, Migratory	Possible
<i>Arenaria interpres</i> Ruddy Turnstone		Marine, Migratory	Possible
<i>Burhinus grallarius</i> Bush Stone Curlew		Migratory	Known
<i>Charadrius bicinctus</i> Double-banded Plover		Marine, Migratory	Likely
<i>Charadrius ruficapillus</i> Red-capped Plover		Marine, Migratory	Possible
<i>Esacus magnirostris</i> Beach-stone Curlew	V	Marine	Known
<i>Falco cenchroides</i> Nankeen Kestrel		Marine, Migratory	Known
<i>Falco peregrinus</i> Peregrine Falcon		Migratory	Possible
<i>Fregata minor</i> Great Frigatebird		Marine, Migratory	Possible
<i>Gallinago hardwickii</i> Japanese Snipe		Marine, Migratory	Possible
<i>Gallinago megala</i> Swinhoe's Snipe		Marine, Migratory	Unlikely
<i>Gallinago stenura</i> Pin-tailed Snipe		Marine, Migratory	Unlikely
<i>Haematopus fuliginosus</i> Sooty Oystercatcher	NT		Known
<i>Haliaeetus leucogaster</i> White-bellied Sea-Eagle		Migratory	Known
<i>Heteroscelus brevipes</i> ( <i>Tringa brevipes</i> ) Grey-tailed tattler		Migratory Marine	Known
<i>Himantopus himantopus</i> Black-winged Stilt		Marine, Migratory	Possible
<i>Hirundapus caudacutus</i> White-throated Needletail		Migratory	Possible
<i>Hirundo rustica</i> Barn Swallow		Marine, Migratory	Possible
<i>Macronectes giganteus</i> Southern Giant Petrel		E Marine, Migratory	Unlikely
<i>Merops ornatus</i> Rainbow Bee-eater		Migratory	Likely
<i>Monarcha melanopsis</i> Black-faced Monarch		Migratory	Possible
<i>Monarcha trivirgatus</i> Spectacled Monarch		Migratory	Possible
<i>Myiagra cyanoleuca</i> Satin Flycatcher		Migratory	Possible
<i>Myiagra inquieta</i> Restless Flycatcher		Migratory	Possible
<i>Myiagra rubecula</i> Leaden Flycatcher		Migratory	Possible
<i>Numenius madagascariensis</i> Eastern curlew	NT	Migratory Marine	Possible
<i>Numenius minutus</i> Little Curlew Little Whimbrel		Marine, Migratory	Unlikely
<i>Numenius phaeopus</i> Whimbrel		Migratory Marine	Known
<i>Phaethon rubricauda</i>	V	Migratory	Possible



Species	NCA Status	EPBC Status	Likelihood of Occurrence*
Red-tailed tropicbird		Marine	
<i>Pluvialis fulva</i> Pacific Golden Plover		Marine, Migratory	Possible
<i>Pluvialis squatarola</i> Grey Plover		Marine, Migratory	Possible
<i>Pterodroma neglecta neglecta</i> Kermadec Petrel		V	Unlikely
<i>Sterna dougallii</i> Roseate Tern		Marine, Migratory	Possible
<i>Sterna hirundo</i> Common Tern		Marine, Migratory	Possible
<i>Sternula albifrons</i> Little Tern	E	Marine, Migratory	Possible
<i>Sula leucogaster</i> Brown Booby		Marine, Migratory	Possible
<i>Thalasseus bengalensis</i> Lesser Crested Tern		Marine, Migratory	Known
<i>Vanellus miles</i> Masked Lapwing		Migratory	Known

\*based on review of habitat preferences and species distribution presented in Appendix H and based on records reported in the literature review.

### 3.5.3 Pest Species

Most studies reviewed identify that feral animals occur on GKI. The only species noted of particular importance as a pest animal is the Goat.

Additional literature searched in order to identify exotic species known or likely to occur in the study area identified using Wildnet data (EPA, 2010) and consultation. The results are tabulated in Table 21.

The declared pest species are identified according to their status under the *Land Protection and Stock Route Management Act 2002* (LPA):

- Class 1 -** It is not commonly present or established in the State; and has the potential to cause an adverse economic, environmental or social impact in the State; if established they are subject to eradication; reasonable steps must be taken to keep land free of Class 1 pests;
- Class 2 -** Are established in the State and have, or could have, an adverse economic, environmental or social impact; reasonable steps must be taken to keep land free of Class 2 pests. It is a serious offence to introduce, keep or supply a Class 2 pest without a permit issued by Biosecurity Queensland;
- Class 3 -** Are established in the State and have, or could have, an adverse economic, environmental or social impact; their impact is primarily environmental; control notices can be issued for land that is, or is adjacent to an environmentally significant area. It is a serious offence to introduce, feed or supply a Class 3 pest without a permit issued by Biosecurity Queensland.



### Non Declared Animals –

There are 28 animals specifically categorised as non-declared under the LPA. These animals include:

- mammals commonly kept for commercial or social benefit
- non-native mammals, reptiles or amphibians that are widespread but have minimal negative commercial, environmental or social impacts; and/or
- there are no cost-effective, broadscale control measures available.

**Table 21: Exotic Fauna Species known from the area**

Species Name	Common Name	Pest Status	Source
<i>Gallus gallus</i>	Red Junglefowl	exotic	Wildnet
<i>Pavo cristatus</i>	Indian Peafowl	exotic	Wildnet
<i>Sturnus vulgaris</i>	Common Starling	exotic	Wildnet
<i>Capra hircus</i>	Goat	Class 2	Wildnet
<i>Rattus rattus</i>	Black Rat	Non-declared exotic	Consultation

## 3.6 RESULTS – FAUNA FIELD ANALYSIS

Fieldwork was undertaken by two fauna ecologists during the dry season conducted between 20 Sept – 28 Sept 2010 and the wet season conducted between 12 Feb – 21 Feb 2011.

Weather experienced over the dry season survey was uncharacteristically wet. (see Table 22 for weather from Yeppoon The Esplanade (station 033294) (Bureau of Meteorology, 2011a). Weather experienced in the wet season survey was hot with periods of both wet and dry (Table 23). The wet season survey was undertaken closely following extreme flooding of the Rockhampton area as well as a category 5 cyclone – Cyclone Yasi making landfall near Mission Beach on 3 Feb 2011 (Bureau of Meteorology, 2011b).

**Table 22: Dry Season Weather**

Date	Day	Temps		Rain	Max wind gust		
		Min	Max		Dir	Spd	Time
		°C	°C		km/h		local
20/09/2010	Mo	20	21.6	20.2	SSW	26	9:48
21/09/2010	Tu	20	22.4	47	SE	22	0:57
22/09/2010	We	21	23.1	24	ESE	43	17:52
23/09/2010	Th	19	22	8.6	SSW	28	6:45
24/09/2010	Fr	19	24.2	6	ESE	26	14:22
25/09/2010	Sa	21	22.5	0.6	NE	35	17:04
26/09/2010	Su	17	23.9	17	E	28	15:19



27/09/2010	Mo	19	24.9	0	ENE	24	16:32
28/09/2010	Tu	22	26.6	0	NE	28	15:48

Table 23: Wet Season Weather

Date	Day	Temps		Rain	Max wind gust		
		Min	Max		Dir	Spd	Time
		°C	°C		km/h		local
12/02/2011	Sa	21.5	29.4	0	ESE	35	12:27
13/02/2011	Su	23.7	29.8	2.2	ESE	31	23:50
14/02/2011	Mo	24.2	28.8	0	E	48	12:40
15/02/2011	Tu	23.5	28.2	31	E	54	12:34
16/02/2011	We	22.8	29.8	51.2	ESE	39	0:37
17/02/2011	Th	22.8	30.3	1	ESE	43	21:13
18/02/2011	Fr	23.5	29.5	9	E	50	22:38
19/02/2011	Sa	24.7	29.8	5.8	ESE	41	1:47
20/02/2011	Su	25.6	30	2.2	ESE	30	2:23
21/02/2011	Mo	23.8	31.1	0	S	59	20:47

### 3.6.1 FAUNA SPECIES

The sections below describe the fauna encountered during terrestrial fieldwork undertaken in this study and the value of the study area to particular fauna groups. It includes reference to records made previously as part of other surveys and consultation (identified in the Literature Review). The full list of fauna species recorded in the study area is provided in Appendix G. The fauna identified as present or likely to be present on the island include migratory birds, mammals, reptiles and amphibians. Higher numbers of birds are recorded compared to mammalian assemblages. Both reptile and amphibian groups were well represented.

#### 3.5.1.1 Mammals

##### Large Mammals

No large or small macropods were recorded from the island. No previous reports of macropod have been identified either in database searches or historic studies. The most common large mammal on the island was the declared pest, Goats. Goats were recorded from Areas 8, 5, 6 and 7. A Sheep was also recorded from the Island; however it is now kept by residents (after being removed from the homestead). No other sheep were observed during the study. Dogs were recorded on the Island; however these are domestic pets. No feral dogs were observed.

##### Small, Ground Dwelling Mammals

Elliott size A and B and pitfall trapping captured only three species of small ground dwelling mammal species over the duration of the survey, these being the Fawn-footed Melomys (*Melomys cervinipes*), Black Rat (*Rattus rattus*\*) and Common Planigale



(*Planigale maculata*). The Water Rat (*Hydromys chrysogaster*) was recorded during spotlight surveys. This outcome of low mammal diversity is comparable to mammal diversity on Magnetic Island where only five native mammals are known to occur (Isaac, 2005).

Whilst Echidnas were only recorded from area 3 – the airstrip, habitat for this species occurs throughout GKI and it is likely to be more widely distributed.

The high densities (see Arboreal Mammals) of Brushtail Possums observed foraging and moving on the ground may be an explanation for low species diversity of other mammal assemblages.

### Arboreal Mammals

The only arboreal mammal recorded in the study area was the Common Brushtail Possum (*Trichosurus vulpecula*). This species was recorded from all types of habitat including the beach front, Eucalypt forest and Melaleuca forests. Observations in the dry season survey indicated the possibility of a high density population, particularly in the areas close to the former resort.

To further investigate this observation, several transect spotlight surveys of between 320 - 700m long and between 15-25m wide were undertaken during the wet season. Results of the possum count transects indicate the initial observations of a possibly higher density of possums around the resort area was confirmed with possum densities calculated up to 6.29 possums per hectare. See Table 24 below for counts per transect and calculated densities. Figure 13 illustrates the transect locations and where highest densities were recorded.

**Table 24: Brushtail Possum Densities**

Transect	Date	Time	Count	Density (per ha)
T1	14/02/2011	8-9pm	2	2.06
T2	16/02/2011	8-9pm	0	0
T3	17/02/2011	8:15-9pm	3	6.25
T4	17/02/2011	9:20-9:30pm	11	6.29

Whilst the investigation provides only a broad estimate of the possum population it is noted that a range of 0-6.29 individuals per hectare well exceeds commonly observed Brushtail densities of between 0.2-4 individuals per hectare (Van Dyck and Strahan, 2008). A study on possums from Magnetic Island found possums occurring in high densities (5 individuals per hectare) comparable to densities found in New Zealand where possums are an introduced pest (Isaac, 2005). This study also found a relatively low diversity of other mammals as well as only few species that might be regarded as possum predators (Isaac, 2005).



The only other arboreal mammal previously reported from GKI is the Koala (Creighton, 1984). This study recorded no signs of Koala activity.

The Wildnet database includes one record of Common Ringtail Possum from GKI. It is likely that this record represents a misidentified Brushtail Possum.

Generally, mammalian species diversity recorded from the island was very similar to that identified on Magnetic Island to the north. Great Keppel Island was found to support 5 native mammal species. The diversity of mammals appears similar to that of Magnetic Island (which is a significantly larger island approximately 5184ha (Isaacs, 2005)). Isaacs (2005) states that Magnetic Island is currently known to support only five species of native mammal (Brushtail Possum, Koala, Echidna, Allied Rock Wallaby and Water Rat). Magnetic Island was also similar to Great Keppel Island as the Brushtail Possum density was found to be much higher than reported in most Australian systems at 5 individuals per hectare (Isaacs, 2005). Isaacs (2005) states the likely factors contributing to such high possum densities are the lack of large predators that affect mainland possums and lack of intraspecific competition with other folivorous species.

### 3.5.1.2 Bats

Two Flying Fox roosts were recorded on GKI (Figure 16). Only Black Flying Foxes (*Pteropus alecto*) was recorded foraging during the study. A roost recorded at the former resort was small and an approximate count of around 20 individuals was made. A roost recorded in Leeke's Estuary appeared to be larger, but a count of individuals was not possible due to the density of the mangroves in this location.

Three confirmed species of microbat were recorded for the study area through Anabat detection and analysis. A possible three further microbat species were not able to be identified to species level using Anabat.

The Vulnerable (NCA) Coastal Sheath-tail Bat (*Taphozous australis*) was identified as a strong possibility to occur on the Island due to the presence of sea caves and rock fissures which is potential roosting habitat. The Coastal Sheath-tail Bat has been known to roost on coastal Islands and fly to the mainland to forage around Cape York Peninsula (DERM, 2010b). This species was not able to be confirmed using Anabat analysis due to the call similarity to Beccari's Free-tail Bat (*Mormopterus beccarii*).

GKI supports a range of roost types for microbats including coastal caves, tree hollows and buildings. The following species were recorded:

- The Little North-Eastern Free-tailed Bat (*Mormopterus ridei*) which forages in woodlands and mangroves and may utilise many types of roosts but mainly tree hollows;



- The Little Bent-wing Bat (*Miniopterus australis*) which uses mainly caves for roosting and forages in paperbark swamps and wet/dry sclerophyll forests; and
- The Large-footed Myotis (*Myotis macropus*) which may be found in a range of roost environments including caves, tunnels, tree hollows, buildings and dense foliage in the tropical part of its range. This species never occur far from water bodies and often forage for insects and small fish over these water bodies (Van Dyck and Strahan, 2008).

### 3.5.1.3 Reptiles

The study area provides suitable habitat for a suite of reptiles. A total of 18 species of reptile were recorded over the wet and dry season searches. Of the 18 species one was the exotic Asian House Gecko (*Hemidactylus frenatus*).

All sclerophyll vegetation communities provide habitat for reptiles recorded and generally incorporate ground cover including leaf litter and log habitat. Specialist niches occur in mangrove habitat for the Rusty Monitor (*Varanus semiremex*) and on intertidal areas for the Littoral Skink (*Cryptobletharus littoralis*).

All but one species recorded by the Queensland Museum were identified during field work. The only species not observed was the Zig-zag Gecko (*Oedura rhombifer*). The Zig-zag gecko occurs in woodlands and shelters under bark and in hollows (Wilson and Swan, 2010).

### 3.5.1.4 Amphibians

Nine species of frogs were recorded during the assessment, all of them common species. The ephemeral ponds and watercourses that appeared during rainfall events were found to be rich in frog numbers.

### 3.5.1.5 Birds

Sixty-seven species of birds were records across the study area during the survey. Thirteen species are listed as EPBC migratory and ten as EPBC marine. One species, the Beach Stone Curlew (*Esacus neglectus*) is listed as Vulnerable under the NCA and two species, the Sooty Oystercatcher (*Haematopus fuliginosus*) and the Eastern Curlew (*Numenius madagascariensis*) are listed as Near Threatened under the NCA. Observations of these scheduled species are illustrated on Figure 16.

A higher diversity of terrestrial birds were recorded during the dry. It is likely that migration patterns were atypical in the wet season survey due to Cyclone Yasi making landfall to the north nine days prior to the survey.



Very few wader birds were recorded using the beaches or estuaries in both the wet and dry season.

Table 25 below, gives the common bird species recorded on the Wildnet database that potentially utilise GKI as habitat for roosting, feeding and breeding. During field work, only one instance of bird breeding was recorded, being the common White-faced Heron nest with two young (See Figure 16 for location).

**Table 25: Common birds likely to occur on GKI**

Species Name	Common Name	Wildnet	Recorded breeding Creighton, 1984
<i>Anhinga novaehollandiae</i>	Australasian Darter	x	
<i>Anous minutus</i>	Black Noddy	x	
<i>Anthus novaeseelandiae</i>	Australasian Pipit	x	Breeding Keppel group
<i>Ardea pacifica</i>	White-Necked Heron	x	
<i>Ardenna pacifica</i>	Wedge-Tailed Shearwater	x	
<i>Artamus cyanopterus</i>	Dusky Woodswallow	x	
<i>Cacomantus flabelliformis</i>	Fan-Tailed Cuckoo	x	
<i>Ceyx azureus</i>	Azure Kingfisher	x	
<i>Chalcid lucidus</i>	Shining Bronze-Cuckoo	x	
<i>Colluricincla harmonica</i>	Grey Shrike-Thrush	x	
<i>Coracina novaehollandiae</i>	Black-Faced Cuckoo-Shrike	x	
<i>Coracina papuensis</i>	White-Bellied Cuckoo-Shrike	x	
<i>Corvus coronoides</i>	Australian Raven	x	
<i>Egretta sacra</i>	Eastern Reef Egret	x	
<i>Eolophus roseicapillus</i>	Galah	x	
<i>Falco cenchroides</i>	Nankeen Kestrel	x	
<i>Geopelia striata</i>	Peaceful Dove	x	Breeding on GKI
<i>Gerygone albogularis</i>	White-Throated Gerygone	x	
<i>Gerygone levigaster</i>	Mangrove Gerygone	x	
<i>Grallina cyanoleuca</i>	Magpie-Lark	x	
<i>Himantopus himantopus</i>	Black-Winged Stilt	x	
<i>Lichenostomus fasciolaris</i>	Mangrove Honeyeater	x	
<i>Lopholaimus antarcticus</i>	Topknot Pigeon	x	
<i>Lichenostomus versicolor</i>	Varied Honeyeater		Breeding Keppel group
<i>Macropygia amboinensis</i>	Brown Cuckoo-Dove	x	
<i>Megalurus timoriensis</i>	Tawny Grassbird	x	
<i>Morus serrator</i>	Australasian Gannet	x	
<i>Myzomela obscura</i>	Dusky Honeyeater	x	
<i>Nycticorax caledonicus</i>	Nankeen Night Heron	x	
<i>Oriolus sagittatus</i>	Olive-Backed Oriole	x	
<i>Pachycephala pectoralis</i>	Golden Whistler	x	
<i>Petrochelidon nigricans</i>	Tree Martin	x	
<i>Phalacrocorax sulcirostris</i>	Little Black Cormorant	x	
<i>Psophodes olivaceus</i>	Eastern Whipbird	x	
<i>Ptilinopus regina</i>	Rose-Crowned Fruit-Dove	x	
<i>Rhipidura albiscapa</i>	Grey Fantail	x	
<i>Rhipidura leucophrys</i>	Willie Wagtail	x	
<i>Rhipidura rufifrons</i>	Rufous Fantail	x	
<i>Sphecotheres vieilloti</i>	Australasian Figbird	x	
<i>Strepera graculina</i>	Pied Currawong	x	
<i>Taeniopygia bichenovii</i>	Double-Barred Finch	x	
<i>Threskiornis molucca</i>	Australian White Ibis	x	
<i>Todiramphus pyrrhopygius</i>	Red-Backed Kingfisher	x	
<i>Todiramphus sanctus</i>	Sacred Kingfisher	x	
<i>Trichoglossus chlorolepidotus</i>	Scaly-Breasted Lorikeet	x	



### **3.7 SIGNIFICANT FAUNA SPECIES**

For the purpose of this study, species scheduled under the EPBC or the NCA will be regarded as significant. Otherwise significant species are regarded as those species that are listed as either 'Priority Species' or 'Data Deficient Species' in the Fitzroy Natural Resource Management Region Back on Track Actions for Biodiversity (DERM, 2010c). Otherwise significant species also includes species of cultural significance identified in the NCA or through consultation. The fauna field survey recorded 14 significant bird species in the study area, of which 13 are Nationally listed, 3 are State listed and 1 is regarded as a High Priority Species. One significant reptile regarded as a High Priority Species was also recorded. One species of cultural significance was listed under the NCA. Section 3.7.1, 3.7.2 and 3.7.3 below provide details regarding the habitat requirements for these species, the location of records and conservation values for the Island.

#### **3.7.1 Nationally Significant Species**

Of the 13 EPBC scheduled species recorded on Great Keppel Island (Table 26), ten species are listed as Marine and all thirteen are listed as Migratory. No nests or records of breeding were made during this study.

All species scheduled as Migratory under the EPBC Act consists of species that are listed under the following international conventions:

- Japan-Australia Migratory Bird Agreement (JAMBA);
- China-Australia Migratory Bird Agreement (CAMBA);
- Convention on the Conservation of Migratory Species of Wild Animals - (Bonn Convention); and
- Republic of Korea – Australia Migratory Bird Agreement (ROKAMBA).



Table 26: Nationally significant Fauna species recorded during the Current Study and 'Known' from the Assessment of Scheduled Fauna

Species	Status	Location Recorded	Population/ Abundance on GKI	Importance of Habitat on local, regional, national, international context	Regional and Local representation of the species relative to GKI	Current Level of Protection and Requirements of Recovery/management plans
<i>Burhinus grallarius</i> Bush Stone Curlew	M (EPBC)	Directly sighted: Areas 1, 2, 3, 4, 5, 6, 7, 8 and 10	Abundant.	Given the habitat of this species covers limited area on GKI it is not regarded as significant at a national or state level owing to its wide occurrence.	Has been recorded from four surveys on GKI (Birds, Australia, 2005-2007). In the CQC bioregion surveys across 25 10" cells have on average recorded this species in between 11-40% of the time (Birds Australia, 2005-2007).  This species is reported as a common species in northern Australia and on many continental islands; however it has declined in southern Queensland (Birdlife International, 2011). The total Australian population has been estimated at 15,000 individuals (Birdlife International, 2011).	Department of Environment and Conservation NSW, 2006 outlines recovery objectives for New South Wales and those applicable on a wider basis are listed below: Raise the profile of the Bush Stone curlew through publicity activities. Increase the total area of Bush Stone-curlew habitat protected and managed for conservation Identify and map suitable Bush Stone-curlew habitat – foraging, breeding and roosting habitat should be identified. Undertake annual monitoring programs during the breeding season to Determine breeding success, juvenile recruitment and status of population.
<i>Esacus neglectus</i> Beach Stone Curlew	V (NCA) Mar (EPBC)	Directly sighted: Leeke's Estuary (a pair) Leeke's Beach Putney Beach	Occasional.	Given the habitat of this species covers limited area on GKI it is not regarded as significant at a national or state level owing to its wide occurrence. Little work has been done on the species within a regional context. The paucity of information on the species is highlighted in Freeman's 2003 study undertaken in the Wet Tropics. However, broadly the species is recorded more commonly from beaches in northern Queensland than southern Queensland and NSW (NSW NPWS, 1999).	The species has been recorded from two survey locations on GKI (Birds Australia, 2005-2007). More broadly the Beach Stone-curlew has been recorded from 17 10" cells along the coast between Yeppoon and Mackay (within the CQC bioregion) (Birds Australia, 2005-2007). These 17 survey cells generally show that 11-40% of surveys record this species.	DERM (2007) lists the following six recovery actions for this species: Protect important habitat areas from urban and industrial development, and pollution; Restrict or control access to beaches where these birds are resident, particularly during the breeding season; Increase public awareness about the effects of beach/sand dune driving; Educate dog owners to restrain their animals in habitat areas; Implement control measures for feral animals; Monitor populations to determine long-term trends.  This species is sensitive to human disturbance and loss of habitat. Further research is required to determine critical levels of disturbance that trigger nest desertion (NSW NPWS, 1999).
<i>Falco cenchroides</i>	M, Mar	Recorded by Black and Houston (2011).	Occasional.	Given the broad habitat types used by this species and the wide occurrence of	The Nankeen Kestrel has been recorded from two surveys on GKI	A specific management plan does not exist for this species.



Species	Status	Location Recorded	Population/ Abundance on GKI	Importance of Habitat on local, regional, national, international context	Regional and Local representation of the species relative to GKI	Current Level of Protection and Requirements of Recovery/management plans
Nankeen Kestrel		One bird was recorded at each of the following locations: Leeke's Beach, Putney Beach and Resort Precinct.		habitat types of GKI within a State and National context, habitat on GKI it is not regarded as significant. Broadly, Nankeen Kestrels are found in most areas of Australia including continental Islands and nearby continental islands (New Guinea and Indonesia) (Birds Australia, 2011).	(Birds, Australia, 2005-2007). In the CQC bioregion surveys across 39 10" cells have on average recorded this species 11% of the time (Birds Australia, 2005-2007).  Estimated 1,000,000 mature individuals occur (Birdlife International, 2011).	
<i>Haliaeetus leucogaster</i> White-bellied Sea Eagle	M, Mar (EPBC)	Directly sighted: Flyover areas 2, 4	Occasional.	Given the broad habitat types used by this species and the wide occurrence of habitat types of GKI within a State and National context, habitat on GKI it is not regarded as significant.	Has been recorded from three surveys on GKI (Birds, Australia, 2005-2007). In the CQC bioregion surveys across 29 10" cells have on average recorded this species in between 11-40% of the time (Birds Australia, 2005-2007).  Based on speculative and conservative estimates of 500 or more pairs in Australia, and more than 10 000 individuals worldwide (including more than 2500 adult pairs, together with immature and non-breeding birds), it has been estimated that approximately 10–20% of the global population of the White-bellied Sea-Eagle occurs throughout Australia (SEWPAC, 2011).	Main threats to White-bellied sea eagle is clearing and development (especially of or near nesting habitats). Eagles may desert nests and young if exposed to human activity near the nest (SEWPAC, 2011). Management recommendations have been made for Victorian and Tasmanian populations of this species. These are listed below: Tasmania (Threatened Species Section, 2006) Increase the effectiveness of predictive habitat models for application State-wide. Increase the proportion and number of nests found prior to land development on all tenures, including, but not restricted to forestry operations and land clearance. Reduce the proportion of nests subject to disturbance. Identify human-induced causes of breeding failure and mitigate against such causes. Increase breeding success. Increase the number and/or density of active territories. Develop and apply protocols for effective eagle management during all land development. Monitor the implementation and effectiveness of management prescriptions. Implement prescriptive nest reserves for conserving nesting habitat. Identify new threats and implement strategies for their mitigation. Reduce the occurrence of eagle mortalities



Species	Status	Location Recorded	Population/ Abundance on GKI	Importance of Habitat on local, regional, national, international context	Regional and Local representation of the species relative to GKI	Current Level of Protection and Requirements of Recovery/management plans
						and injuries (in number and proportion), particularly those attributable to human activities. Engage the electricity industry in reducing the proportion of eagle collisions and electrocutions. Respond to inquiries for information on eagle management by affected interests and the public. Undertake research into eagle biology that targets improved species management. Victoria: Protect known nesting sites, and a suitable buffer zone around nests, from human and habitat disturbance on public land through appropriate land management practices. This protection should be given priority (Clunie, 2003).
<i>Merops ornatus</i> Rainbow Bee-eater	M, Mar (EPBC)	Directly sighted: Area 1, 3, 4, 5, 6 and 8	Abundant.	Given the broad habitat types used by this species and the wide occurrence of habitat types of GKI within a State and National context, habitat on GKI it is not regarded as significant.	Has been recorded from four surveys on GKI (Birds, Australia, 2005-2007). In the CQC bioregion surveys across 41 10" cells have on average recorded this species more than 40% of the time (Birds Australia, 2005-2007).  The rainbow bee-eater population size throughout the region and the state are assumed to be large and there is little evidence of declines. (SEWPAC, 2011).	A recovery plan does not exist for this species. The only identified threat to rainbow bee-eaters is the Cane Toad as cane toads feed on the eggs and usurp nesting burrows (SEWPAC, 2011).
<i>Monarcha melanopsis</i> Black-faced Monarch	M, Mar (EPBC)	Directly sighted: Areas 3, 5, 6 and 8 during dry season only	Common.	Given the broad habitat types used by this species and the wide occurrence of habitat types of GKI within a State and National context, habitat on GKI it is not regarded as significant.	Has been recorded from one survey on GKI (Birds, Australia, 2005-2007). In the CQC bioregion surveys across 22 10" cells have on average recorded this species less than 11% of the time (Birds Australia, 2005-2007).  The global population size has not been quantified, but the species is reported to be locally quite common (Birdlife International, 2011).	A specific recovery plan does not exist for this species.



Species	Status	Location Recorded	Population/ Abundance on GKI	Importance of Habitat on local, regional, national, international context	Regional and Local representation of the species relative to GKI	Current Level of Protection and Requirements of Recovery/management plans
<i>Monarcha trivirgatus</i> Spectacled Monarch	M, Mar (EPBC)	Directly sighted: Area 10 during wet season:	Occasional.	Given the broad habitat types used by this species and the wide occurrence of habitat types of GKI within a State and National context, habitat on GKI it is not regarded as significant.	Has been recorded from two surveys on GKI (Birds, Australia, 2005-2007). In the CQC bioregion surveys across 23 10" cells have on average recorded this species in between 11-40% of the time (Birds Australia, 2005-2007).  The global population size has not been quantified, but the species is reported to be locally quite common (Birdlife International, 2011).	A specific recovery plan does not exist for this species.
<i>Myiagra inquieta</i> Restless Flycatcher	M (EPBC)	Directly sighted: Areas 1, 2, 3, 4, 5, 6, 7, 8 and 10	Abundant.	Given the broad habitat types used by this species and the wide occurrence of habitat types of GKI within a State and National context, habitat on GKI it is not regarded as significant.	Has been recorded from one survey on GKI (Birds, Australia, 2005-2007). In the CQC bioregion surveys across 10 10" cells have on average recorded this species less than 11% of the time (Birds Australia, 2005-2007).  The global population size has not been quantified, but the species is reported to be locally quite common (Birdlife International, 2011).	A specific recovery plan does not exist for this species.
<i>Myiagra rubecula</i> Leaden Flycatcher	M (EPBC)	Directly sighted: Area 4	Occasional.	Given the broad habitat types used by this species and the wide occurrence of habitat types of GKI within a State and National context, habitat on GKI it is not regarded as significant.	Has been recorded from two surveys on GKI (Birds, Australia, 2005-2007). In the CQC bioregion surveys across 46 10" cells have on average recorded this species in between 11-40% of the time (Birds Australia, 2005-2007).  The global population size has not been quantified, but the species is reported to be locally quite common (Birdlife International, 2011).	A specific recovery plan does not exist for this species.
<i>Numenius madagascariensis</i> Eastern Curlew	NT (NCA) M, Mar (EPBC)	Directly sighted: Leeke's Estuary	Occasional.	Given the habitat of this species covers limited area on GKI it is not regarded as significant at a national or state level owing to its wide occurrence.	Has been recorded from two surveys on GKI (Birds, Australia, 2005-2007). In the CQC bioregion surveys across 21 10" cells have on average recorded this species in between 11-40% of the time (Birds Australia, 2005-2007).  This species has been recorded from	Human disturbance can disrupt feeding and roosting. Eastern Curlews may take off when approached within 30-100m or even 250m (SEWPAC, 2011) The Environmental Protection Agency (2007) produced a bird disturbance on beaches fact sheet outlining management activities for migratory shore birds which includes the



Species	Status	Location Recorded	Population/ Abundance on GKI	Importance of Habitat on local, regional, national, international context	Regional and Local representation of the species relative to GKI	Current Level of Protection and Requirements of Recovery/management plans
					within the CQC bioregion from the internationally important site, Mackay Town Beach, where a maximum count of 710 Curlews was made and from the internationally important Shoalwater Bay and Broad Sound where counts of 2,986 birds was made in 1995 (Bamford <i>et. al.</i> , 2008; SEWPAC, 2011). The total estimated East Asian – Australasian flyway population is 38 000 curlews (Bamford <i>et. al.</i> , 2008). This illustrates that large numbers of Eastern Curlews use habitats nearby to GKI.	following: Responsible beach driving and dune protection Minimise disturbance to wildlife Noise, speed and movement easily disturb shorebirds, so help protect their habitat and their future by leaving them undisturbed. Ensure that domestic animals under control and kept on a leash Keep our beaches and coastline clean – most rubbish and pollutants discarded on land end up in the ocean, so please take your rubbish with you.
<i>Numenius phaeopus</i> Whimbrel	M. Mar (EPBC)	Directly sighted: Leeke's Estuary	Occasional.	<p>Given the habitat of this species covers limited area on GKI it is not regarded as significant at a national or state level owing to its wide occurrence.</p> <p>Bamford <i>et. al.</i> (2008) identified 7 sites of international importance to this species in Australia. These sites are spread north from Moreton Bay in Queensland and across the northern coast of Australia and GKI is not identified as one of them.</p>	<p>The Whimbrel has been recorded from two locations on GKI (Birds Australia, 2005-2007). In the CQC bioregion surveys across 20 10" cells have on average recorded this species in between 11-40% of the time (Birds Australia, 2005-2007).</p> <p>Of the estimated East Asian – Australasian flyway population of 100 000 whimbrels, a total of 7,124 whimbrels have been recorded from the nearby Shoalwater Bay and Broad Sound important habitat area (Bamford <i>et. al.</i>, 2008).</p>	<p>SEWPAC (SEWPAC, 2009) released draft guidelines containing general recommendations for migratory shorebirds. Measures to mitigate against the impacts of disturbance need to be determined on a case-by-case basis, as different species of shorebird respond differently to disturbance. Options for mitigating impacts from disturbance include:</p> <ul style="list-style-type: none"> <li>the use of buffer zones around areas important for the migratory shorebirds. The appropriate buffer will depend on the nature of the individual circumstances, including the species present, type of habitat (ephemeral vs. permanent), habitat use (roosting or foraging) and scale of disturbance. As a guide, previous studies have recommended buffer zones ranging from 165m to 255m;</li> <li>construction of appropriate barriers, such as fences around important habitat, to restrict access. Ideally, there should be no public access (by humans and/or domestic animals) to areas identified as important to migratory shorebirds. Where this is not feasible, particular recreational activities may need to be excluded from the area or it may be necessary to limit</li> </ul>



Species	Status	Location Recorded	Population/ Abundance on GKI	Importance of Habitat on local, regional, national, international context	Regional and Local representation of the species relative to GKI	Current Level of Protection and Requirements of Recovery/management plans
						<p>the number of people using an area at one time and/or to limit activities during the period between October and March (when the majority of birds will be present at the site); and</p> <ul style="list-style-type: none"> <li>landscape and urban design, including sympathetic lighting strategies and sound attenuation, or</li> <li>Community education through mechanisms such as interpretive signs at access points to shorebird habitats.</li> </ul>
<i>Thalasseus bengalensis</i> Lesser Crested Tern	M, Mar	Recorded by Black and Houston (2010) from Leeke's Estuary.	Occasional.	Given the broad habitat types used by this species and the wide occurrence of habitat types of GKI within a State and National context, habitat on GKI it is not regarded as significant. Broadly, the Lesser Crested Tern naturally occurs throughout Australia and internationally (DERM, 2011d).	<p>This species has been recorded from two surveys on GKI (Birds, Australia, 2005-2007). In the CQC bioregion surveys across 5 10" cells have on average recorded this species in between 11-40% of the time (Birds Australia, 2005-2007).</p> <p>Estimated 190,000 – 230,000 individuals (Birdlife International, 2011).</p>	A specific management plan does not exist for this species.
<i>Tringa brevipes</i> Grey-tailed Tattler	M, Mar	Recorded by Black and Houston (2011) from Leeke's Estuary.	Occasional.	Has a wide global distribution. In Queensland the Grey-tailed Tattler is found along the entire coast with a continuous population along the east coast of the Cape York Peninsula. Inland records also occur, although rarely (SEWPAC, 2011).	<p>The Grey-tailed Tattler has been recorded from 1 survey on GKI (Birds Australia, 2005-2007). In the CQC bioregion surveys across 15 10" cells have on average recorded this species in between 11-40% of the time (Birds Australia, 2005-2007).</p> <p>The highest maximum bird count at an internationally important site was made in Western Australia (12,420 individuals at Eighty Mile Beach). This species has also been recorded from within the CQC bioregion at Shoalwater Bay and Broad sound (maximum count of 3,014 individuals).</p>	This species is listed under the Wildlife Conservation Plan for Migratory Shorebirds (DEH, 2006) and the SEWPAC (SEWPAC, 2009) draft guidelines containing general recommendations for migratory shorebirds. General guidelines for mitigating development include:
<i>Vanellus miles</i> Masked Lapwing	M (EPBC)	Directly sighted: Area 1, 2, 3, 4, 8 and 10	Abundant.	Given the broad habitat types used by this species and the wide occurrence of habitat types of GKI within a State and National context, habitat on GKI it is not	The Masked Lapwing has been recorded from 6 surveys on GKI (BA, 2005-2007) and is reported as common throughout northern, central and	A specific recovery plan does not exist for this species.



Species	Status	Location Recorded	Population/ Abundance on GKI	Importance of Habitat on local, regional, national, international context	Regional and Local representation of the species relative to GKI	Current Level of Protection and Requirements of Recovery/management plans
				regarded as significant.	eastern Australia (Birds Australia, 2011). In the CQC bioregion surveys across 44 10" cells have on average recorded this species greater than 40% of the time (Birds Australia, 2005-2007).	

Further information on the nesting, resting, breeding, foraging and seasonal influences on the species listed above as well as significant species returned by the EPBC Protected Matters Database search are presented in Appendix H Listed Species Analysis.

None of the habitats on GKI can be considered unique as all types of habitat are represented elsewhere, either on the mainland or on other continental islands of GBR. 'Important habitat' defined in Figure 2 of the Draft EPBC Act Policy Statement 3.21 – Significant Impact Guidelines for 36 Migratory Shorebird Species (SEWPAC, 2009), has been reviewed and no habitats on GKI meet these criteria for those species known to occur. Whilst other habitats on GKI are used by migratory species that are not shorebirds, again none of these habitats can be regarded as 'important'.

None of the nationally significant species have any particular social, economic significance; nor do they have any special conservation or biodiversity value. While Aboriginal groups did have strong links with the native flora and fauna and some of these links may still be important today, no specific species of cultural significance have been identified at this time. Consultation with the Traditional Owners is ongoing and further information will be available once this has been completed.

### 3.7.2 State Significant Species

Three species of State significance were recorded on Great Keppel Island (table 27). One species is listed as Vulnerable and Two as Near Threatened under the NCA. The Beach Stone Curlew (Vulnerable, NCA) and the Eastern Curlew (Near Threatened, NCA) are discussed in section 3.7.1.



Table 27: State significant Fauna species recorded during the Current Study

Species	Status	Location Recorded	Population/ Abundance on GKI	Importance of Habitat on local, regional, national, international context	Regional and Local representation of the Species relative to GKI	Current Level of Protection and Requirements of Recovery/management plans
<i>Haematopus fuliginosus</i> Sooty Oystercatcher	NT (NCA)	Directly sighted: Wreck Beach	Occasional	Given the limited area on GKI of habitat types used by this species and the wide occurrence within a State and National context, habitat on GKI it is not regarded as significant. Broadly this species is distributed widely throughout coastal (usually within 50m of the ocean) Australia except for coastal northern Australia (Birds Australia, 2011).	The Sooty Oystercatcher has been recorded from 3 surveys on GKI (Birds Australia, 2005-2007). In the CQC bioregion surveys across 15 10" cells have on average recorded this species in between 11-40% of the time (Birds Australia, 2005-2007).  The overall population is estimated at 12,000 mature birds (Birdlife International, 2011).	The Department of Environment and Conservation (NSW) (2005) identified 7 priority actions for recovery of this species which are: Undertake fox, feral cat and rat control programs. Assess the appropriateness of dog and cat ownership in new subdivisions. Manage estuaries and the surrounding landscape to ensure the natural hydrological regimes are maintained. Install interpretive signs at major nesting sites. Protect and maintain known or potential habitat, including the implementation of protection zones around known habitat and breeding sites and sites of recent records.

Further information on the nesting, resting, breeding, foraging and seasonal influences on the species listed above as well as significant species returned by the Wildnet Database search are presented in Appendix H Listed Species Analysis.

### 3.7.3 Otherwise Significant Species

Two species regarded as Priority Species were recorded on GKI. Both species are regarded as High Priority in the Fitzroy Basin Area. The Beach Stone Curlew is regarded as High Priority and is discussed in Sections 3.7.2 and 3.7.1 above. The Rusty Monitor (*Varanus semiremex*) is also regarded as High Priority. The Echidna is regarded as culturally significant under the NCA. Further information on these species is presented in Table 28 below.



Table 28: Otherwise Significant Fauna species recorded during the Current Study.

Species	Status	Location Recorded	Population/ Abundance on GKI	Importance of Habitat on local, regional, national, international context	Regional and Local representation of the Species relative to GKI	Current Level of Protection and Requirements of Recovery/management plans
<i>Varanus semiremex</i> Rusty Monitor	High Priority	Directly sighted: Leeke's Estuary	Occasional.	Given the limited area on GKI of habitat types used by this species and the wide occurrence within a State and National context, habitat on GKI it is not regarded as significant.. Broadly the Rusty Monitor uses coastal and estuarine areas up to 70km from the Queensland coast between Boyne Island and Weipa including some offshore Islands (EPA, 2007b).	The species is poorly understood in terms of population, breeding habits within its natural habitat (Jackson, unknown).	As this is a priority species for Queensland, and is threatened in other regions, a watching brief is required so the stronghold population is maintained in the region. Action F 59.5.11 in the table 'Potential decline in stronghold populations in the region' table states: Encourage surveys for rusty monitor to identify their distribution and key populations in the Fitzroy NRM region, and monitor potential decline that may results from urban development, cane toads, cats and foxes. Mangrove habitats should be protected from the impacts of development (DERM, 2010d).  The EPA (2007) Conservation Management Profile also recommends a buffer of 100m around any hollow-bearing tree used by this species and clearing should not occur within known habitat of the Rusty Monitor.
<i>Tachyglossus aculeatus</i> Echidna	Culturally Significant (NCA)	Directly sighted within the resort precinct	Occasional.	Given the limited area of habitat types on GKI and the wide occurrence within a State and National context, habitat on GKI it is not regarded as significant.	This species is common and widespread throughout Australia (DPIPWE, 2009).	<ul style="list-style-type: none"> <li>• Drive carefully and do not drive the centre of the car over echidnas;</li> <li>• Control dogs and prevent them roaming - they can easily kill echidnas; and</li> <li>• Leave gaps under fences where possible. This will allow them to roam freely when feeding (DPIPWE, 2009).</li> </ul>



### 3.8 HABITAT

#### 3.8.1 Confirmed Beach Stone Curlew Habitat

DERM's Essential Habitat mapping is prepared through multiple information sources and habitat modeling. One of the simplest approaches is the buffering of point records. Beach Stone Curlew Essential Habitat for GKI has been mapped utilising this method and thus the resulting mapping incorporates sclerophyll habitats on ridgelines. Whilst the 'Mandatory Essential Habitat Factor' for the species is described as "All regional ecosystems along ecotone with beach", the 'Vegetation Description' (DERM, 2011b) is described as "All types of undisturbed beaches and littoral habitat, both surf and sheltered exposure on mainland and islands, especially near river mouths and mangrove-backed areas. Nest at back of beach/sandbank (occasionally among sparse grass or shingle with plant debris) or on coral ridge above high tide mark, often near creek or estuary." This is consistent with NSW NPWS (1999) which describes the preferred habitat of the species as open undisturbed beaches, islands, reefs, estuarine intertidal sandflats and mudflats. Given this, the extent of Essential Habitat as mapped extends into habitats unlikely to be utilised by the species.

Based on field observations, the known habitat of the species includes areas of RE 8.1.1, 8.1.2 and 8.2.1 in the wetland area behind Leeke's Beach.

A study conducted by Laursen, Kahlert and Frikke (2005) recorded the staging (escape distance) distance of a diversity of wader species on intertidal mudflats. As the Beach Stone Curlew was not one of the species considered in the study a precautionary approach has been adopted whereby the wader bird with the greatest escape distance was used as a surrogate for the species. The greatest mean escape distance was 298m and was recorded for the Curlew (*Numenius arquata*) which is similar in body size to the Beach Stone Curlew. Given this, the application of a 300m buffer to the outward edge of the known habitat of the Beach Stone Curlew is likely to adequately represent a sensitivity area for the species.

#### 3.8.2 Habitat Assessment

Based on the habitat assessment (Appendix F for habitat forms) and the vegetation assessment (Sections 2.3.3 of this report), broad habitat types are mapped for the island in Figure 17. Table 29 below identifies these broad habitat types, the key associated habitat features along with the both fauna groups recorded from the island and threatened species recorded from database searches that may utilise these habitat assemblages.

**Table 29: Key Habitat Features of Habitat Types on GKI**



Habitat Types	Mapped Ecosystems within Regional Habitat Type	Key Habitat features
Beach front	Includes 8.2.1, 8.2.7e, 8.2.2	Marine flora species Intertidal zone
Tidal inlet/Estuary/mangroves	includes RE 8.1.1, 8.1.2 Includes Leeke's Estuary	Marine flora species Interface with terrestrial vegetation
Sclerophyll Associations (Eucalypt, Corymbia, Melaleuca spp.)	Includes RE 8.3.6c, 8.3.13c	Periodically inundated Fresh water Leaf litter and fallen timber Some hollow bearing trees
Sclerophyll Associations (Eucalypt, Corymbia, Acacia spp.)	Includes RE 8.2.8a, 8.11.3a, 8.12.14x2c	Leaf litter Fallen timber Some hollow bearing trees
Headland and wind-sheared vegetation, cliffs	Includes RE 8.11.9a, 8.11.10	Low vegetation Cliffs/caves Interface between rocky shore and marine areas
Clear open Grassland or dams	Includes non-remnant vegetation	Few trees Open grassed areas Permanent freshwater (Dams)

Many areas throughout the island had high proportions of leaf litter and fallen timber providing good habitat for ground-dwelling fauna, particularly fossorial skinks which were observed in abundance. Generally habitat values across the Island are 'high – very high' (see methodology section) with few areas assessed as very low - low value habitat. Low value habitat corresponds with areas that are cleared and open with little structural diversity and therefore few habitat components of value to an array of fauna. Generally beachfront and wind-swept headlands are ranked as moderate - high due to their intrinsic lack of diverse structural elements and fauna must be tolerant to regular marine influences.

Hollow-bearing trees were recorded in sclerophyll forests and in less disturbed areas, providing nesting/roosting habitat for species of bird including kingfishers, arboreal mammals and microbats.

A number of habitat assemblages occur on GKI which are grouped in Table 29. One of the most important habitat areas on the Island is Leeke's Estuary. This marine influenced community is sensitive to changes or disturbances particularly because it is prime roosting, feeding and nesting habitat for those migratory and marine species recorded in this study.

Leeke's Estuary was identified as significant for several reasons. The highest number of significant species recorded during the study was found in this area. Leeke's estuary was also found to provide breeding habitat (White-faced Heron nest), roosting habitat for flying foxes and foraging habitat for the water rat. The highest diversity of wader birds on GKI was identified in Leeke's estuary. This area was also identified as having the potential to provide foraging and roosting habitat to some scheduled bird species not recorded during the current study.



### 3.8.3 MOVEMENT CORRIDORS/ CONNECTIVITY

Tidal estuaries like Leeke's estuary provide a corridor for species to move between marine environments and terrestrial environments. Putney Creek provides a similar corridor but on a smaller scale than Leeke's Estuary.

As much of the Island is vegetated and currently no significant man-made barriers to movement are present (i.e. major roads and high car traffic), movement is likely to occur freely across the island for the larger more mobile species and freely between microhabitats for the smaller species.

The terrestrial habitats throughout the Island are sensitive to fragmentation as currently fauna movement is relatively unconstrained. Some areas of the Island where historical clearing has occurred have slightly lower connectivity values particularly for small mammals that require high proportions of groundcover (as predator protection) to move through an area. However, many fauna species recorded on GKI have the capacity to move over/through modified areas.

### 3.9 FERAL ANIMALS

Several species of exotic fauna were recorded on the island. Two species of exotic mammal (Goat and Black Rat), one reptile (Asian house gecko) and one species of bird (Indian Peafowl) were found to be naturalized in wooded habitats. One species of bird recorded was not native to the region being the Long-billed Corella, recorded from Putney Creek and Area 10. Of these only one, the Goat, is listed under the LPA. Goats are Class 2 pests and landholders must take reasonable steps to keep land free of Class 2 pests.

Of significance is that there have not been any records of Cane Toad (*Rhinella marina*) from GKI.



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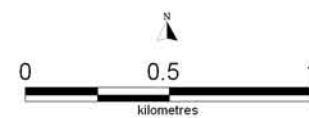




#### LEGEND

- Clam Bay Resort Precinct
- Fisherman's Beach Resort Precinct
- Marine Services Precinct
- Airstrip Runway Precinct

- The Homestead
- Leeks Estuary



Great Keppel Island EIS  
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#### Great Keppel Island and Proposed Development Location

**FIGURE 1**

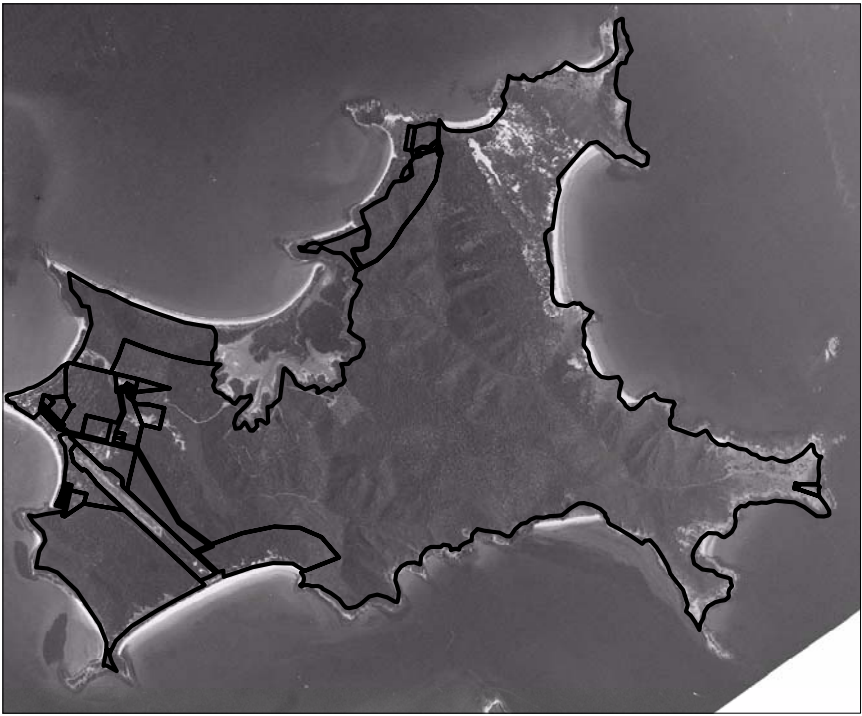


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Date: 19/07/2011  
10CH061 Dwn: AP





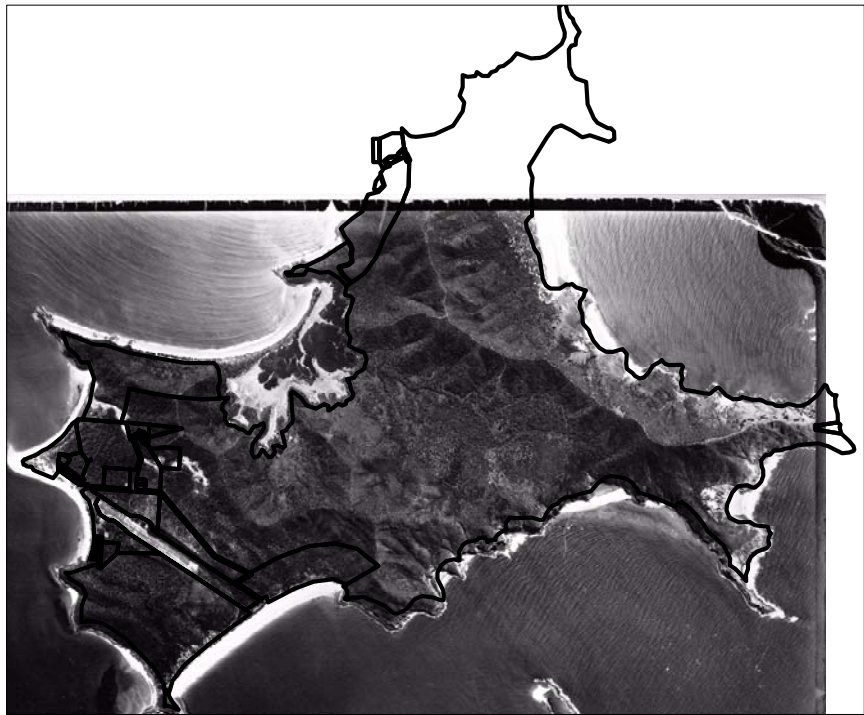
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1988



1995



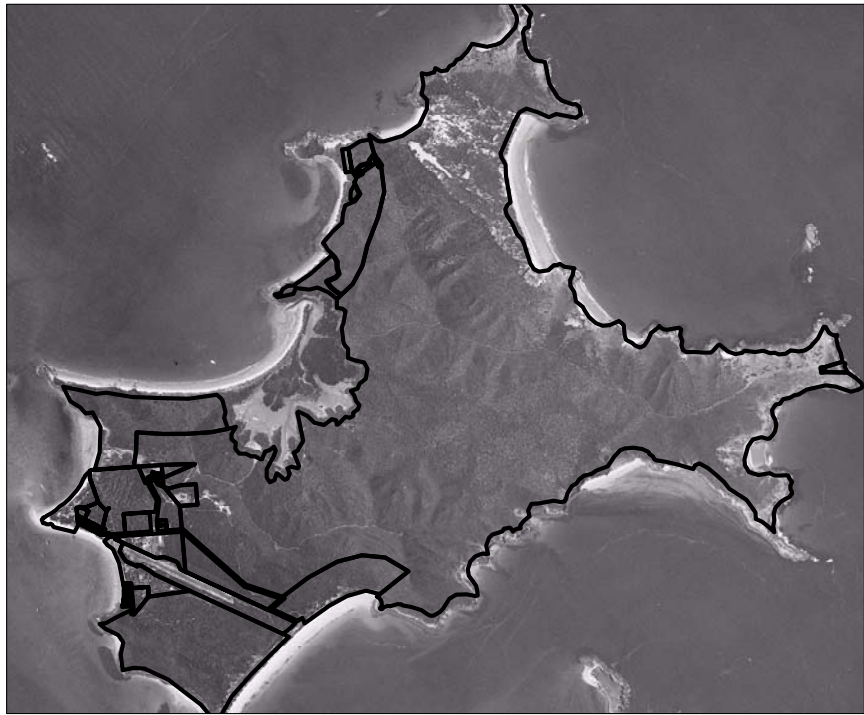
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1999

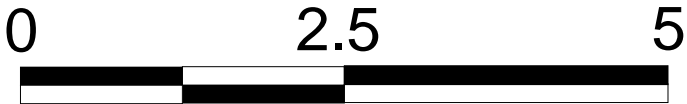


CURRENT



1984

Cadastre



Kilometres

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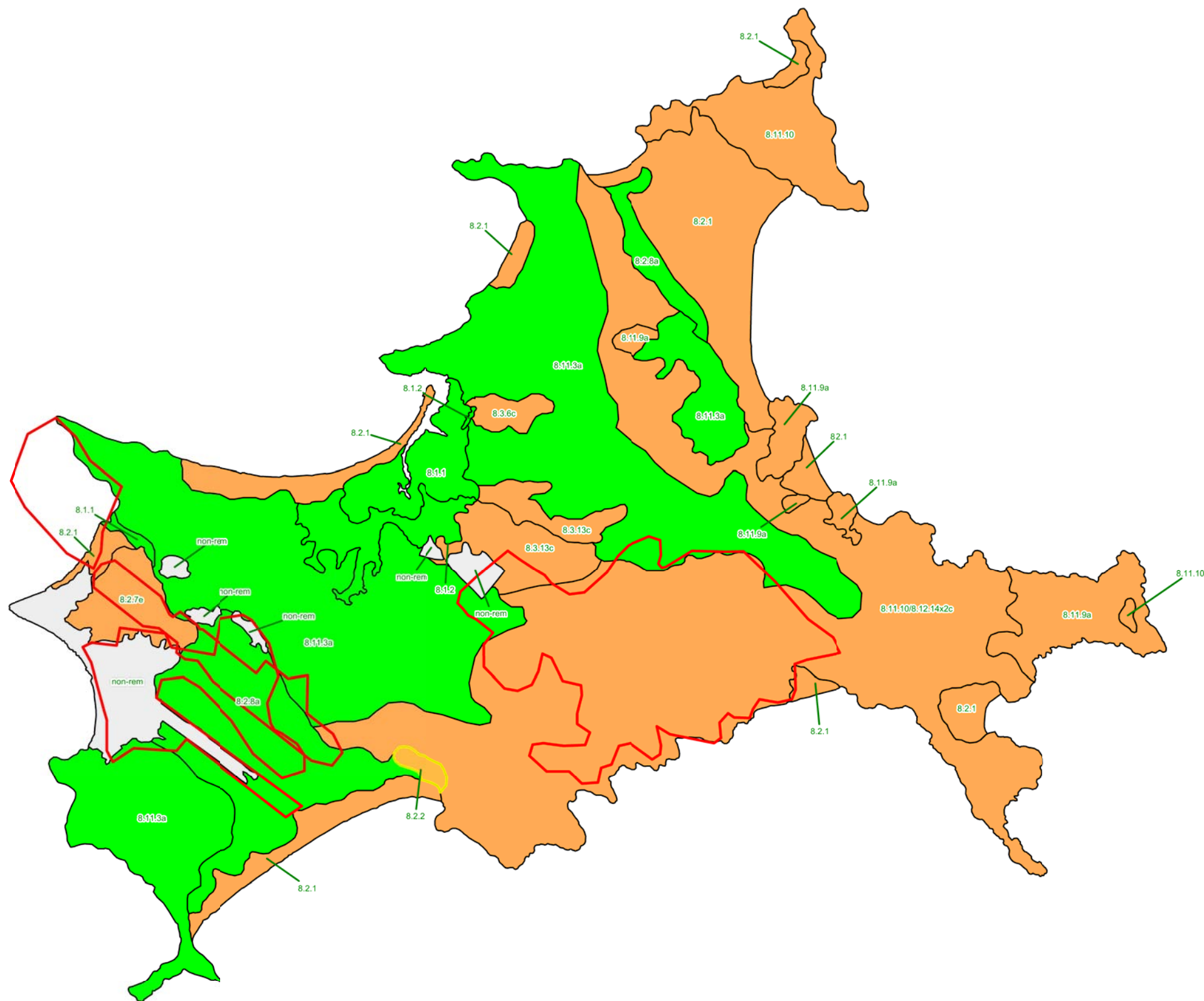
**Historical Aerial  
Photographs**

**FIGURE 2**



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Date: 04/04/2011  
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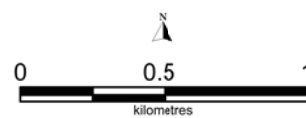
Regional Ecosystem V6 Status  
(DERM, 2010)

- Of Concern Dominant
- Least Concern
- Non-remnant

Proposed development areas

Cadastre

Critically Endangered EPBC Community - 8.2.2



Great Keppel Island EIS  
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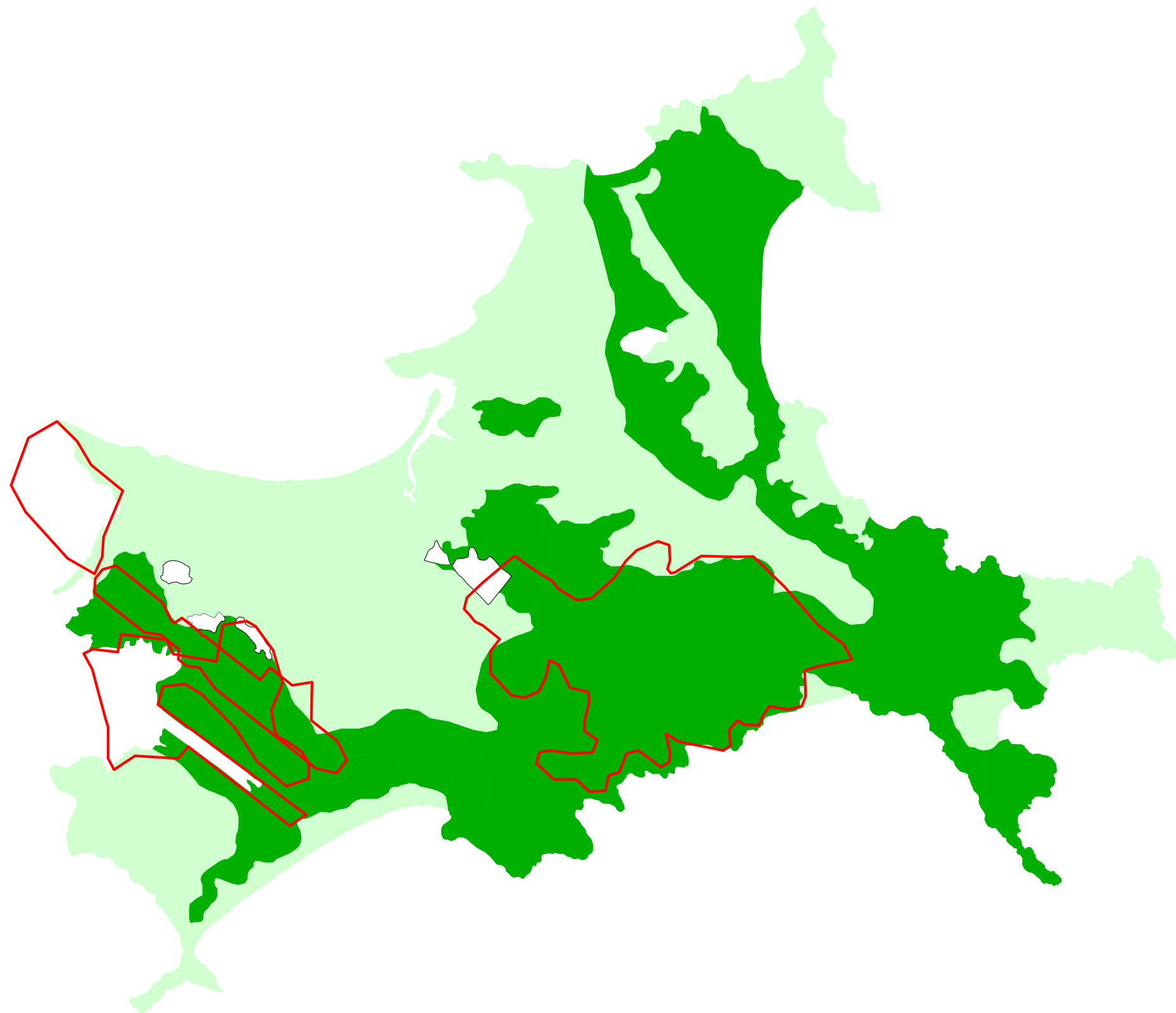
Regional Ecosystem Mapping  
Version 6.0  
RE Status

**FIGURE 3**



File:Fig3\_REV5\_Status.WOR  
Date: 19/07/2011  
10CH061 Dwn: AP

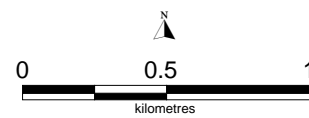




BPA Mapping Central Qld Coast

Regional  
State

Proposed development areas

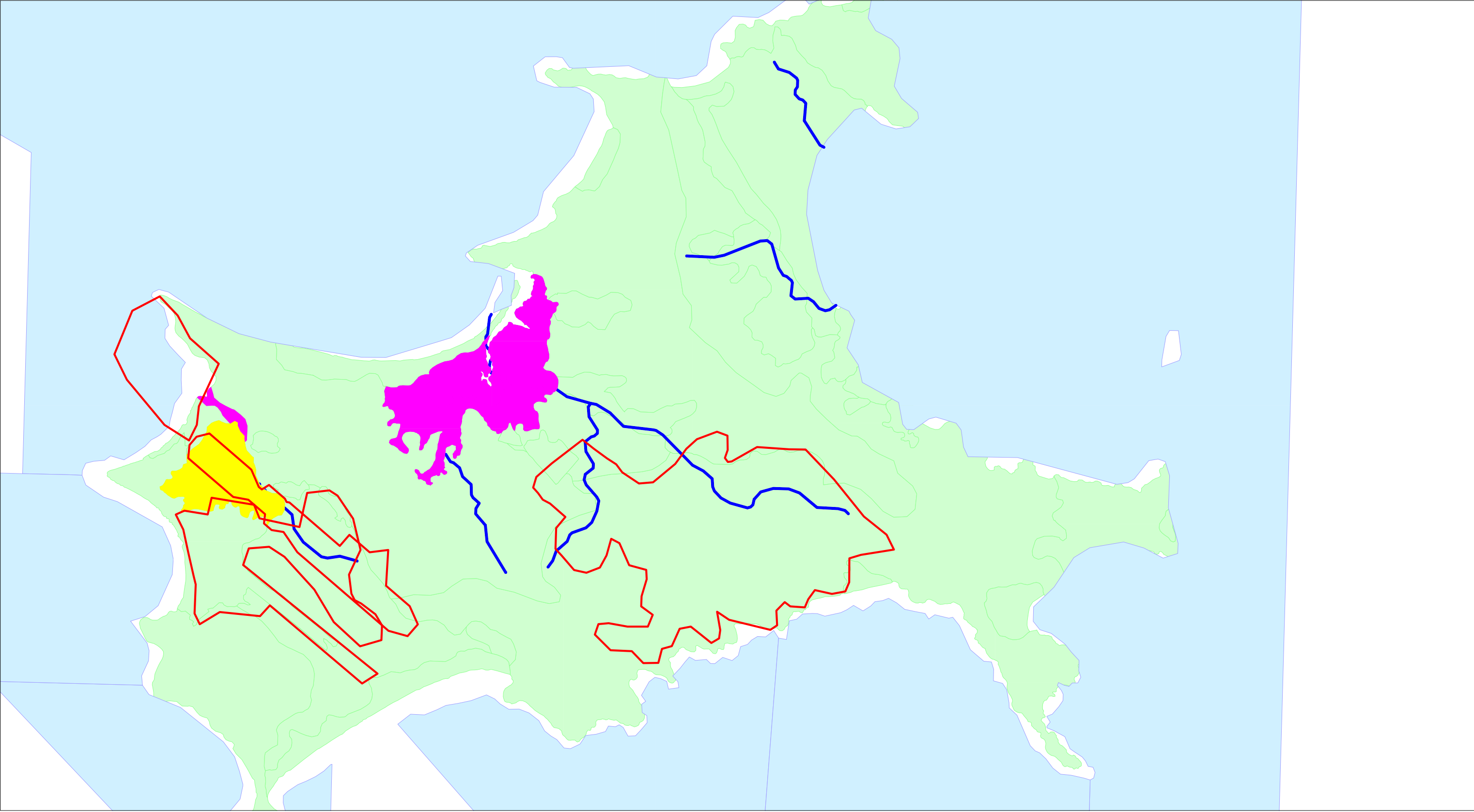


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**Biodiversity Planning Assessment  
(EPA, 2006)**

**FIGURE 4**





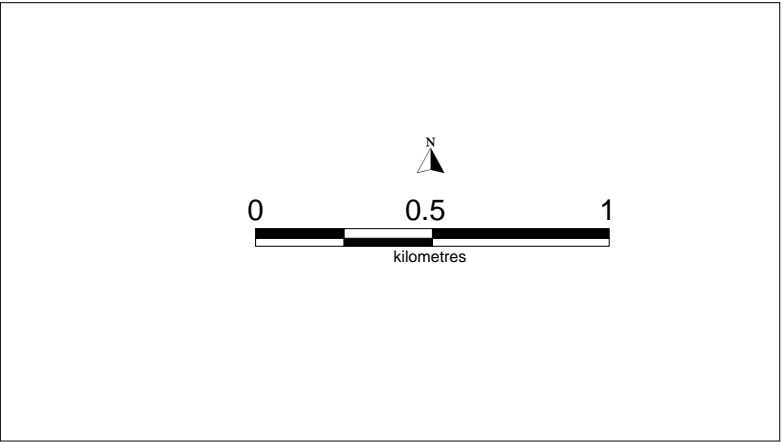


**LEGEND**

Proposed development areas

**DERM Wetland Management Areas**

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<span style="background-color: blue; display: inline-block; width: 15px; height: 10px; vertical-align: middle;"></span>	Qld Riverine Drainage
<span style="background-color: magenta; display: inline-block; width: 15px; height: 10px; vertical-align: middle;"></span>	Estuarine Wetland
<span style="background-color: yellow; display: inline-block; width: 15px; height: 10px; vertical-align: middle;"></span>	Palustrine Wetland



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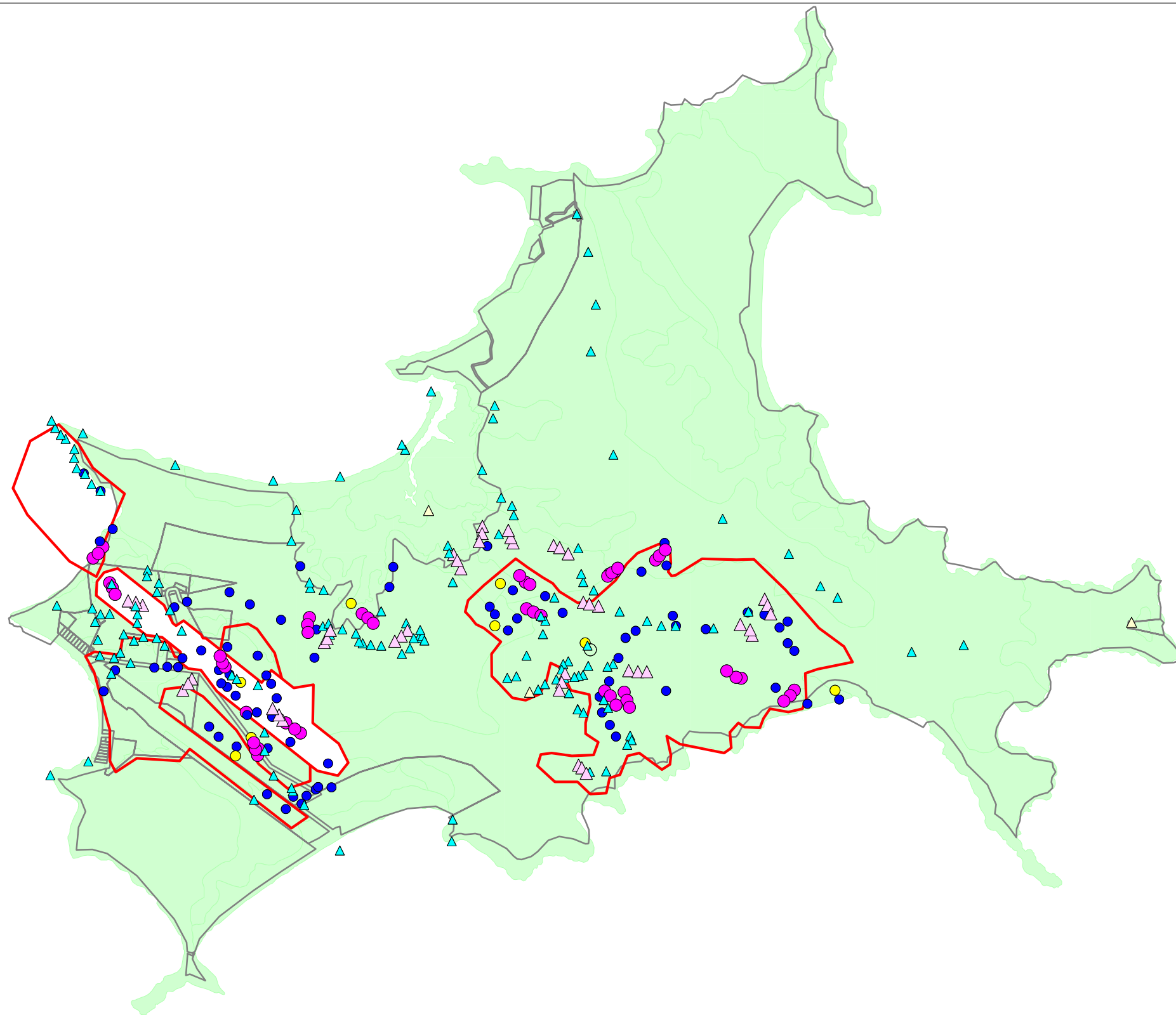
**DERM Wetland  
Mapping**

**FIGURE 5**

**CHENOWETH**  
ENVIRONMENTAL PLANNING  
& LANDSCAPE ARCHITECTURE

File: Fig5\_DERM\_Wetlands.WOR  
Date: 19/07/2011  
10CH061 Dwn: AP





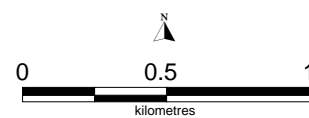
**Dry Season Survey**

- Quaternary
- Tertiary
- Secondary

**Wet Season Survey**

- ▲ Quaternary
- ▲ Tertiary
- ▲ Secondary

- Proposed development areas
- Cadastre



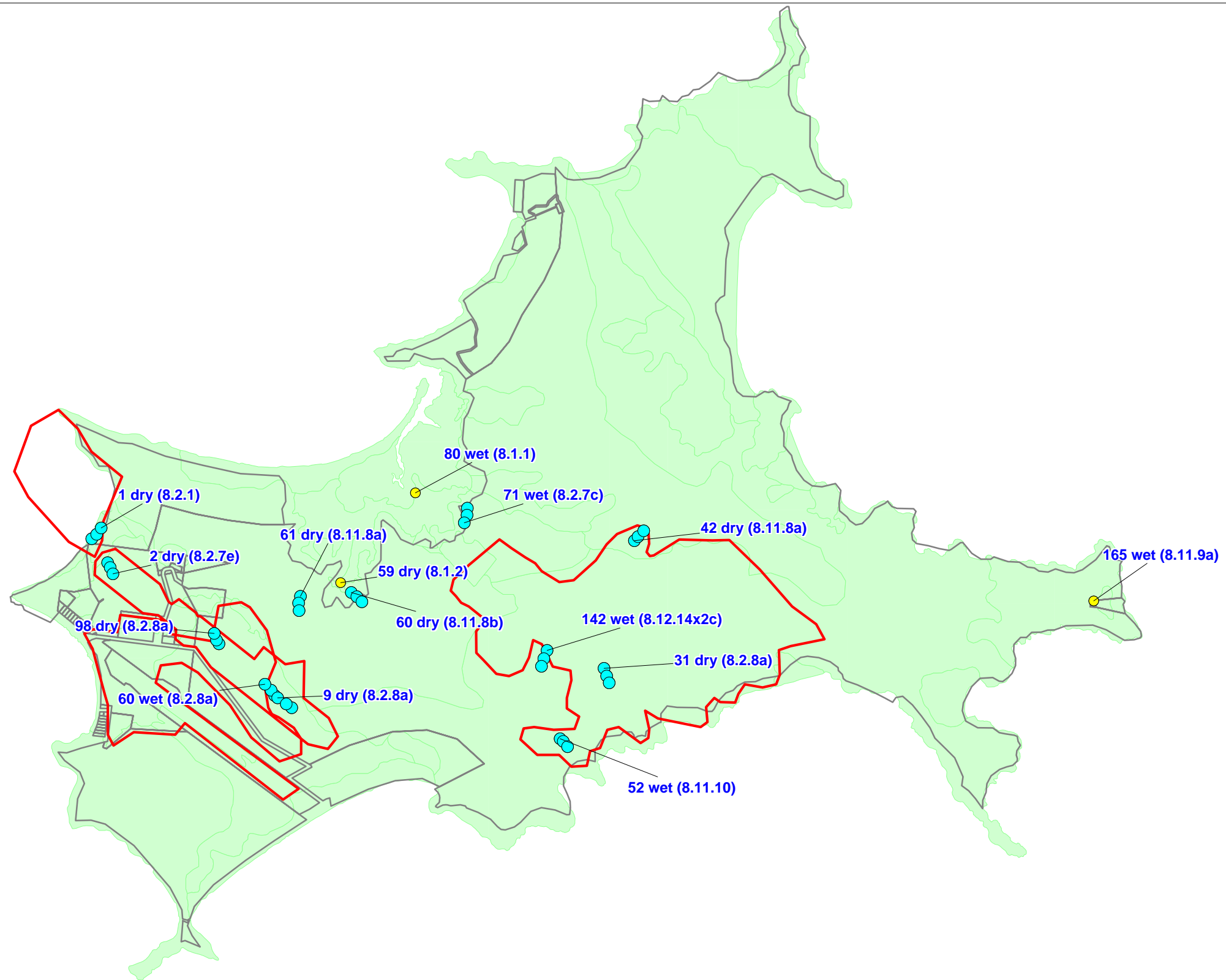
Great Keppel Island EIS  
Flora and Fauna Technical Report

**Flora Survey Points  
Wet and Dry Season Surveys**

**FIGURE 6**







#### Reference Sites

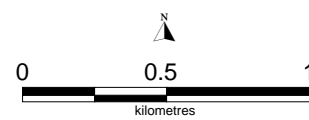
● Secondary  
● Tertiary

RE v 6

Proposed development areas

Cadastre

*Note: Reference sites are labelled with site number, wet or dry season, reference for regional ecosystem in brackets*



Great Keppel Island EIS  
Flora and Fauna Technical Report

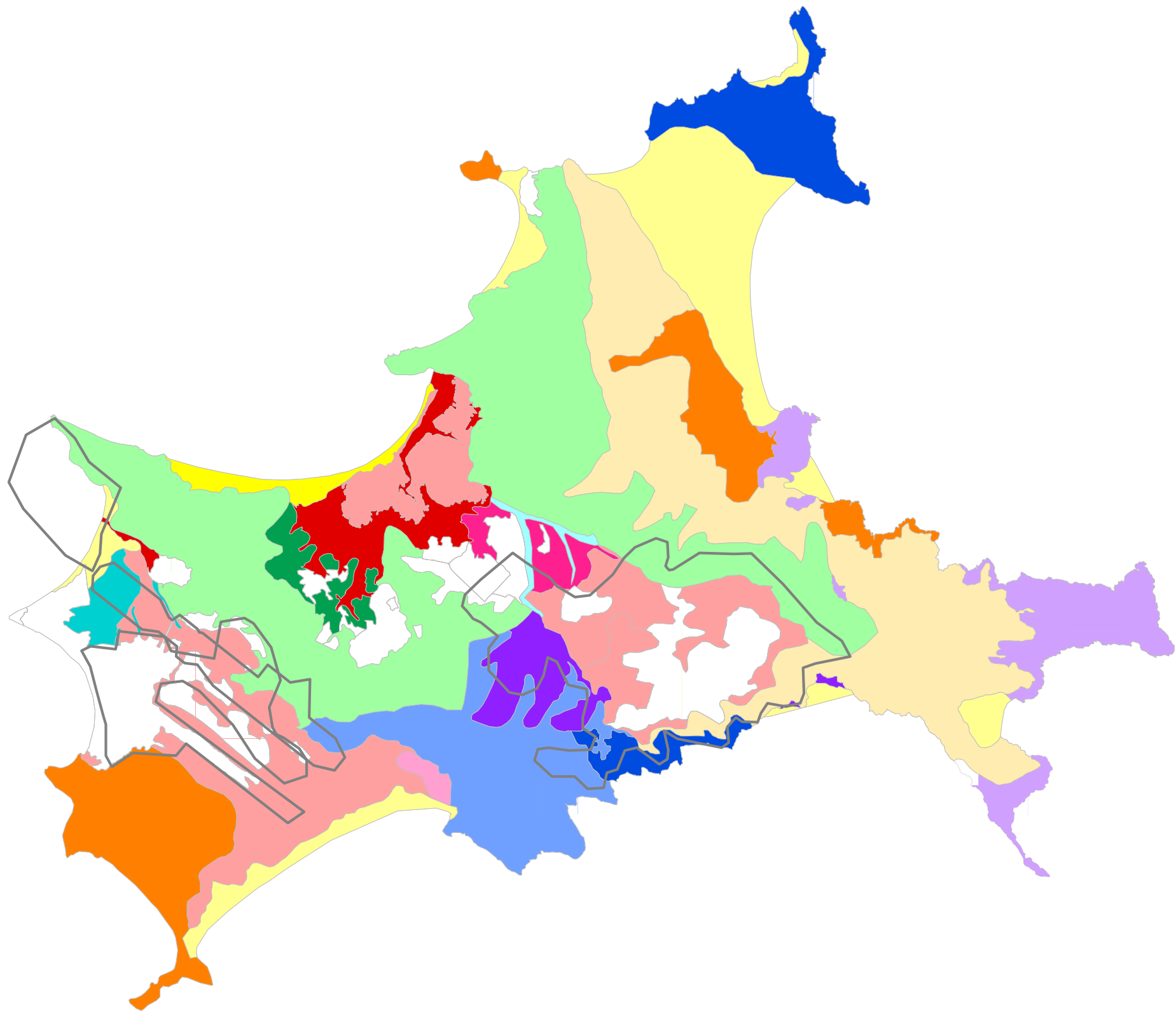
Reference  
Sites

**FIGURE 7**




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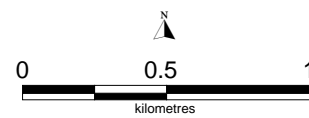




#### CEPLA Regional Ecosystem Mapping

8.1.1	8.11.8a	8.2.2
8.1.2	8.11.8b	8.2.7b
8.11.10	8.11.9a	8.2.7b/8.2.8a
8.11.10/8.11.9a	8.12.14x2c	8.2.7e
8.11.10/8.12.14x2c	8.2.1	8.2.8a
8.11.3a	8.2.1/8.2.8a	non-rem

 Proposed Development Areas



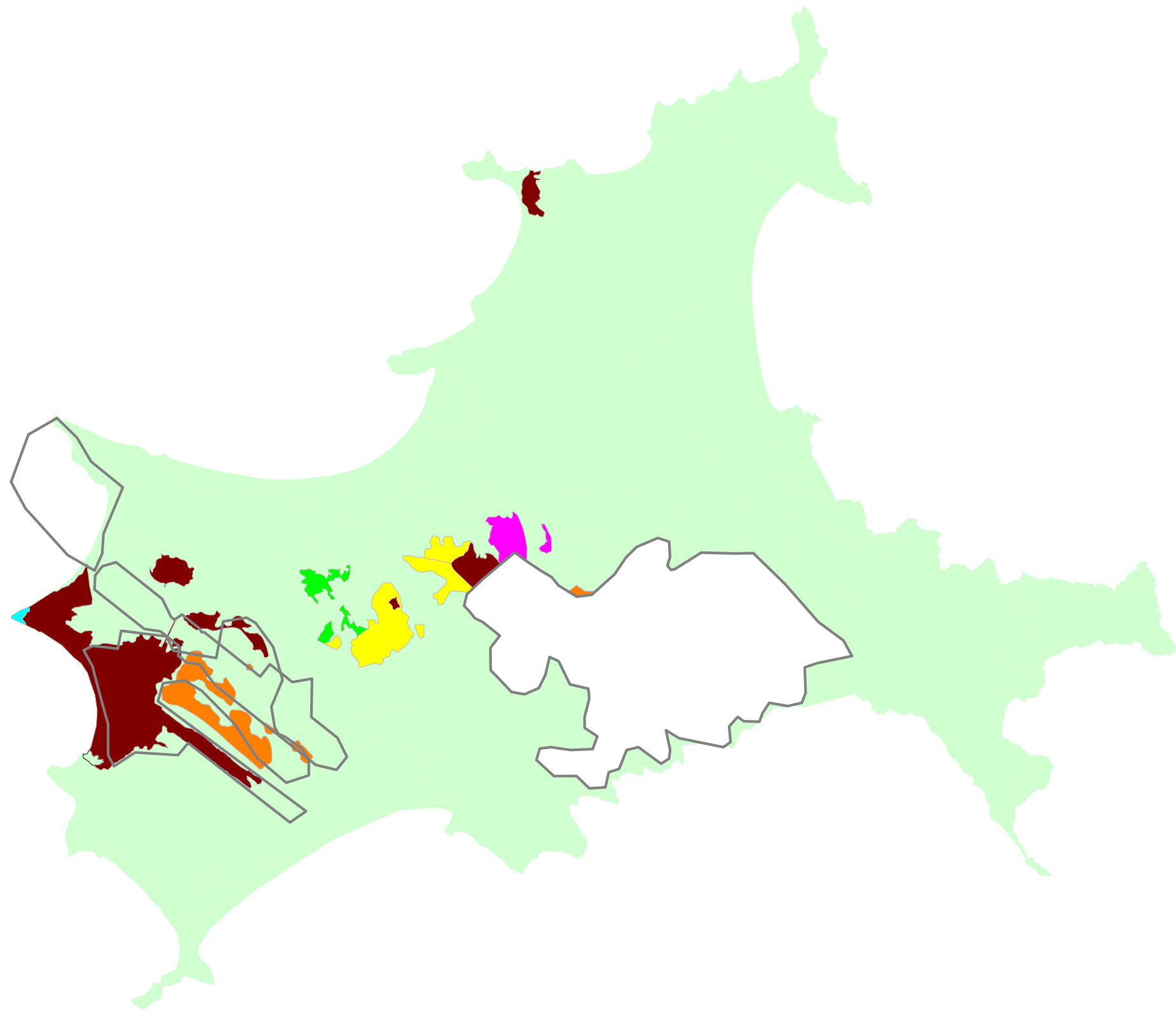
Great Keppel Island EIS  
Flora and Fauna Technical Report

**Regional Ecosystem Mapped  
at a Scale of 1:10,000**

**FIGURE 8**



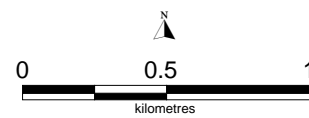




#### Non-remnant Vegetation Classes

- Non-remnant 8.11.8a
- Non-remnant 8.11.8b
- Non-remnant 8.2.1
- Non-remnant 8.2.7b
- Non-remnant 8.2.8a
- clear

Proposed Development Area



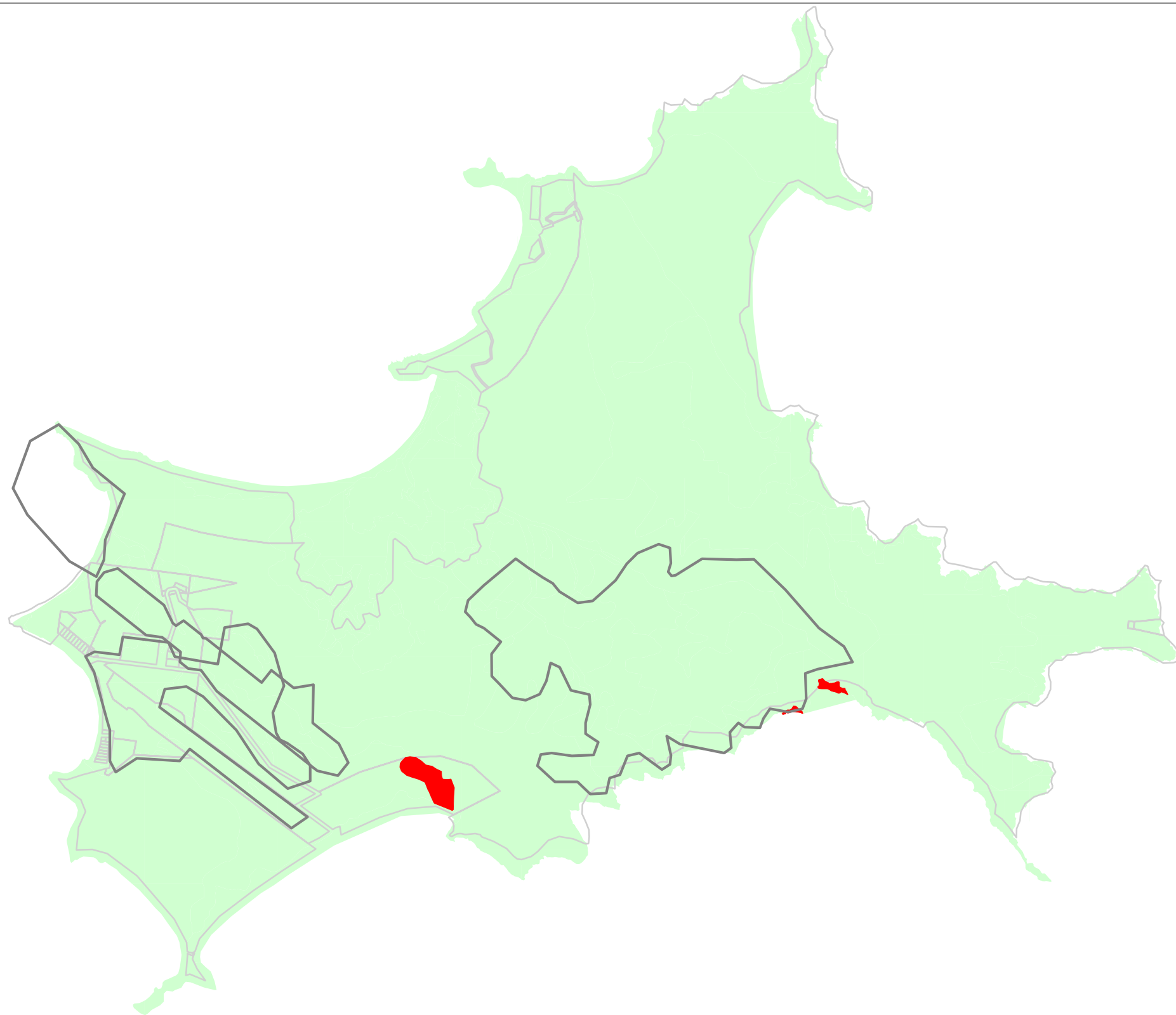
Great Keppel Island EIS  
Flora and Fauna Technical Report


**Non Remnant  
Vegetation Classes**

**FIGURE 9**




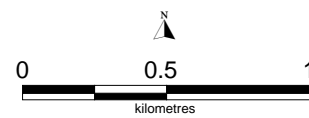




 Critically Endangered EPBC Community

 Proposed Development Footprint

 Cadastre



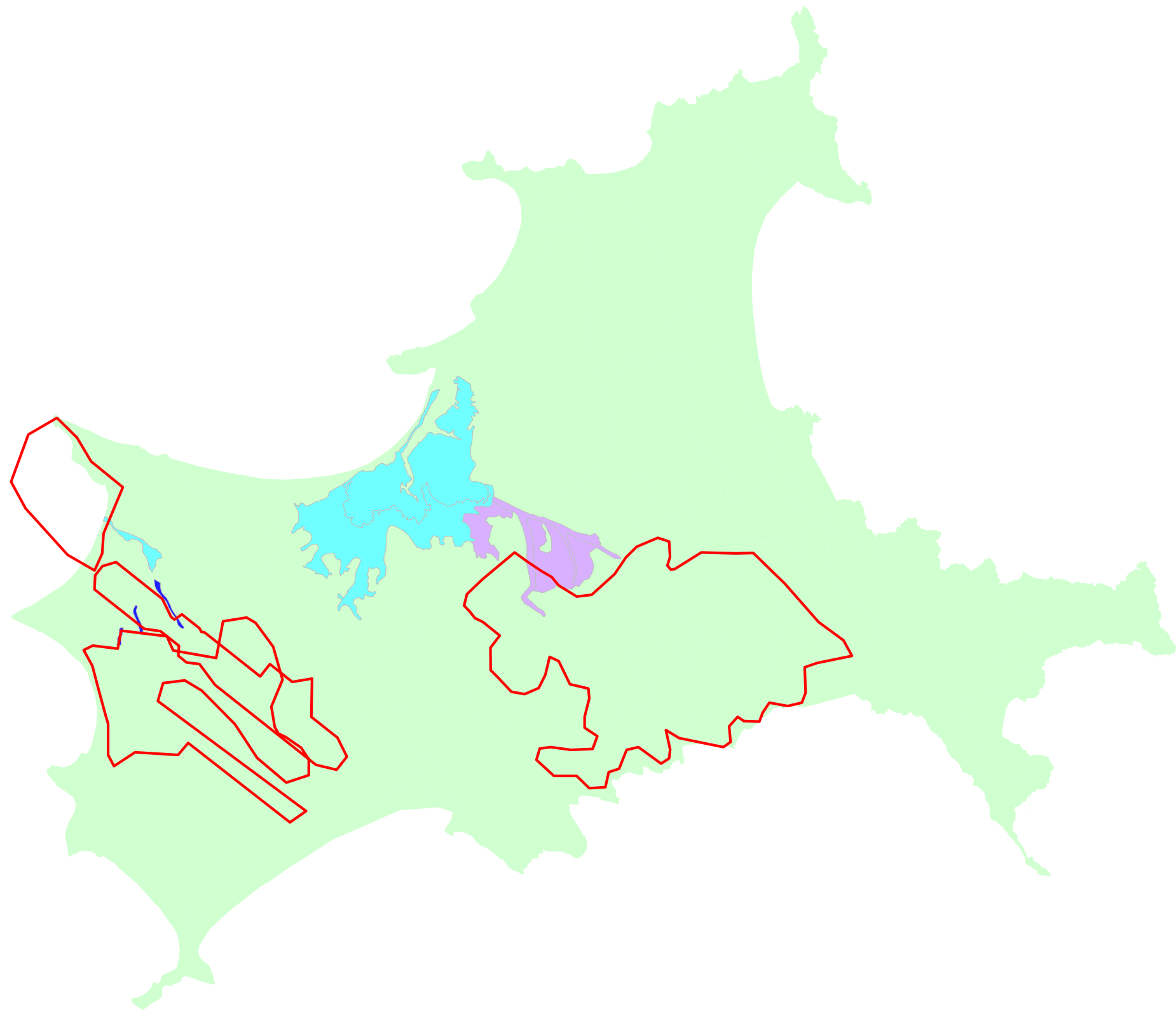
Great Keppel Island EIS  
Flora and Fauna Technical Report

**EPBC Communities**

**FIGURE 10**



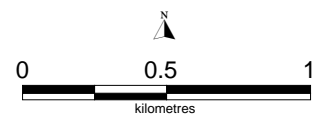




CEPLA Wetland

- Contains Palustrine
- Estuarine
- Palustrine

Proposed Development Footprint



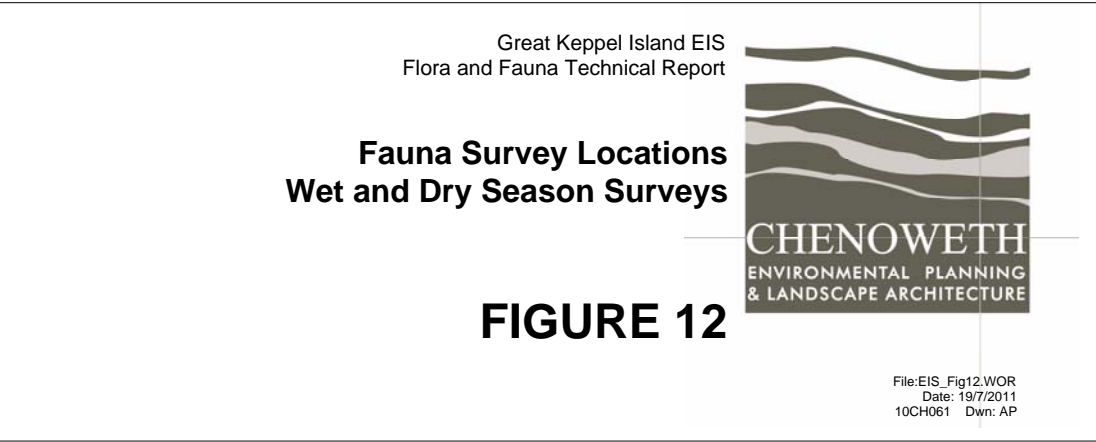
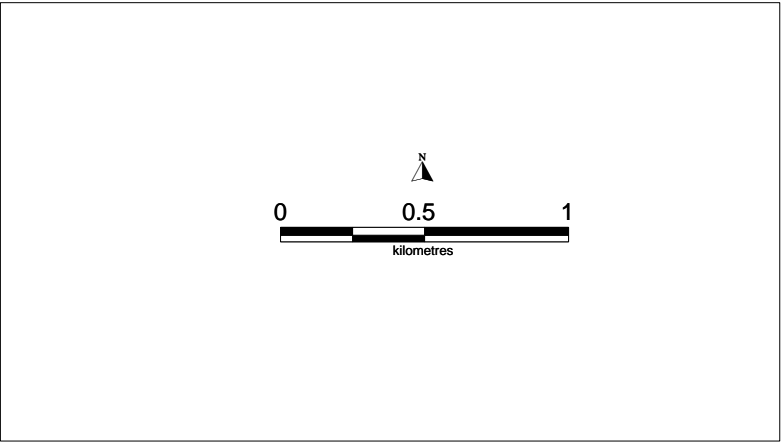
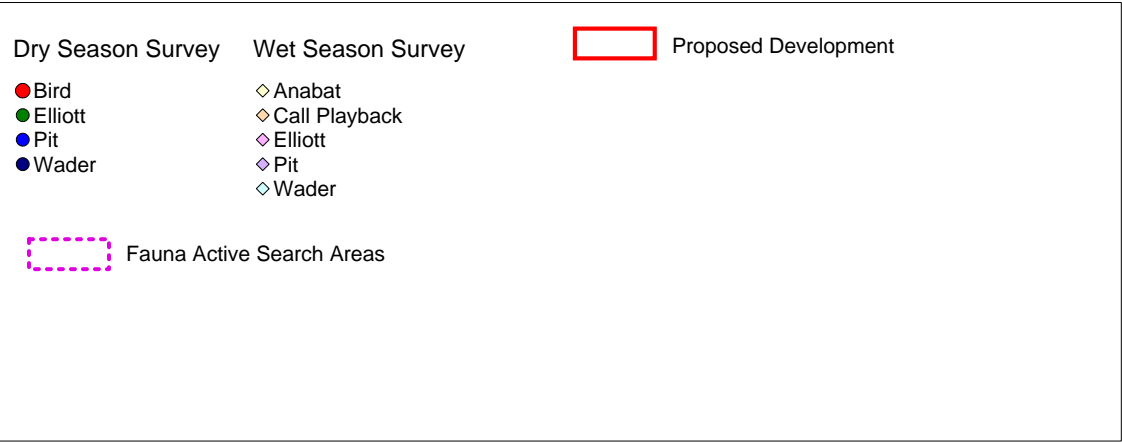
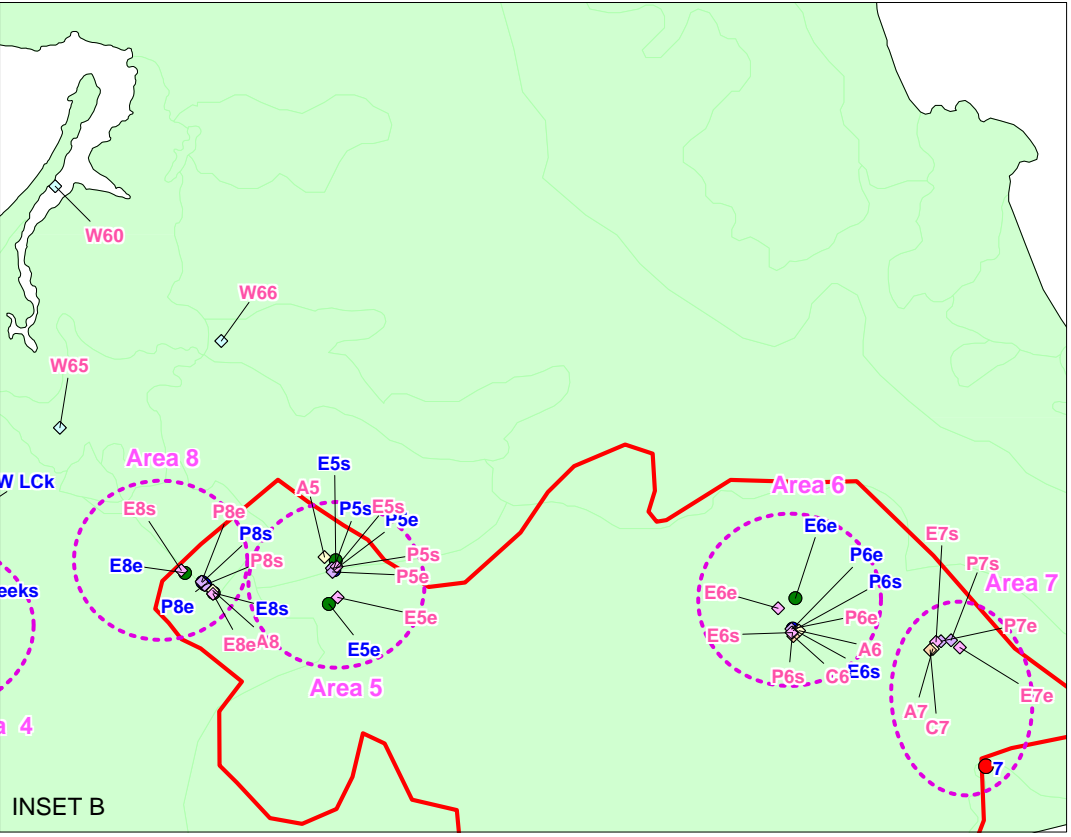
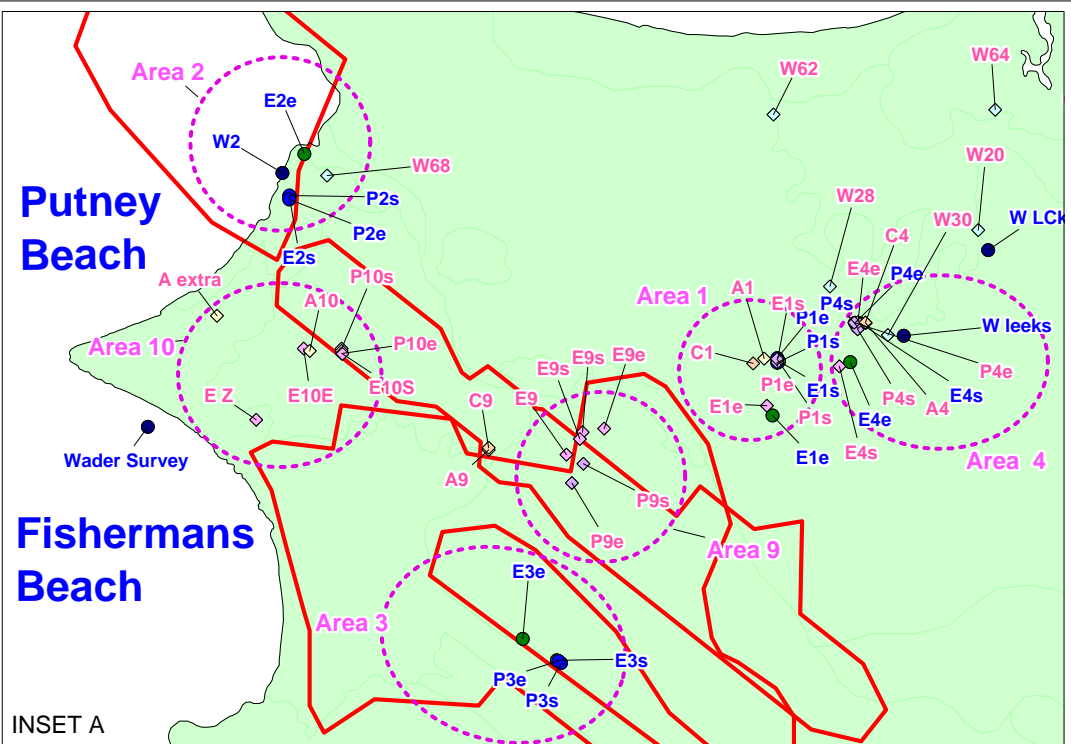
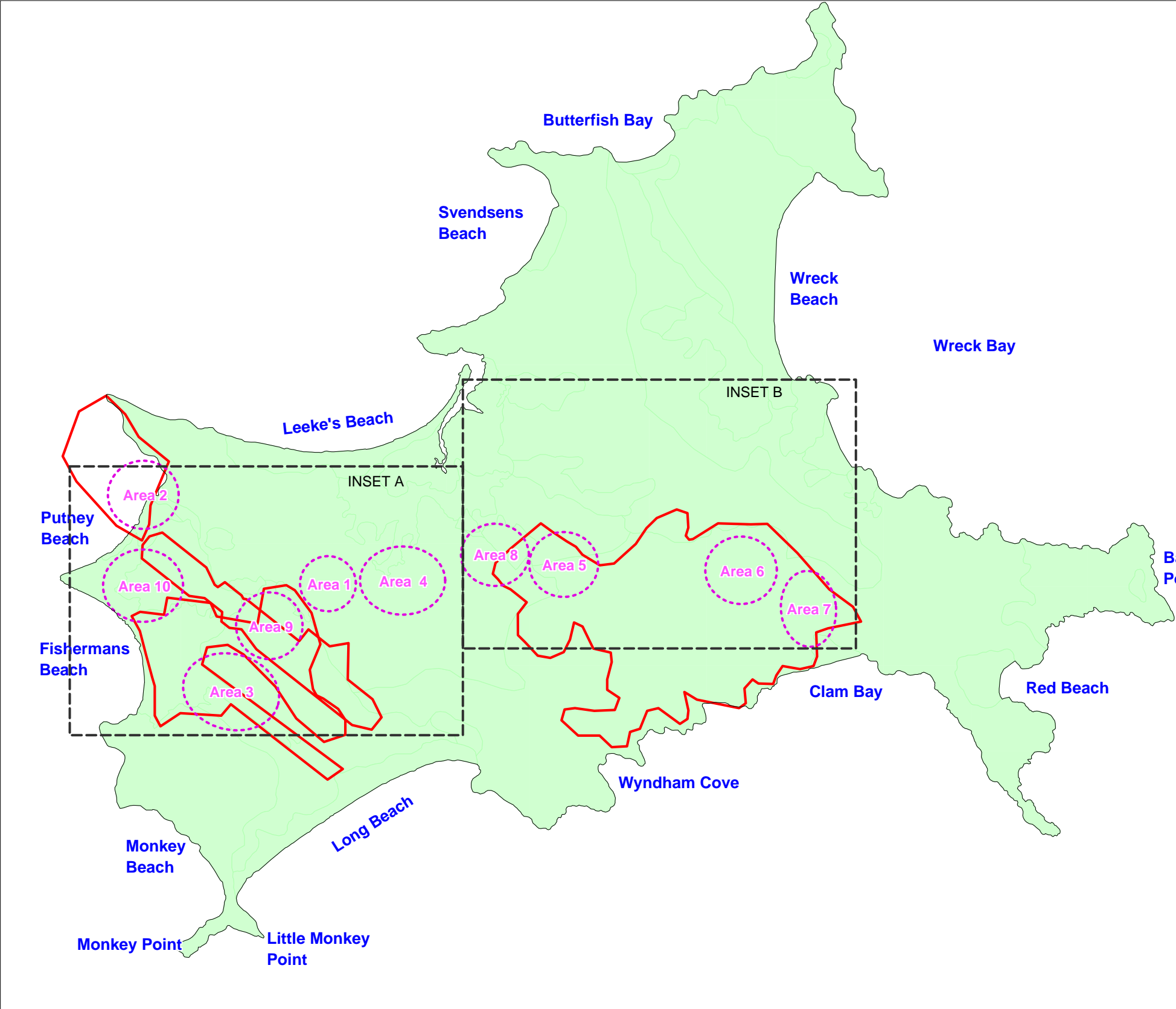
Great Keppel Island EIS  
Flora and Fauna Technical Report

CEPLA Mapped Wetlands

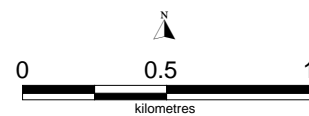
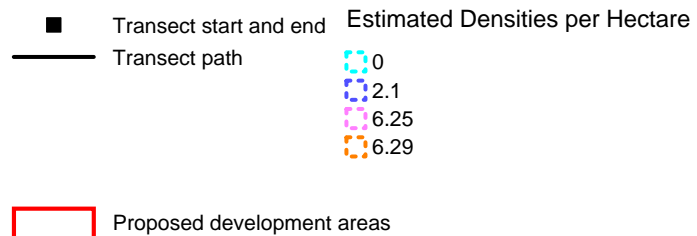
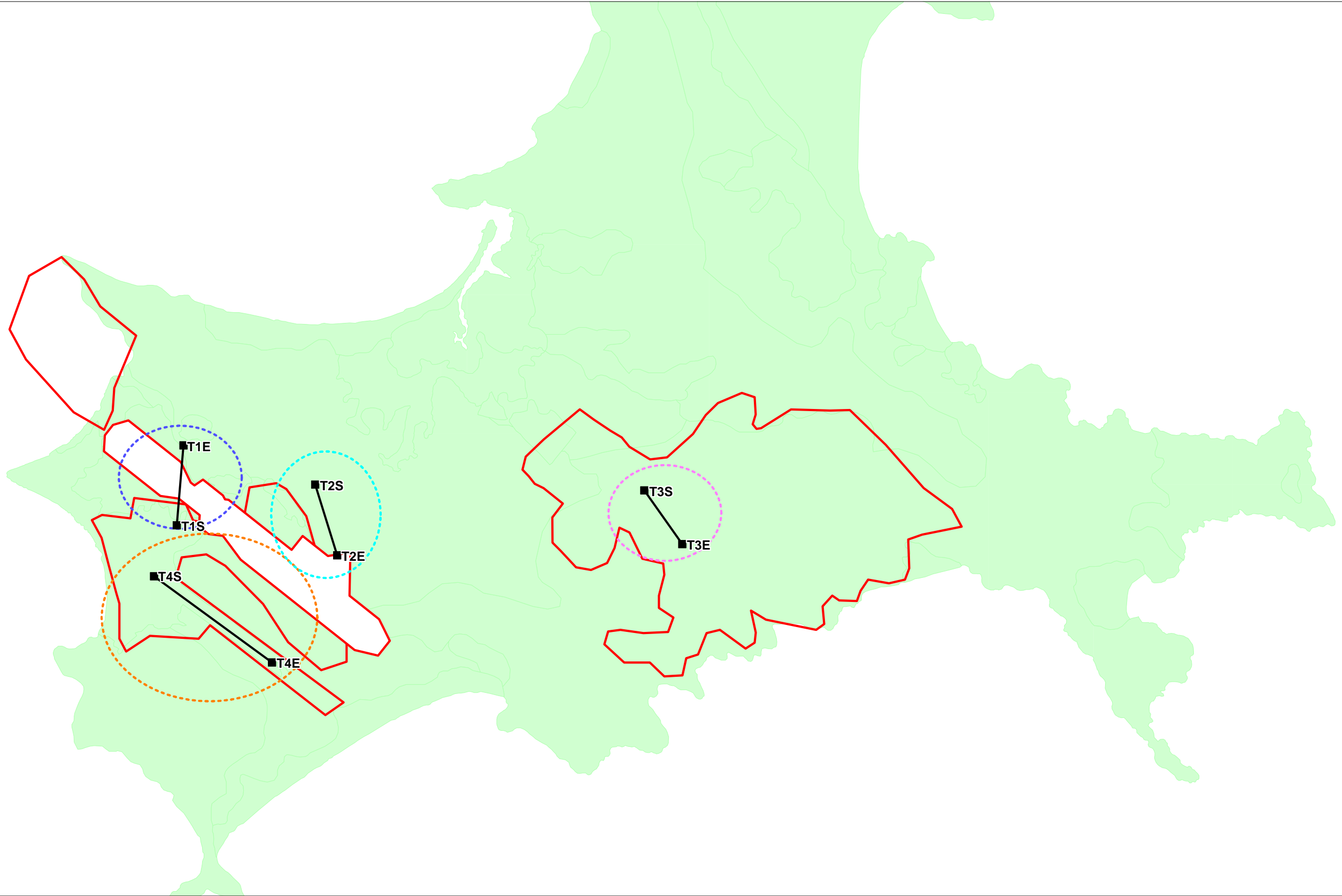
**FIGURE 11**











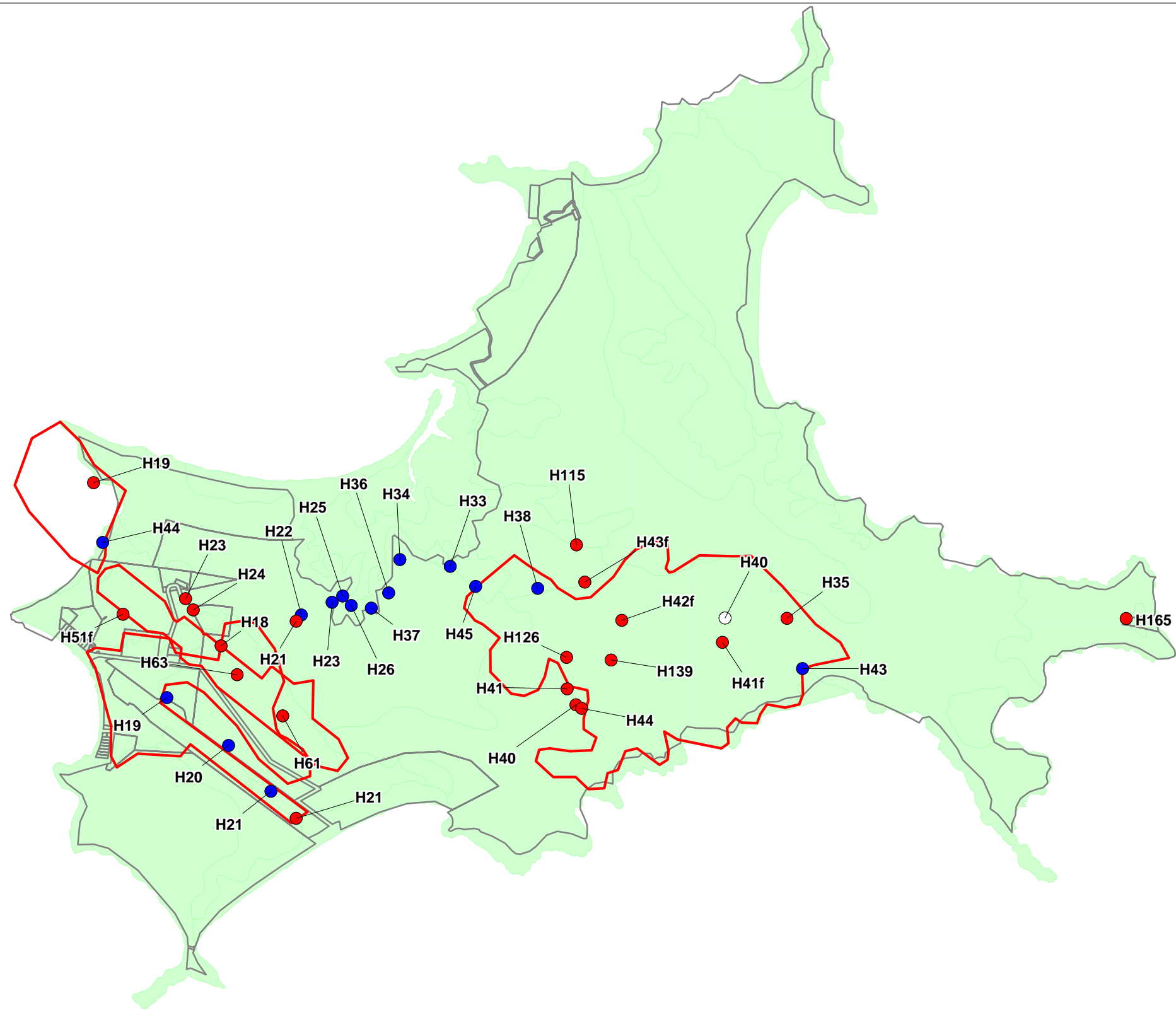
Great Keppel Island EIS  
Flora and Fauna Technical Report

**Possum Density Estimates  
using spotlight transects**

**FIGURE 13**



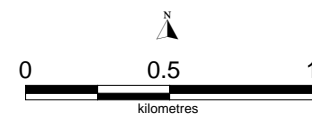




#### Habitat Survey Locations

- Wet Season
- Dry Season

- Proposed development areas
- Cadastre



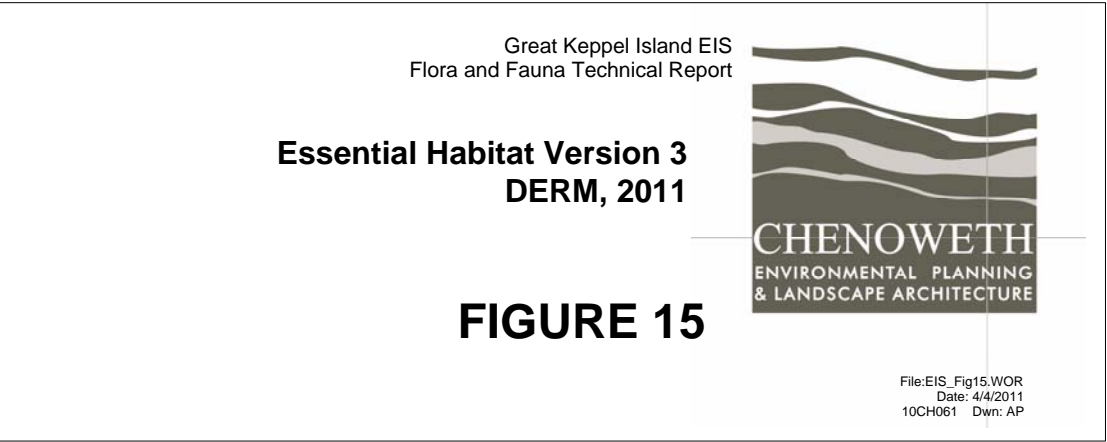
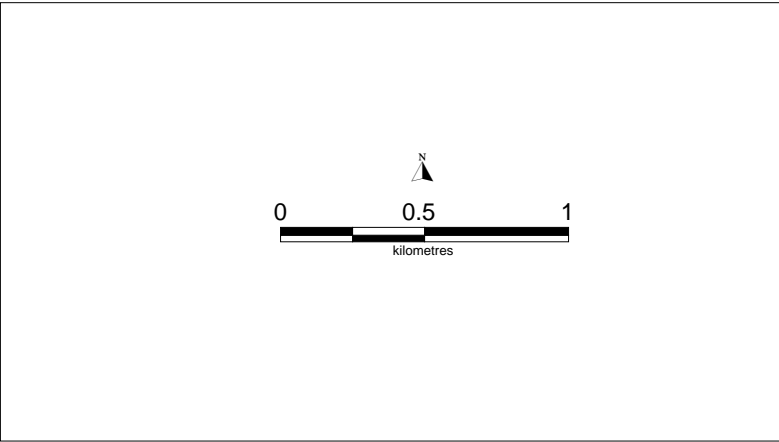
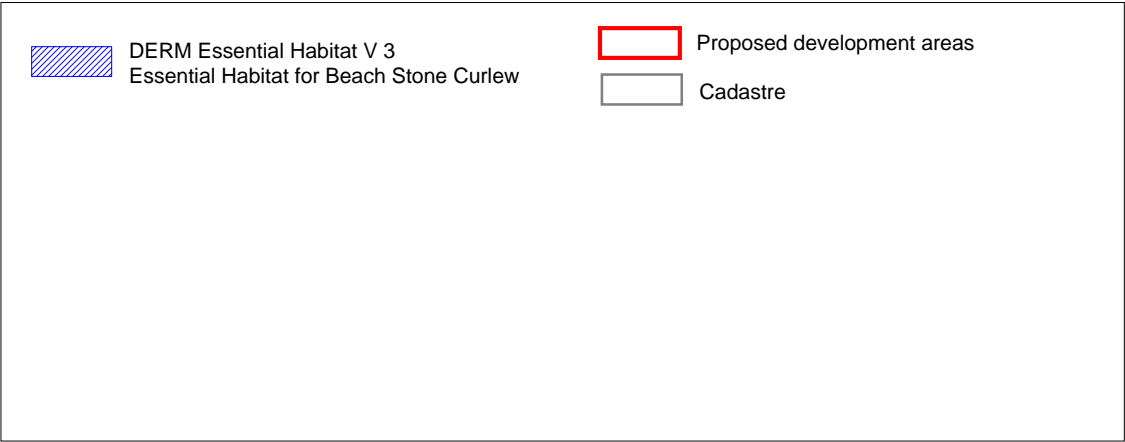
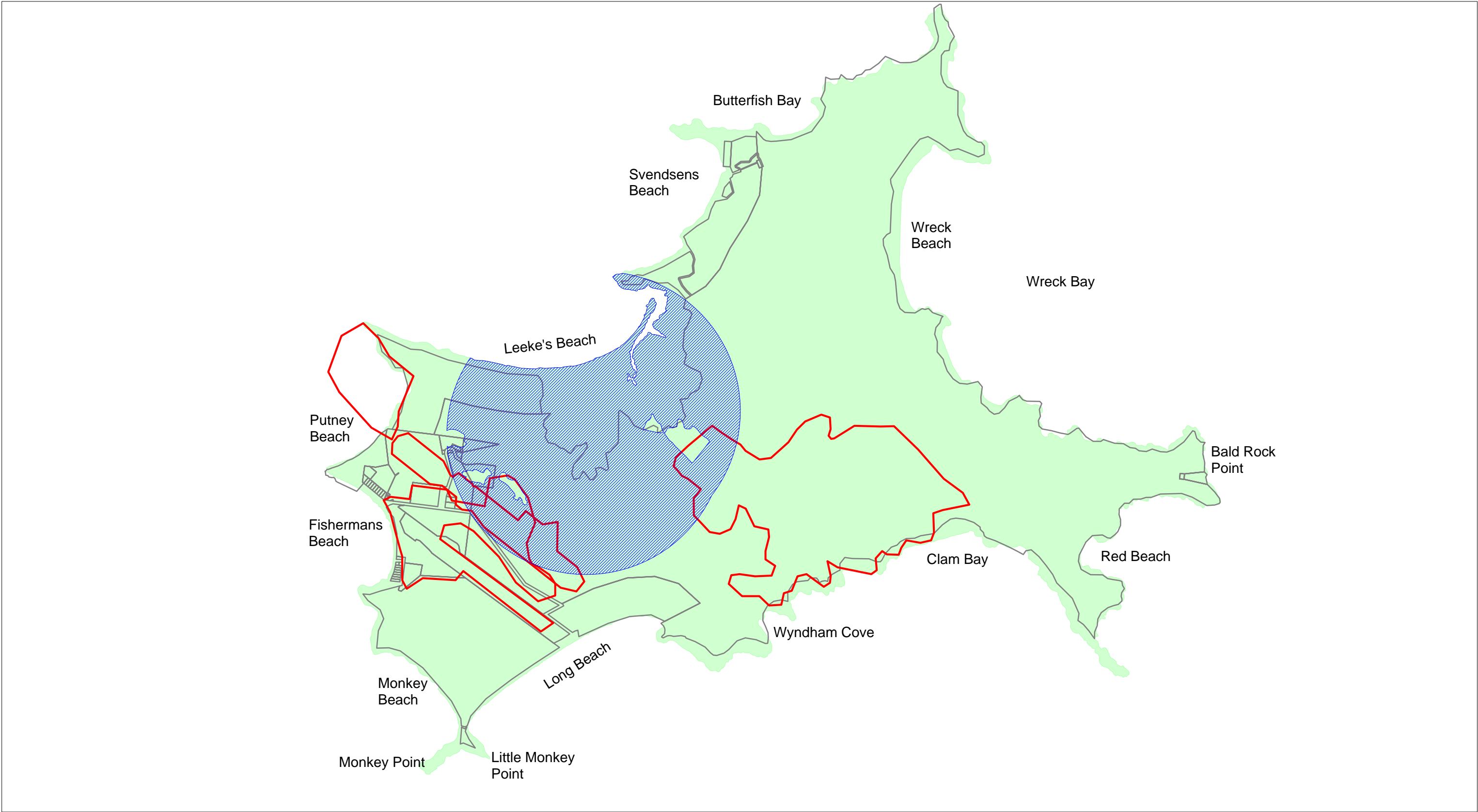
Great Keppel Island EIS  
Flora and Fauna Technical Report

#### Habitat Survey Points Wet and Dry Season Surveys

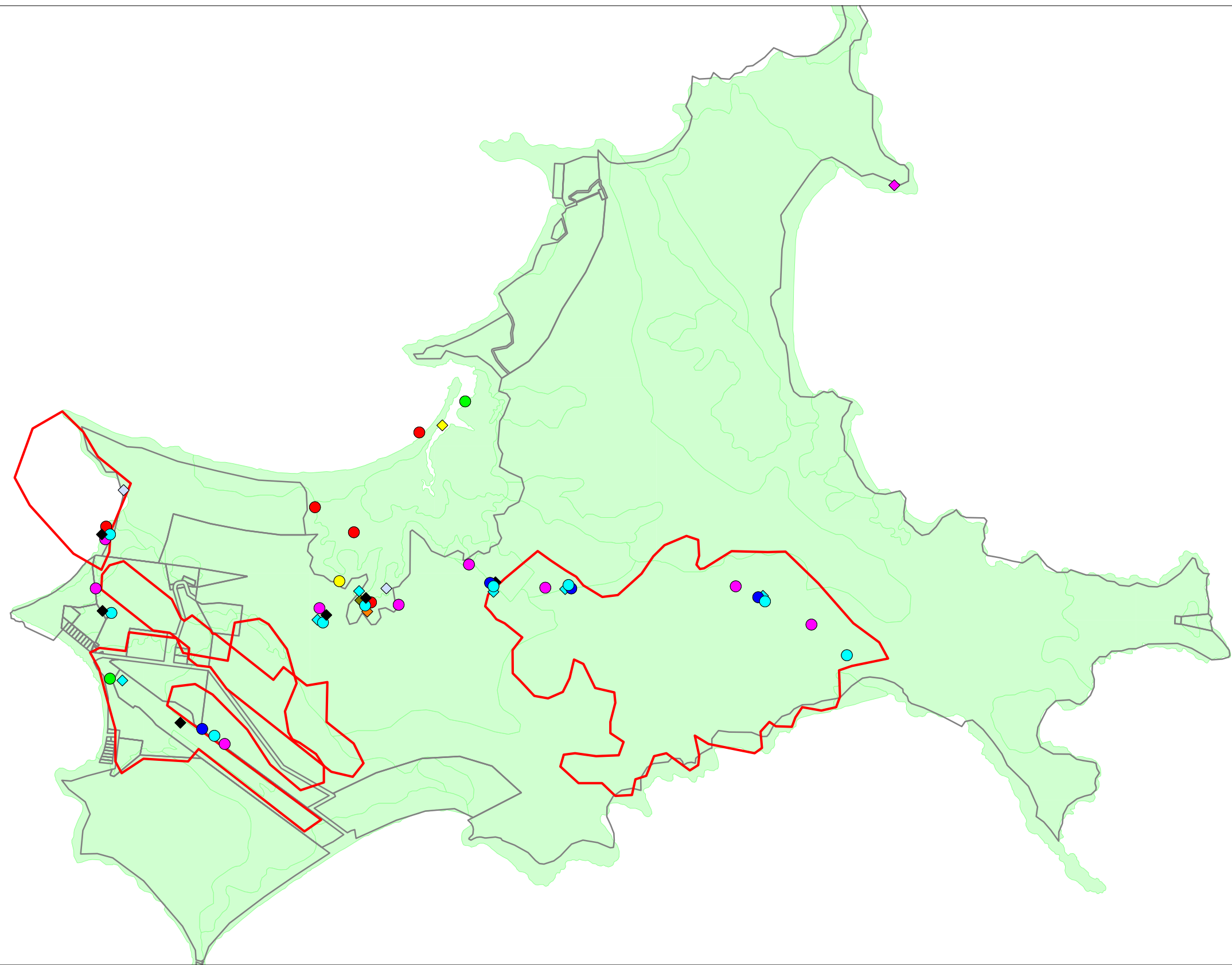
**FIGURE 14**







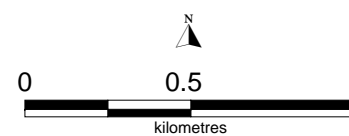




#### Significant Records

- Beach Stone Curlew
- Black Flying Fox (Flying Fox Camp)
- Black-faced Monarch
- Bush Stone Curlew
- Eastern Curlew
- Leaden Flycatcher
- ◆ Masked Lapwing
- ◆ Rainbow Bee-eater
- ◆ Restless Flycatcher
- ◆ Sooty Oystercatcher
- ◆ Rusty Monitor
- ◆ Whimbrel
- ◆ White-bellied Sea Eagle

- Proposed development areas
- RE v 6
- Cadastre



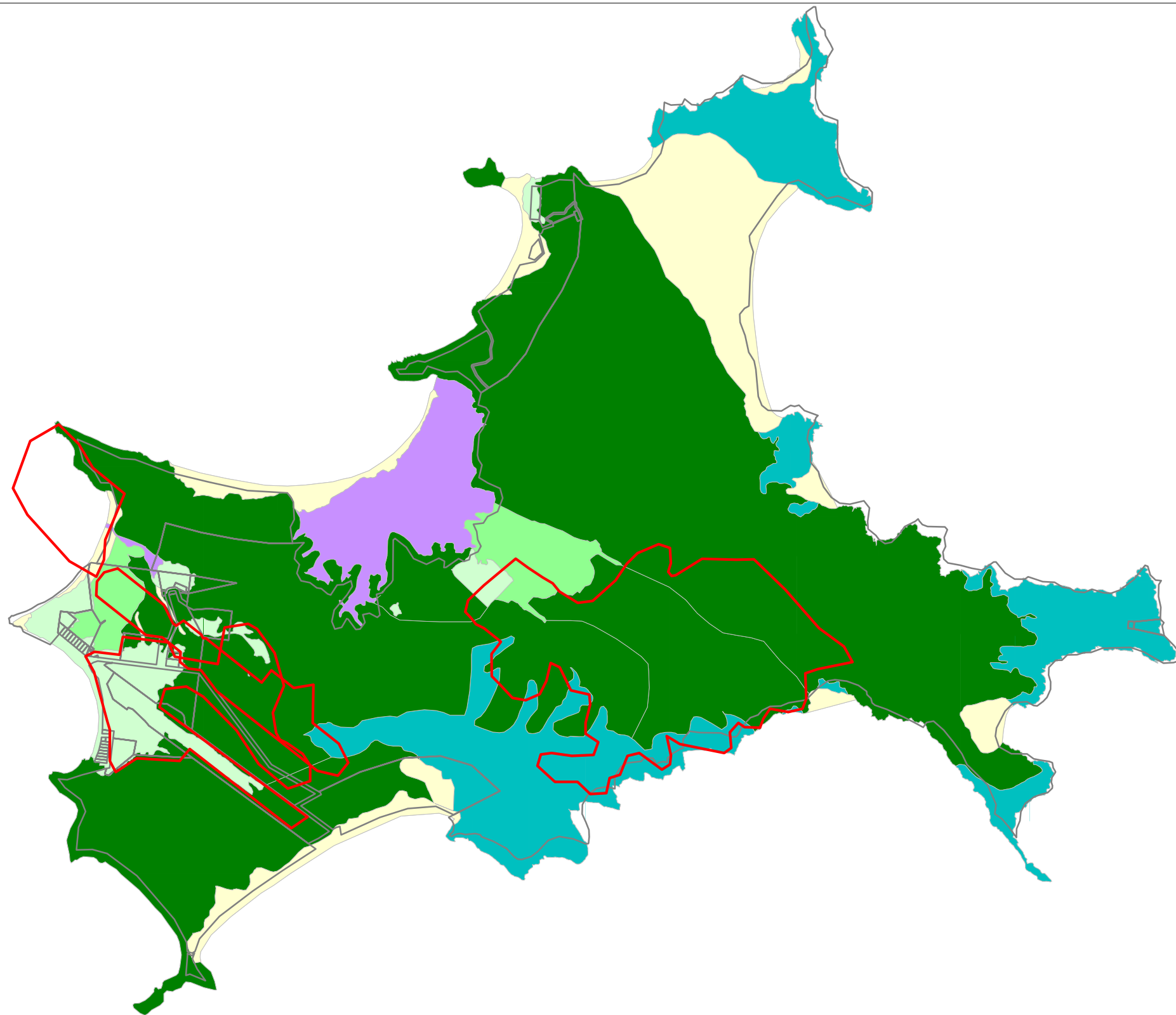
Great Keppel Island EIS  
Flora and Fauna Technical Report

#### Significant Fauna Records

**FIGURE 16**







**Broad Dominant Habitat Type**

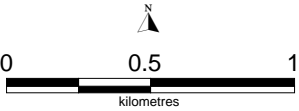
- Beach Front/influence
- Clear - grassland or Dam
- Headland and Wind sheared
- Sclerophyll Association (Eucalypt, Corymbia, Acacia)
- Sclerophyll Association (Eucalypt, Corymbia, Melaleuca)
- Tidal/estuary/mangroves



Proposed development areas



Cadastre



Great Keppel Island EIS  
Flora and Fauna Technical Report

**Broad Dominant Habitat Types**



**FIGURE 17**



## APPENDIX A – EPBC Protected Matters Database Search Results





Australian Government

Department of the Environment, Water, Heritage and the Arts

## Environmental Reporting Tool

You are here: [Environment Home](#) > [ERIN](#) > [ERT](#)

1 September 2010 16:16

## Database Report

This report includes places of national environmental significance that are registered in the Department of the Environment and Water Resources' databases, for the selected area. The information presented here has been provided by a range of groups across Australia, and the accuracy and resolution varies.

**Search Type:** Area  
**Buffer:** 0 km  
**Coordinates:** -23.14788,150.92548, -23.19957,150.92548, -23.19957,150.99574, -23.14788,150.99574



**Report Contents:** [Summary](#) >> [Details](#) >> [Caveat](#) >> [Acknowledgment](#)

### Biodiversity

[Threatened Species:](#) 15  
[Migratory Species:](#) 28  
[Listed Marine Species:](#) 72  
**Invasive Species:** None  
[Whales and Other Cetaceans:](#) 12  
[Threatened Ecological Communities:](#)

### Heritage

[World Heritage Properties:](#) 1  
[Australian Heritage Sites:](#) 2

### Wetlands

[Ramsar sites:](#) 1  
 (Internationally important)  
[Nationally Important Wetlands:](#) 1

### National Pollutant Inventory

**Reporting Facilities:** None  
**Airsheds:** None  
**Catchments:** None

### Protected Areas

[Reserves and Conservation Areas](#) 3

**Regional Forest Agreements:** None



This map may contain data which are  
 © Commonwealth of Australia (Geoscience Australia)  
 © PSMA Australia Limited

### Biodiversity

Threatened Species [ [Dataset Information](#) ]

#### Birds

[Macronectes giganteus](#)  
 Southern Giant-Petrel

[Pterodroma neglecta neglecta](#)  
 Kermadec Petrel (western)

#### Mammals

[Balaenoptera musculus](#)  
 Blue Whale

Status Comments

Endangered Species or species habitat may occur within area

Vulnerable Species or species habitat may occur within area

Endangered Species or species habitat may occur within area



[\*Megaptera novaeangliae\*](#)

Humpback Whale

Vulnerable Breeding known to occur within area

**Reptiles**[\*Caretta caretta\*](#)

Loggerhead Turtle

Endangered Species or species habitat likely to occur within area

[\*Chelonia mydas\*](#)

Green Turtle

Vulnerable Breeding known to occur within area

[\*Dermochelys coriacea\*](#)

Leatherback Turtle, Leathery Turtle, Luth

Endangered Species or species habitat likely to occur within area

[\*Eretmochelys imbricata\*](#)

Hawksbill Turtle

Vulnerable Species or species habitat likely to occur within area

[\*Lepidochelys olivacea\*](#)

Olive Ridley Turtle, Pacific Ridley Turtle

Endangered Species or species habitat likely to occur within area

[\*Natator depressus\*](#)

Flatback Turtle

Vulnerable Breeding known to occur within area

**Sharks**[\*Pristis zijsron\*](#)

Green Sawfish, Dindagubba, Narrowsnout Sawfish

Vulnerable Species or species habitat may occur within area

[\*Rhincodon typus\*](#)

Whale Shark

Vulnerable Species or species habitat may occur within area

**Plants**[\*Cycas megacarpa\*](#)

Endangered Species or species habitat may occur within area

[\*Cycas ophiolitica\*](#)

Endangered Species or species habitat likely to occur within area

[\*Taeniophyllum muelleri\*](#)

Minute Orchid, Ribbon-root Orchid

Vulnerable Species or species habitat may occur within area

Migratory Species [ [Dataset Information](#) ]

Status Comments

**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

[\*Myiagra cyanoleuca\*](#)

Satin Flycatcher

Migratory Species or species habitat likely to occur within area

**Migratory Wetland Species****Birds**[\*Arenaria interpres\*](#)

Ruddy Turnstone

Migratory Roosting known to occur within area

[\*Charadrius bicinctus\*](#)

Double-banded Plover

Migratory Roosting known to occur within area

[\*Gallinago hardwickii\*](#)

Latham's Snipe, Japanese Snipe

Migratory Roosting may occur within area

[\*Heteroscelus brevipes\*](#)

Grey-tailed Tattler

Migratory Roosting known to occur within area

[\*Numenius madagascariensis\*](#)

Eastern Curlew

Migratory Roosting known to occur within area

[\*Numenius minutus\*](#)

Little Curlew, Little Whimbrel

Migratory Roosting likely to occur within area

[\*Numenius phaeopus\*](#)

Whimbrel

Migratory Roosting known to occur within area



<a href="#"><i>Pluvialis fulva</i></a> Pacific Golden Plover	Migratory	Roosting known to occur within area
<b>Migratory Marine Birds</b>		
<a href="#"><i>Macronectes giganteus</i></a> Southern Giant-Petrel	Migratory	Species or species habitat may occur within area
<b>Migratory Marine Species</b>		
<b>Mammals</b>		
<a href="#"><i>Balaenoptera edeni</i></a> Bryde's Whale	Migratory	Species or species habitat may occur within area
<a href="#"><i>Balaenoptera musculus</i></a> Blue Whale	Migratory	Species or species habitat may occur within area
<a href="#"><i>Dugong dugon</i></a> Dugong	Migratory	Species or species habitat likely to occur within area
<a href="#"><i>Megaptera novaeangliae</i></a> Humpback Whale	Migratory	Breeding known to occur within area
<a href="#"><i>Orcaella brevirostris</i></a> Irrawaddy Dolphin	Migratory	Species or species habitat may occur within area
<a href="#"><i>Orcinus orca</i></a> Killer Whale, Orca	Migratory	Species or species habitat may occur within area
<a href="#"><i>Sousa chinensis</i></a> Indo-Pacific Humpback Dolphin	Migratory	Species or species habitat may occur within area
<b>Reptiles</b>		
<a href="#"><i>Caretta caretta</i></a> Loggerhead Turtle	Migratory	Species or species habitat likely to occur within area
<a href="#"><i>Chelonia mydas</i></a> Green Turtle	Migratory	Breeding known to occur within area
<a href="#"><i>Crocodylus porosus</i></a> Salt-water Crocodile, Estuarine Crocodile	Migratory	Species or species habitat likely to occur within area
<a href="#"><i>Dermochelys coriacea</i></a> Leatherback Turtle, Leathery Turtle, Luth	Migratory	Species or species habitat likely to occur within area
<a href="#"><i>Eretmochelys imbricata</i></a> Hawksbill Turtle	Migratory	Species or species habitat likely to occur within area
<a href="#"><i>Lepidochelys olivacea</i></a> Olive Ridley Turtle, Pacific Ridley Turtle	Migratory	Species or species habitat likely to occur within area
<a href="#"><i>Natator depressus</i></a> Flatback Turtle	Migratory	Breeding known to occur within area
<b>Sharks</b>		
<a href="#"><i>Rhincodon typus</i></a> Whale Shark	Migratory	Species or species habitat may occur within area
Listed Marine Species [ <a href="#">Dataset Information</a> ]	Status	Comments
<b>Birds</b>		
<a href="#"><i>Arenaria interpres</i></a> Ruddy Turnstone	Listed	Roosting known to occur within area
<a href="#"><i>Charadrius bicinctus</i></a> Double-banded Plover	Listed - overfly marine area	Roosting known to occur within area
<a href="#"><i>Charadrius ruficapillus</i></a> Red-capped Plover	Listed - overfly marine area	Roosting known to occur within area
<a href="#"><i>Gallinago hardwickii</i></a> Latham's Snipe, Japanese Snipe	Listed - overfly marine area	Roosting may occur within area
<a href="#"><i>Gallinago megala</i></a> Swinhoe's Snipe	Listed - overfly marine area	Roosting likely to occur within area



<a href="#"><i>Gallinago stenura</i></a> Pin-tailed Snipe	Listed - overfly marine area	Roosting likely to occur within area
<a href="#"><i>Haliaeetus leucogaster</i></a> White-bellied Sea-Eagle	Listed	Species or species habitat likely to occur within area
<a href="#"><i>Heteroscelus brevipes</i></a> Grey-tailed Tattler	Listed	Roosting known to occur within area
<a href="#"><i>Himantopus himantopus</i></a> Black-winged Stilt	Listed - overfly marine area	Roosting known to occur within area
<a href="#"><i>Hirundapus caudacutus</i></a> White-throated Needletail	Listed - overfly marine area	Species or species habitat may occur within area
<a href="#"><i>Hirundo rustica</i></a> Barn Swallow	Listed - overfly marine area	Species or species habitat may occur within area
<a href="#"><i>Macronectes giganteus</i></a> Southern Giant-Petrel	Listed	Species or species habitat may occur within area
<a href="#"><i>Myiagra cyanoleuca</i></a> Satin Flycatcher	Listed - overfly marine area	Species or species habitat likely to occur within area
<a href="#"><i>Numenius madagascariensis</i></a> Eastern Curlew	Listed	Roosting known to occur within area
<a href="#"><i>Numenius minutus</i></a> Little Curlew, Little Whimbrel	Listed - overfly marine area	Roosting likely to occur within area
<a href="#"><i>Numenius phaeopus</i></a> Whimbrel	Listed	Roosting known to occur within area
<a href="#"><i>Pluvialis fulva</i></a> Pacific Golden Plover	Listed	Roosting known to occur within area
<b>Mammals</b>		
<a href="#"><i>Dugong dugon</i></a> Dugong	Listed	Species or species habitat likely to occur within area
<b>Ray-finned fishes</b>		
<a href="#"><i>Acentronura tentaculata</i></a> Shortpouch Pygmy Pipehorse	Listed	Species or species habitat may occur within area
<a href="#"><i>Campichthys tryoni</i></a> Tryon's Pipefish	Listed	Species or species habitat may occur within area
<a href="#"><i>Choeroichthys brachysoma</i></a> Pacific Short-bodied Pipefish, Short-bodied Pipefish	Listed	Species or species habitat may occur within area
<a href="#"><i>Corythoichthys amplexus</i></a> Fijian Banded Pipefish, Brown-banded Pipefish	Listed	Species or species habitat may occur within area
<a href="#"><i>Corythoichthys flavofasciatus</i></a> Reticulate Pipefish, Yellow-banded Pipefish, Network Pipefish	Listed	Species or species habitat may occur within area
<a href="#"><i>Corythoichthys haematopterus</i></a> Reef-top Pipefish	Listed	Species or species habitat may occur within area
<a href="#"><i>Corythoichthys intestinalis</i></a> Australian Messmate Pipefish, Banded Pipefish	Listed	Species or species habitat may occur within area
<a href="#"><i>Corythoichthys ocellatus</i></a> Orange-spotted Pipefish, Ocellated Pipefish	Listed	Species or species habitat may occur within area
<a href="#"><i>Corythoichthys paxtoni</i></a> Paxton's Pipefish	Listed	Species or species habitat may occur within area
<a href="#"><i>Corythoichthys schultzi</i></a> Schultz's Pipefish	Listed	Species or species habitat may occur within area
<a href="#"><i>Doryrhamphus excisus</i></a> Bluestripe Pipefish, Indian Blue-stripe Pipefish, Pacific	Listed	Species or species habitat may occur within area



## Blue-stripe Pipefish

[\*Festucalex cinctus\*](#)

Listed

Species or species habitat may occur within area

## Girdled Pipefish

[\*Filicampus tigris\*](#)

Listed

Species or species habitat may occur within area

## Tiger Pipefish

[\*Halicampus dunckeri\*](#)

Listed

Species or species habitat may occur within area

## Red-hair Pipefish, Duncker's Pipefish

[\*Halicampus grayi\*](#)

Listed

Species or species habitat may occur within area

## Mud Pipefish, Gray's Pipefish

[\*Halicampus nitidus\*](#)

Listed

Species or species habitat may occur within area

## Glittering Pipefish

[\*Halicampus spinirostris\*](#)

Listed

Species or species habitat may occur within area

## Spiny-snout Pipefish

[\*Hippichthys cyanospilos\*](#)

Listed

Species or species habitat may occur within area

## Blue-speckled Pipefish, Blue-spotted Pipefish

[\*Hippichthys heptagonus\*](#)

Listed

Species or species habitat may occur within area

## Madura Pipefish, Reticulated Freshwater Pipefish

[\*Hippichthys penicillus\*](#)

Listed

Species or species habitat may occur within area

## Beady Pipefish, Steep-nosed Pipefish

[\*Hippocampus bargibanti\*](#)

Listed

Species or species habitat may occur within area

## Pygmy Seahorse

[\*Hippocampus kuda\*](#)

Listed

Species or species habitat may occur within area

## Spotted Seahorse, Yellow Seahorse

[\*Hippocampus planifrons\*](#)

Listed

Species or species habitat may occur within area

## Flat-face Seahorse

[\*Hippocampus zebra\*](#)

Listed

Species or species habitat may occur within area

## Zebra Seahorse

[\*Lissocampus runa\*](#)

Listed

Species or species habitat may occur within area

## Javelin Pipefish

[\*Micrognathus andersonii\*](#)

Listed

Species or species habitat may occur within area

## Anderson's Pipefish, Shortnose Pipefish

[\*Micrognathus brevirostris\*](#)

Listed

Species or species habitat may occur within area

## thorntail Pipefish, Thorn-tailed Pipefish

[\*Nannocampus pictus\*](#)

Listed

Species or species habitat may occur within area

## Painted Pipefish, Reef Pipefish

[\*Solegnathus hardwickii\*](#)

Listed

Species or species habitat may occur within area

## Pallid Pipehorse, Hardwick's Pipehorse

[\*Solenostomus cyanopterus\*](#)

Listed

Species or species habitat may occur within area

## Robust Ghostpipefish, Blue-finned Ghost Pipefish,

[\*Solenostomus paegnius\*](#)

Listed

Species or species habitat may occur within area

## Rough-snout Ghost Pipefish

[\*Solenostomus paradoxus\*](#)

Listed

Species or species habitat may occur within area

## Ornate Ghostpipefish, Harlequin Ghost Pipefish, Ornate Ghost Pipefish

[\*Syngnathoides biaculeatus\*](#)

Listed

Species or species habitat may occur within area

## Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish

[\*Trachyrhamphus bicoarctatus\*](#)

Listed

Species or species habitat may occur within area

## Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish

**Reptiles**[\*Acalyptophis peronii\*](#)

Listed

Species or species habitat may occur within area

## Horned Seasnake

[\*Aipysurus duboisii\*](#)

Listed

Species or species habitat may occur within area

## Dubois' Seasnake

[\*Aipysurus eydouxii\*](#)

Listed

Species or species habitat may occur within



Spine-tailed Seasnake		area
<a href="#">Aipysurus laevis</a> Olive Seasnake	Listed	Species or species habitat may occur within area
<a href="#">Astrotia stokesii</a> Stokes' Seasnake	Listed	Species or species habitat may occur within area
<a href="#">Caretta caretta</a> Loggerhead Turtle	Listed	Species or species habitat likely to occur within area
<a href="#">Chelonia mydas</a> Green Turtle	Listed	Breeding known to occur within area
<a href="#">Crocodylus porosus</a> Salt-water Crocodile, Estuarine Crocodile	Listed	Species or species habitat likely to occur within area
<a href="#">Dermochelys coriacea</a> Leatherback Turtle, Leathery Turtle, Luth	Listed	Species or species habitat likely to occur within area
<a href="#">Disteira kingii</a> Spectacled Seasnake	Listed	Species or species habitat may occur within area
<a href="#">Disteira major</a> Olive-headed Seasnake	Listed	Species or species habitat may occur within area
<a href="#">Emydocephalus annulatus</a> Turtle-headed Seasnake	Listed	Species or species habitat may occur within area
<a href="#">Eretmochelys imbricata</a> Hawksbill Turtle	Listed	Species or species habitat likely to occur within area
<a href="#">Hydrophis elegans</a> Elegant Seasnake	Listed	Species or species habitat may occur within area
<a href="#">Lapemis hardwickii</a> Spine-bellied Seasnake	Listed	Species or species habitat may occur within area
<a href="#">Laticauda colubrina</a> a sea krait	Listed	Species or species habitat may occur within area
<a href="#">Laticauda laticaudata</a> a sea krait	Listed	Species or species habitat may occur within area
<a href="#">Lepidochelys olivacea</a> Olive Ridley Turtle, Pacific Ridley Turtle	Listed	Species or species habitat likely to occur within area
<a href="#">Natator depressus</a> Flatback Turtle	Listed	Breeding known to occur within area
<a href="#">Pelamis platurus</a> Yellow-bellied Seasnake	Listed	Species or species habitat may occur within area
Whales and Other Cetaceans [ <a href="#">Dataset Information</a> ]	Status	Comments
<a href="#">Balaenoptera acutorostrata</a> Minke Whale	Cetacean	Species or species habitat may occur within area
<a href="#">Balaenoptera edeni</a> Bryde's Whale	Cetacean	Species or species habitat may occur within area
<a href="#">Balaenoptera musculus</a> Blue Whale	Cetacean	Species or species habitat may occur within area
<a href="#">Delphinus delphis</a> Common Dolphin, Short-beaked Common Dolphin	Cetacean	Species or species habitat may occur within area
<a href="#">Grampus griseus</a> Risso's Dolphin, Grampus	Cetacean	Species or species habitat may occur within area
<a href="#">Megaptera novaeangliae</a> Humpback Whale	Cetacean	Breeding known to occur within area
<a href="#">Orcaella brevirostris</a> Irrawaddy Dolphin	Cetacean	Species or species habitat may occur within area
<a href="#">Orcinus orca</a> Killer Whale, Orca	Cetacean	Species or species habitat may occur within area
<a href="#">Sousa chinensis</a> Indo-Pacific Humpback Dolphin	Cetacean	Species or species habitat may occur within area
<a href="#">Stenella attenuata</a> Spotted Dolphin, Pantropical Spotted Dolphin	Cetacean	Species or species habitat may occur within area



<a href="#"><i>Tursiops aduncus</i></a> Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin	Cetacean	Species or species habitat likely to occur within area
<a href="#"><i>Tursiops truncatus s. str.</i></a> Bottlenose Dolphin	Cetacean	Species or species habitat may occur within area
Threatened Ecological Communities [ <a href="#">Dataset Information</a> ]	Status	Comments
<a href="#">Littoral Rainforest and Coastal Vine Thickets of Eastern Australia</a> Heritage World Heritage Properties [ <a href="#">Dataset Information</a> ] <a href="#">Great Barrier Reef QLD</a> Australian Heritage Sites [ <a href="#">Dataset Information</a> ] Note that not all Indigenous sites may be listed.	Critically Endangered	Community likely to occur within area
<b>Indigenous</b>		
<a href="#">Wamba - Guran QLD</a>		
<b>Natural</b>		
<a href="#">Great Barrier Reef Region QLD</a>		
Wetlands		
Wetlands of International Importance (Ramsar sites) [ <a href="#">Dataset Information</a> ]		
<a href="#">SHOALWATER AND CORIO BAYS AREA</a>		Within same catchment as Ramsar site
Nationally Important Wetland Sites [ <a href="#">Dataset Information</a> ]		
<a href="#">Great Barrier Reef Marine Park, QLD</a>		
Other		
Reserves and Conservation Areas [ <a href="#">Dataset Information</a> ]		
Great Barrier Reef Marine Park, COM		
Keppel Bay Islands National Park, QLD		
Mackay/Capricorn Marine Park, QLD		

## Caveat

The information presented here has been drawn from a range of sources, compiled for a variety of purposes. Details of the coverage of each dataset are included in the metadata [Dataset Information] links above.

## Acknowledgment

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. The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.




## APPENDIX B – Secondary and Tertiary Sites



# Vegetation Mapping Records - Great Keppel Island

## September 2010

### REFERENCE SITE FOR 8.2.1

<b>SITE NUMBER</b>	1												
<b>LEVEL</b>	2												
<b>DETAIL SP. LIST</b>	Y												
<b>REGIONAL ECOSYSTEM</b>	8.2.1												
<b>DATE</b>	21/09/2010												
<b>RECORDER</b>	David Francis & Julia Olsen												
<b>LOCALITY</b>	Great Keppel Island												
<b>SITE DESCRIPTION</b>		Casuarina equisetifolia low open woodland											
<b>GENERAL NOTES</b>													
<b>COMMUNITY AREA (ha)</b>		20-50			<b>COMMUNITY WIDTH (m)</b>		75-150						
<b>MAPPED (Current RE)</b>		8.2.1			<b>REFERENCE SITE</b>		Y						
<b>LANDFORM</b>													
<b>Situation</b>	R	<b>Element</b>	BR1	<b>Eros pattern</b>	GR	<b>Pattern</b>	BEA						
<b>SLOPE</b>													
<b>Type</b>	F	<b>Slope (%)</b>	<5%			<b>Aspect (°)</b>	0						
<b>SOILS</b>													
<b>Source</b>	S	<b>Reliability</b>	H	<b>Code</b>	E	<b>Add data</b>	-	<b>ISB/MU</b>	-	<b>Colour</b>	Buff	<b>Texture</b>	Sand
<b>GEOLOGY</b>													
<b>Source</b>	0	<b>Reliability</b>	H	<b>Code</b>	F	<b>Map Unit</b>	Qhcb						
<b>SPECHT STRUCTURE CODE</b>						Low open woodland							
<b>GROUND (%)</b>													
<b>Litter</b>	10	<b>Rock</b>	0	<b>Bare ground</b>	10	<b>Cryptophyte</b>	0	<b>Vegetation</b>	80				
<b>RAINFOREST</b>													
<b>Struct. Complexity</b>	-	<b>Leaf Size</b>	-	<b>Leaf fall</b>	-	<b>Floor Comp</b>	-	<b>In. Gr Forms</b>	-				
<b>DISTURBANCE</b>													
<b>Storm damage (Proportion/Age)</b>		0			<b>Road Works (Proportion/Age)</b>		0						
<b>Fire (Proportion/Age/Height)</b>		0			<b>Salinity</b>		0						
<b>Logging (#)</b>		-			<b>Ringbarking /Thinning (#)</b>		-						
<b>Grazing</b>		N			<b>Feral Digging</b>		N						
<b>Weeds (% Cover)</b>		0			<b>Remnant</b>		Y						
<b>Erosion (Type/Severity)</b>		0											

SITE NUMBER		1			continued
STRUCTURAL SUMMARY					
Stratum	Height Range in Strata (m)	Median Height (m)	Cover (%) (100m transect)	Species	
Emergent	-	-	-	-	
Tree 1	6-11	7	6	<i>Banksia integrifolia</i> subsp. <i>compar</i> <i>Casuarina equisetifolia</i> subsp. <i>incana</i> <i>Corymbia tessellaris</i>	
Tree 2	2-5	4.5	33.5	<i>Allocasuarina littoralis</i> <i>Alphitonia excelsa</i> <i>Dodonaea viscosa</i> <i>Ficus opposita</i>	



Tree 3	-	-	-	-
Shrub 1	0.5-1	1	-	<i>Dodonaea viscosa</i> <i>Lantana camara</i> * <i>Opuntia stricta</i> *
Shrub 2	-	-	-	-
Ground	0-0.5	0.5	-	<i>Canavalia rosea</i> <i>Crotalaria medicaginea</i> var. <i>neglecta</i> <i>Eragrostis curvula</i> <i>Eragrostis interrupta</i> <i>Imperata cylindrica</i> <i>Lysiana maritima</i> <i>Melinis repens</i> * <i>Passiflora suberosa</i> * <i>Tridax procumbens</i> *  Out of plot: <i>Agave vivipara</i> * <i>Catharanthus roseus</i> * <i>Euphorbia cyathophora</i> *

#### BASAL AREA & STEM COUNTS

Species	Basal area for plot (50X10m)					Volume/ha		Stem count for plot (50X10m)					
	E	T1	T2	T3	S1	T1	T2	E	T1	T2	T3	S1	S2
<i>Allocasuarina littoralis</i>			2							19		2	
<i>Banksia integrifolia</i> subsp. <i>compar</i>										1			
<i>Casuarina equisetifolia</i> subsp. <i>Incana</i>									2				
<i>Corymbia tessellaris</i>													
<i>Dodonaea viscosa</i>										6		6	
<i>Lantana camara</i> *												1	
<i>Opuntia stricta</i> *												2	


#### CANOPY COVER DATA (100m TRANSECT)

Canopy Start (m)	Canopy finish (m)	Species	Strata
0	0.5	<i>Allocasuarina littoralis</i>	T2
8	9.5	<i>Allocasuarina littoralis</i>	T2
9.5	11	<i>Dodonaea viscosa</i>	T2
25	27	<i>Allocasuarina littoralis</i>	T2
32	35	<i>Allocasuarina littoralis</i>	T2
37	38.5	Stag	T1
38.5	40	<i>Corymbia tessellaris</i>	T1
40	43	<i>Allocasuarina littoralis</i>	T2
45.5	48.5	<i>Corymbia tessellaris</i>	T1
48.5	50	<i>Dodonaea viscosa</i>	T2
50	56	<i>Allocasuarina littoralis</i>	T2
58.5	63	<i>Allocasuarina littoralis</i>	T2
61	63	<i>Alphitonia excelsa</i>	T2
67	67.5	<i>Allocasuarina littoralis</i>	T2
76	76.5	<i>Allocasuarina littoralis</i>	T2
78.5	82.5	<i>Allocasuarina littoralis</i>	T2
85.5	87.5	<i>Allocasuarina littoralis</i>	T2
90	93	<i>Dodonaea viscosa</i>	T2



## REFERENCE SITE RE 8.2.6

<b>SITE NUMBER</b>	2
<b>LEVEL</b>	2
<b>DETAIL SP. LIST</b>	Y
<b>REGIONAL ECOSYSTEM</b>	8.2.6
<b>DATE</b>	21/09/2010
<b>RECORDER</b>	David Francis & Julia Olsen
<b>LOCALITY</b>	Great Keppel Island



<b>SITE DESCRIPTION</b>	<i>Melaleuca dealbata</i> open forest												
<b>GENERAL NOTES</b>													
<b>COMMUNITY AREA (ha)</b>	20-50				<b>COMMUNITY WIDTH (m)</b>	75-150							
<b>MAPPED (Current RE)</b>	8.2.7e				<b>REFERENCE SITE</b>	Yes							
<b>LANDFORM</b>													
<b>Situation</b>	Plain		<b>Element</b>	A		<b>Eros pattern</b>	LP		<b>Pattern</b>	PLA			
<b>SLOPE</b>													
<b>Type</b>	F		<b>Slope (%)</b>	<5%				<b>Aspect (°)</b>	10				
<b>SOILS</b>													
<b>Source</b>	S	<b>Reliability</b>	H	<b>Code</b>	E	<b>Add data</b>	-	<b>ISB/MU</b>	-	<b>Colour</b>	Grey	<b>Texture</b>	Sand
<b>GEOLOGY</b>													
<b>Source</b>	O		<b>Reliability</b>	H		<b>Code</b>	F		<b>Map Unit</b>	Qhcb			
<b>SPECHT STRUCTURE CODE</b>	Open Forest												
<b>GROUND (%)</b>													
<b>Litter</b>	50		<b>Rock</b>	-		<b>Bare ground</b>	<1		<b>Cryptophyte</b>	-		<b>Vegetation</b>	50
<b>RAINFOREST</b>													
<b>Struct.</b>	-		<b>Leaf Size</b>	-		<b>Leaf fall</b>	-		<b>Floor Comp</b>	-		<b>In. Gr Forms</b>	-
<b>Complexity</b>													
<b>DISTURBANCE</b>													
<b>Storm damage (Proportion/Age)</b>	0				<b>Road Works (Proportion/Age)</b>	0							
<b>Fire (Proportion/Age/Height)</b>	0				<b>Salinity</b>	0							
<b>Logging (#)</b>	N				<b>Ringbarking /Thinning (#)</b>	N							
<b>Grazing</b>	N				<b>Feral Digging</b>	N							
<b>Weeds (% Cover)</b>	15%				<b>Remnant</b>	Y							
<b>Erosion (Type/Severity)</b>	0												

SITE NUMBER		2			continued
STRUCTURAL SUMMARY					
Stratum	Height Range in Strata (m)	Median Height (m)	Cover (%) (100m transect)	Species	
Emergent	-	-	-	-	
Tree 1	14-17	15	55.5	<i>Melaleuca dealbata</i>	
Tree 2	4-8	7	58.5	<i>Acacia disparrima</i> subsp. <i>disparrima</i> <i>Allocasuarina littoralis</i> <i>Alphitonia excelsa</i> <i>Banksia integrifolia</i> subsp. <i>compar</i> <i>Breynia oblongifolia</i> <i>Casuarina equisetifolia</i> subsp. <i>incana</i> <i>Corymbia tessellaris</i> <i>Dodonaea viscosa</i> <i>Planchonia careya</i>	
Tree 3	-	-	-	-	



Shrub 1	1-4	2.5	-	<i>Acacia disparrima</i> subsp. <i>disparrima</i> <i>Alphitonia excelsa</i> <i>Breynia oblongifolia</i> <i>Clerodendrum floribundum</i> <i>Lantana camara</i> * <i>Opuntia stricta</i> * <i>Pittosporum ferrugineum</i> subsp. <i>linifolium</i> <i>Senna pendula</i> *
Shrub 2	-	-	-	-
Ground	0-0.5	0.5	-	<i>Abrus precatorius</i> <i>Bulbostylis barbata</i> <i>Cenchrus echinatus</i> * <i>Clematocissus opaca</i> <i>Conyza canadensis</i> var. <i>pusilla</i> * <i>Cyperus rotundus</i> <i>Cyperus stradbokensis</i> <i>Euphorbia cyathophora</i> * <i>Imperata cylindrica</i> <i>Lepturus repens</i> <i>Megathyrsus maximus</i> * <i>Melinis repens</i> * <i>Passiflora suberosa</i> * <i>Solanum nigrum</i> * <i>Stephania japonica</i> var. <i>discolour</i>

#### BASAL AREA & STEM COUNTS

Species	Basal area for plot (50X10m)					Volume/ha		Stem count for plot (50X10m)					
	E	T1	T2	T3	S1	T1	T2	E	T1	T2	T3	S1	S2
<i>Acacia disparrima</i> subsp. <i>disparrima</i>										2		1	
<i>Allocasuarina littoralis</i>			5							14		4	1
<i>Alphitonia excelsa</i>										1		1	
<i>Banksia integrifolia</i> subsp. <i>compar</i>													
										2			
<i>Breynia oblongifolia</i>												3	3
<i>Clerodendrum floribundum</i>												4	10
<i>Dodonaea viscosa</i>												5	1
<i>Lantana camara</i> *												4	
<i>Melaleuca dealbata</i>		6											
<i>Pittosporum ferrugineum</i> subsp. <i>linifolium</i>												2	
<i>Planchonia careya</i>										1		2	1
<i>Senna pendula</i> *												22	2
<i>Acacia julifera</i>												1	

#### CANOPY COVER DATA (100m TRANSECT)


Canopy Start (m)	Canopy finish (m)	Species	Strata
0	1	<i>Allocasuarina littoralis</i>	T2
3	7	<i>Allocasuarina littoralis</i>	T2
3	4	<i>Banksia integrifolia</i> subsp. <i>compar</i>	T2
4	23	<i>Melaleuca dealbata</i>	T1
9.5	11	<i>Allocasuarina littoralis</i>	T2
17.5	23	<i>Allocasuarina littoralis</i>	T2
19.5	20.5	<i>Breynia oblongifolia</i>	T2
24	25	Stag	T2
25.5	31.5	<i>Allocasuarina littoralis</i>	T2
34	42.5	<i>Melaleuca dealbata</i>	T1
35.5	38	<i>Acacia disparrima</i> subsp. <i>disparrima</i>	T2
46	50.5	<i>Allocasuarina littoralis</i>	T2
50.5	59	<i>Dodonaea lanceolata</i> var. <i>subsessilifolia</i>	T2
51	69	<i>Melaleuca dealbata</i>	T1
55	56.5	<i>Acacia disparrima</i> subsp. <i>disparrima</i>	T2
62	63	<i>Acacia disparrima</i> subsp. <i>disparrima</i>	T2
62.5	67.5	<i>Dodonaea viscosa</i>	T2
65	68	<i>Acacia disparrima</i> subsp. <i>disparrima</i>	T2
68	68.5	<i>Acacia disparrima</i> subsp. <i>disparrima</i>	T2



69	71	<i>Dodonaea viscosa</i>	T2
70	71.5	<i>Acacia disparrima</i> subsp. <i>disparrima</i>	T2
73.5	77.5	<i>Dodonaea viscosa</i>	T2
73	83	<i>Melaleuca dealbata</i>	T1
80	83	<i>Dodonaea viscosa</i>	T2
84	84.5	<i>Planchonia careya</i>	T2
88.5	90	<i>Planchonia careya</i>	T2
93	99	<i>Corymbia tessellaris</i>	T2



# REFERENCE SITE FOR 8.2.6a

<b>SITE NUMBER</b>	9												
<b>LEVEL</b>	2												
<b>DETAIL SP. LIST</b>	Y												
<b>REGIONAL ECOSYSTEM</b>	8.2.6a												
<b>DATE</b>	21/09/2010												
<b>RECORDER</b>	David Francis & Julia Olsen												
<b>LOCALITY</b>	Great Keppel Island												
<b>SITE DESCRIPTION</b>		Corymbia clarksoniana open forest											
<b>GENERAL NOTES</b>													
<b>COMMUNITY AREA (ha)</b>		20-50		<b>COMMUNITY WIDTH (m)</b>		75-150							
<b>MAPPED (Current RE)</b>		8.2.8a		<b>REFERENCE SITE</b>		Y							
<b>LANDFORM</b>													
<b>Situation</b>		A		<b>Element</b>		VLF		<b>Eros pattern</b>		UP			
<b>SLOPE</b>													
<b>Type</b>		R		<b>Slope (%)</b>		<5%		<b>Aspect (°)</b>		260			
<b>SOILS</b>													
<b>Source</b>	S	<b>Reliability</b>	M	<b>Code</b>	D	<b>Add data</b>	-	<b>ISB/MU</b>	-	<b>Colour</b>	F	<b>Texture</b>	A
<b>GEOLOGY</b>													
<b>Source</b>	O	<b>Reliability</b>	H	<b>Code</b>	A		<b>Map Unit</b>	Qhcd					
<b>SPECHT STRUCTURE CODE</b>						Open Forest							
<b>GROUND (%)</b>													
<b>Litter</b>	40	<b>Rock</b>	0	<b>Bare ground</b>	0	<b>Cryptophyte</b>	0	<b>Vegetation</b>	60				
<b>RAINFOREST</b>													
<b>Struct. Complexity</b>	-	<b>Leaf Size</b>	-	<b>Leaf fall</b>	--	<b>Floor Comp</b>	-	<b>In. Gr Forms</b>	-				
<b>DISTURBANCE</b>													
<b>Storm damage (Proportion/Age)</b>		0		<b>Road Works (Proportion/Age)</b>		0							
<b>Fire (Proportion/Age/Height)</b>		0		<b>Salinity</b>		0							
<b>Logging (#)</b>		0		<b>Ringbarking /Thinning (#)</b>		0							
<b>Grazing</b>		0		<b>Feral Digging</b>		0							
<b>Weeds (% Cover)</b>		0		<b>Remnant</b>									
<b>Erosion (Type/Severity)</b>		0											

SITE NUMBER		9				continued	
STRUCTURAL SUMMARY							
Stratum	Height Range in Strata (m)	Median Height (m)	Cover (%) (100m transect)	Species			
Emergent	-	-	-	-			
Tree 1	7-12	10	53.5	Acacia disparrima subsp. disparrima Allocasuarina littoralis Corymbia clarksoniana Eucalyptus portuensis			
Tree 2	3-7	7	53.0	Acacia disparrima subsp. disparrima Allocasuarina littoralis Alphitonia excelsa Banksia integrifolia subsp. compar Corymbia clarksoniana Eucalyptus portuensis Leptospermum neglectum Petalostigma pubescens			



Tree 3	-	-	-	-
Shrub 1	1-1.5	1	-	<i>Lithomyrtus obtusa</i> <i>Xanthorrhoea latifolia</i>
Shrub 2	-	-	-	-
Ground	0-0.5	0.5	-	<i>Amyema conspicua</i> subsp. <i>conspicua</i> <i>Eriachne pallescens</i> var. <i>pallescens</i> <i>Imperata cylindrica</i> <i>Paspalidium distans</i> <i>Paspalidium gausum</i> <i>Passiflora suberosa</i> * <i>Planchonia careya</i> (seedling) <i>Trachystylis stradbokensis</i> <i>Triumfetta rhomboides</i> <i>Xanthorrhoea latifolia</i>

#### BASAL AREA & STEM COUNTS

Species	Basal area for plot (50X10m)					Volume/ha		Stem count for plot (50X10m)					
	E	T1	T2	T3	S1	T1	T2	E	T1	T2	T3	S1	S2
<i>Acacia disparrima</i> subsp. <i>disparrima</i>										1			
<i>Allocasuarina littoralis</i>		1	5							13		5	
<i>Alphitonia excelsa</i>			1							10		2	1
<i>Banksia integrifolia</i> subsp. <i>compar</i>										2			
<i>Corymbia clarksoniana</i>		7							5			1	1
<i>Eucalyptus portuensis</i>													
<i>Leptospermum neglectum</i>													
<i>Lithomyrtus obtusa</i>												1	1
<i>Petalostigma pubescens</i>													

#### CANOPY COVER DATA (100m TRANSECT)

Canopy Start (m)	Canopy finish (m)	Species	Strata
0	1.5	<i>Banksia integrifolia</i> subsp. <i>compar</i>	T2
0.5	2	<i>Alphitonia excelsa</i>	T2
3.5	5	<i>Allocasuarina littoralis</i>	T2
6	9.5	<i>Allocasuarina littoralis</i>	T2
8	11	<i>Acacia disparrima</i> subsp. <i>disparrima</i>	T2
13.5	18	<i>Corymbia clarksoniana</i>	T1
17	19.5	<i>Allocasuarina littoralis</i>	T2
22.5	26	<i>Allocasuarina littoralis</i>	T2
26	30	<i>Alphitonia excelsa</i>	T2
30	34.5	<i>Allocasuarina littoralis</i>	T2
31	32	<i>Alphitonia excelsa</i>	T2
34.5	45.5	<i>Corymbia clarksoniana</i>	T1
41.5	44	<i>Allocasuarina littoralis</i>	T2
41.5	43	<i>Alphitonia excelsa</i>	T2
47	52.5	<i>Alphitonia excelsa</i>	T2




51	58.5	<i>Allocasuarina littoralis</i>	T2
53	57.5	<i>Corymbia clarksoniana</i>	T1
58.5	59.5	<i>Acacia disparrima</i> subsp. <i>disparrima</i>	T2
60	63	<i>Banksia integrifolia</i> subsp. <i>compar</i>	TT2
59	64	<i>Alphitonia excelsa</i>	T2
67	68.5	<i>Banksia integrifolia</i> subsp. <i>compar</i>	T2
67.5	87	<i>Corymbia clarksoniana</i>	T1
71	73	<i>Alphitonia excelsa</i>	T2
92	94	<i>Banksia integrifolia</i> subsp. <i>compare</i>	T2
95	98	<i>Banksia integrifolia</i> subsp. <i>compar</i>	T2
98	100	<i>Acacia disparrima</i> subsp. <i>disparrima</i>	T2
86	100	<i>Eucalyptus portuensis</i>	T1



# Tertiary Site

<b>SITE NUMBER</b>	24
<b>LEVEL</b>	3
<b>DETAIL SP. LIST</b>	Y
<b>REGIONAL ECOSYSTEM</b>	8.2.1
<b>DATE</b>	21/09/2010
<b>RECORDER</b>	David Francis & Julia Olsen
<b>LOCALITY</b>	Great Keppel Island



<b>SITE DESCRIPTION</b>													
<b>GENERAL NOTES</b>													
<b>COMMUNITY AREA (ha)</b>				5-20		<b>COMMUNITY WIDTH (m)</b>				75-150			
<b>MAPPED (Current RE)</b>				8.2.1		<b>REFERENCE SITE</b>				N			
<b>LANDFORM</b>													
<b>Situation</b>	A		<b>Element</b>	FOO		<b>Eros pattern</b>	GP		<b>Pattern</b>	PLA			
<b>SLOPE</b>													
<b>Type</b>	F		<b>Slope (%)</b>	<1		<b>Aspect (°)</b>							
<b>SOILS</b>													
<b>Source</b>	S	<b>Reliability</b>	M	<b>Code</b>	A	<b>Add data</b>	-	<b>ISB/MU</b>	-	<b>Colour</b>	K	<b>Texture</b>	E
<b>GEOLOGY</b>													
<b>Source</b>	S	<b>Reliability</b>	M	<b>Code</b>	K		<b>Map Unit</b>	Ccs					
<b>SPECHT STRUCTURE CODE</b>													
Open Herbland													
<b>GROUND (%)</b>													
<b>Litter</b>			<b>Rock</b>			<b>Bare ground</b>			<b>Cryptophyte</b>			<b>Vegetation</b>	
<b>RAINFOREST</b>													
<b>Struct. Complexity</b>	-	<b>Leaf Size</b>	-	<b>Leaf fall</b>	-	<b>Floor Comp</b>	-	<b>In. Gr Forms</b>	-				
<b>DISTURBANCE</b>													
<b>Storm damage (Proportion/Age)</b>	0		<b>Road Works (Proportion/Age)</b>	0									
<b>Fire (Proportion/Age/Height)</b>	0		<b>Salinity</b>	0									
<b>Logging (#)</b>	N		<b>Ringbarking /Thinning (#)</b>	N									
<b>Grazing</b>	Y (Goats)		<b>Feral Digging</b>	N									
<b>Weeds (% Cover)</b>	5%		<b>Remnant</b>										
<b>Erosion (Type/Severity)</b>	0												


SITE NUMBER		24			continued
STRUCTURAL SUMMARY					
Stratum	Height Range in Strata (m)	Median Height (m)	Cover (%) (100m transect)	Species	
Emergent	-	-	-	-	
Tree 1		-	-	No Trees	
Tree 2					
Tree 3	-	-	-	-	
Shrub 1	1	1		<i>Lantana camara</i> *	
Shrub 2	-	-	-	-	
Ground	0-0.5	0.5	-	<i>Ageratum conyzoides</i> subsp. <i>conyzoides</i> * <i>Tridax procumbens</i> * <i>diera scandens</i> <i>Cryptostegia grandiflora</i> * <i>Cynodon dactylon</i> * <i>Heteropogon contortus</i> <i>Hibbertia scandens</i>	



			<i>Imperata cylindrica</i> <i>Ipomoea pes-caprae</i> subsp. <i>brasiliensis</i> <i>Opuntia stricta</i> * <i>Sida cordifolia</i> * <i>Boerhavia pubescens</i> <i>Mukia maderaspatana</i> * <i>Hyptis suaveolens</i> * <i>Stephania japonica</i> var. <i>discolor</i> <i>Triumfetta rhomboidea</i>
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# Tertiary Site


<b>SITE NUMBER</b>	25		
<b>LEVEL</b>	3		
<b>DETAIL SP. LIST</b>	Y		
<b>REGIONAL ECOSYSTEM</b>	8.12.14x2c		
<b>DATE</b>	21/09/2010		
<b>RECORDER</b>	David Francis & Julia Olsen		
<b>LOCALITY</b>	Great Keppel Island		
<b>SITE DESCRIPTION</b>		<i>Ficus obliqua</i> wind-sheared closed forest	
<b>GENERAL NOTES</b>			
<b>COMMUNITY AREA (ha)</b>	5-20	<b>COMMUNITY WIDTH (m)</b>	75-150
<b>MAPPED (Current RE)</b>	8.2.1	<b>REFERENCE SITE</b>	N
<b>LANDFORM</b>			
<b>Situation</b>	L	<b>Element</b>	CLI
<b>Eros pattern</b>	SH	<b>Pattern</b>	HIL
<b>SLOPE</b>			
<b>Type</b>	R	<b>Slope (%)</b>	30
<b>Aspect (°)</b>	160		
<b>SOILS</b>			
<b>Source</b>	S	<b>Reliability</b>	M
<b>Code</b>		<b>Add data</b>	-
<b>ISB/MU</b>	-	<b>Colour</b>	Dark Brown
<b>Texture</b>	Sandy Loam & Clay		
<b>GEOLOGY</b>			
<b>Source</b>	O	<b>Reliability</b>	Low
<b>Code</b>	K	<b>Map Unit</b>	Ccs
<b>SPECHT STRUCTURE CODE</b>		Low Closed Forest	
<b>GROUND (%)</b>			
<b>Litter</b>	5	<b>Rock</b>	40
<b>Bare ground</b>	0	<b>Cryptophyte</b>	5
<b>Vegetation</b>	50		
<b>RAINFOREST</b>			
<b>Struct. Complexity</b>	-	<b>Leaf Size</b>	-
<b>Leaf fall</b>	-	<b>Floor Comp</b>	-
<b>In. Gr Forms</b>	-		
<b>DISTURBANCE</b>			
<b>Storm damage (Proportion/Age)</b>	0	<b>Road Works (Proportion/Age)</b>	0
<b>Fire (Proportion/Age/Height)</b>	0	<b>Salinity</b>	0
<b>Logging (#)</b>	N	<b>Ringbarking /Thinning (#)</b>	N
<b>Grazing</b>	Y (Goats)	<b>Feral Digging</b>	N
<b>Weeds (% Cover)</b>	5%	<b>Remnant</b>	
<b>Erosion (Type/Severity)</b>	0		

SITE NUMBER		25			continued	
STRUCTURAL SUMMARY						
Stratum		Height Range in Strata (m)	Median Height (m)	Cover (%) (100m transect)	Species	
Emergent		-	-	-	-	
Tree 1			6		<i>Diospyros geminata</i> <i>Ficus obliqua</i> <i>Jagera pseudorhus</i> var. <i>pseudorhus</i> <i>Pipturus argenteus</i> <i>Pouteria sericea</i> <i>Scolopia braunii</i>	
Tree 2						
Tree 3		-	-	-	-	
Shrub 1					<i>Lantana camara</i> *	
Shrub 2		-	-	-	-	
Ground		0-0.5	0.5	-	<i>Acronychia laevis</i>	



			<i>Adiantum hispidulum</i> var. <i>hispidulum</i> <i>Ageratum conyzoides</i> subsp. <i>conyzoides</i> * <i>Clematicissus opaca</i> <i>Cissus oblonga</i> <i>Cyperus gracilis</i> <i>Diospyros geminata</i> <i>Microsorium punctatum</i> <i>Oplismenus aemulus</i> <i>Passiflora suberosa</i> * <i>Pseuderanthemum variabile</i> <i>Stephania japonica</i> var. <i>discolor</i> <i>Tetrastigma nitens</i> <i>Triumfetta rhomboides</i>
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<b>SITE NUMBER</b>	27												
<b>LEVEL</b>	2												
<b>DETAIL SP. LIST</b>	Y												
<b>REGIONAL ECOSYSTEM</b>	8.11.10												
<b>DATE</b>	22/09/2010												
<b>RECORDER</b>	David Francis & Julia Olsen												
<b>LOCALITY</b>	Great Keppel Island												
<b>SITE DESCRIPTION</b>		<i>Allocasuarina littoralis</i> low woodland											
<b>GENERAL NOTES</b>													
<b>COMMUNITY AREA (ha)</b>		20-50				<b>COMMUNITY WIDTH (m)</b>		75-150					
<b>MAPPED (Current RE)</b>		8.11.1/8.12.14x2c				<b>REFERENCE SITE</b>		N					
<b>LANDFORM</b>													
<b>Situation</b>	F	<b>Element</b>	HSL	<b>Eros pattern</b>	UH	<b>Pattern</b>	HIL						
<b>SLOPE</b>													
<b>Type</b>	MO			<b>Slope (%)</b>	15		<b>Aspect (°)</b>	80					
<b>SOILS</b>													
<b>Source</b>	S	<b>Reliability</b>	M	<b>Code</b>	A/K	<b>Add data</b>	-	<b>ISB/MU</b>	-	<b>Colour</b>	Dark Brown	<b>Texture</b>	Sandy Clay
<b>GEOLOGY</b>													
<b>Source</b>	I	<b>Reliability</b>	M	<b>Code</b>	F/G		<b>Map Unit</b>	Ccs					
<b>SPEECH STRUCTURE CODE</b>				Low Woodland									
<b>GROUND (%)</b>													
<b>Litter</b>	5	<b>Rock</b>	0	<b>Bare ground</b>	0	<b>Cryptophyte</b>	0	<b>Vegetation</b>	95				
<b>RAINFOREST</b>													
<b>Struct. Complexity</b>	-	<b>Leaf Size</b>	-	<b>Leaf fall</b>	-	<b>Floor Comp</b>	-	<b>In. Gr Forms</b>	-				
<b>DISTURBANCE</b>													
<b>Storm damage (Proportion/Age)</b>		0		<b>Road Works (Proportion/Age)</b>		0							
<b>Fire (Proportion/Age/Height)</b>		0		<b>Salinity</b>		0							
<b>Logging (#)</b>		N		<b>Ringbarking /Thinning (#)</b>		N							
<b>Grazing</b>		N		<b>Feral Digging</b>		N							
<b>Weeds (% Cover)</b>		<5%		<b>Remnant</b>		Y							
<b>Erosion (Type/Severity)</b>		0											

SITE NUMBER		27				continued	
STRUCTURAL SUMMARY							
Stratum	Height Range in Strata (m)	Median Height (m)	Cover (%) (100m transect)	Species			
Emergent	-	-	-	-			
Tree 1	4-5	4	25	Acacia disparrima subsp. disparrima Acacia leiocalyx subsp. leiocalyx Allocasuarina littoralis Capparis canescens			
Tree 2	1-3	2	48.5	Acacia disparrima subsp. disparrima Acacia leiocalyx subsp. leiocalyx Acronychia laevis Allocasuarina littoralis			
Tree 3	-	-	-	-			



Shrub 1	0.5-1	1	-	<i>Diospyros geminata</i> <i>Drypetes deplanchei</i> <i>Lantana camara</i> * <i>Trema tomentosa</i>
Shrub 2	-	-	-	-
Ground	0-0.5	0.5	-	<i>Brunoniella australis</i> <i>Capparis canescens</i> <i>Cheilanthes sieberi</i> <i>Desmodium rhytidophyllum</i> <i>Diospyros geminata</i> <i>Ficus opposita</i> (seedling) <i>Gahnia aspera</i> <i>Hibbertia vestita</i> <i>Lomandra multiflora</i> <i>Lomandra confertifolia</i> subsp. <i>pallida</i> <i>Oplismenus aemulus</i> <i>Passiflora suberosa</i> <i>Marrumbium vulgare</i> * <i>Scleria brownii</i> <i>Sida cordifolia</i> * <i>Triumfetta rhomboides</i>

**BASAL AREA & STEM COUNTS**

Species	Basal area for plot (50X10m)					Volume/ha		Stem count for plot (50X10m)					
	E	T1	T2	T3	S1	T1	T2	E	T1	T2	T3	S1	S2
<i>Acacia leiocalyx</i> subsp. <i>leiocalyx</i>			1						1	31		12	
<i>Allocasuarina littoralis</i>		5							18	3		1	
<i>Acacia disparrima</i> subsp. <i>disparrima</i>										2		1	
<i>Diospyros geminata</i>												1	
<i>Capparis canescens</i>									1				
<i>Lantana camara</i> *												1	
<i>Trema tomentosa</i>												1	
<i>Alphitonia excelsa</i>												1	
<i>Drypetes deplanchei</i>												1	
<i>Acronychia laevis</i>										2		3	


**CANOPY COVER DATA (100m TRANSECT)**

Canopy Start (m)	Canopy finish (m)	Species	Strata
0	5	<i>Acacia leiocalyx</i> subsp. <i>leiocalyx</i>	T2
4.5	7	<i>Allocasuarina littoralis</i>	T1
7	9	<i>Acacia leiocalyx</i> subsp. <i>leiocalyx</i>	T2
12	20	<i>Allocasuarina littoralis</i>	T1
20	22	<i>Acacia leiocalyx</i> subsp. <i>leiocalyx</i>	T2
23	26.5	<i>Allocasuarina littoralis</i>	T1
23.5	24	<i>Acacia leiocalyx</i> subsp. <i>leiocalyx</i>	T2
27	30	<i>Acacia disparrima</i> subsp. <i>disparrima</i>	T2
31.5	35.5	<i>Acacia disparrima</i> subsp. <i>disparrima</i>	T2
39	39.5	<i>Acacia disparrima</i> subsp. <i>disparrima</i>	T2
40	42	Stag	T1
43	44	<i>Acacia leiocalyx</i> subsp. <i>leiocalyx</i>	T2



45	50	<i>Acacia disparrima</i> subsp. <i>disparrima</i>	T2
51	52	<i>Acacia disparrima</i> subsp. <i>disparrima</i>	T2
53.5	59.5	<i>Allocasuarina littoralis</i>	T1
55	57	<i>Acronychia laevis</i>	T2
59	64	<i>Acronychia laevis</i>	T2
65	67	<i>Acacia leiocalyx</i> subsp. <i>leiocalyx</i>	T2
67.5	69	<i>Allocasuarina littoralis</i>	T2
71	72.5	<i>Acronychia laevis</i>	T2
71.5	74.5	<i>Acacia leiocalyx</i> subsp. <i>leiocalyx</i>	T2
76	79	<i>Acronychia laevis</i>	T2
78	80	<i>Allocasuarina littoralis</i>	T1
84	84.5	<i>Allocasuarina littoralis</i>	T2
87	88.5	<i>Acacia leiocalyx</i> subsp. <i>leiocalyx</i>	T2
90	91	<i>Allocasuarina littoralis</i>	T1
94	98	<i>Acacia disparrima</i> subsp. <i>disparrima</i>	T2
98	99.5	<i>Acronychia laevis</i>	T2



<b>SITE NUMBER</b>	29			
<b>LEVEL</b>	2			
<b>DETAIL SP. LIST</b>	Y			
<b>REGIONAL ECOSYSTEM</b>	Non-rem 8.2.8a			
<b>DATE</b>	22/09/2010			
<b>RECORDER</b>	David Francis & Julia Olsen			
<b>LOCALITY</b>	Great Keppel Island			
<b>SITE DESCRIPTION</b> <i>Allocasuarina littoralis</i> open forest				
<b>GENERAL NOTES</b>				
<b>COMMUNITY AREA (ha)</b>	20-50	<b>COMMUNITY WIDTH (m)</b>	75-150	
<b>MAPPED (Current RE)</b>	8.11.10/8.12.14x2c	<b>REFERENCE SITE</b>	N	
<b>LANDFORM</b>				
<b>Situation</b>	F	<b>Element</b>	HSL	
<b>Eros pattern</b>	UL	<b>Pattern</b>	Low	
<b>SLOPE</b>				
<b>Type</b>	VG	<b>Slope (%)</b>	<5%	
<b>Aspect (°)</b>	320			
<b>SOILS</b>				
<b>Source</b>	S	<b>Reliability</b>	H	
<b>Code</b>	A	<b>Add data</b>	-	
<b>ISB/MU</b>	-	<b>Colour</b>	Dark Grey	
<b>Texture</b>	Sand			
<b>GEOLOGY</b>				
<b>Source</b>	O	<b>Reliability</b>	H	
<b>Code</b>	Sand		<b>Map Unit</b>	Ccs
<b>SPECHT STRUCTURE CODE</b> Low Open Forest				
<b>GROUND (%)</b>				
<b>Litter</b>	15	<b>Rock</b>	0	
<b>Bare ground</b>	0	<b>Cryptophyte</b>	0	
<b>Vegetation</b>	85			
<b>RAINFOREST</b>				
<b>Struct. Complexity</b>	-	<b>Leaf Size</b>	-	
<b>Leaf fall</b>	-	<b>Floor Comp</b>	-	
<b>In. Gr Forms</b>	-			
<b>DISTURBANCE</b>				
<b>Storm damage (Proportion/Age)</b>	3 (storm/cyclone)		<b>Road Works (Proportion/Age)</b>	0
<b>Fire (Proportion/Age/Height)</b>	0		<b>Salinity</b>	0
<b>Logging (#)</b>	N		<b>Ringbarking /Thinning (#)</b>	N
<b>Grazing</b>	Y (goats)		<b>Feral Digging</b>	N
<b>Weeds (% Cover)</b>	<1%		<b>Remnant</b>	N
<b>Erosion (Type/Severity)</b>	0			

SITE NUMBER		29			continued
STRUCTURAL SUMMARY					
Stratum	Height Range in Strata (m)	Median Height (m)	Cover (%) (100m transect)	Species	
Emergent	-	-	-	-	
Tree 1	4-8	5	46	Acacia disparrima subsp. disparrima Acacia leiocalyx subsp. leiocalyx Acacia julifera Allocasuarina littoralis Alphitonia excelsa Corymbia tessellaris	
Tree 2	-	-	-	-	
Tree 3	-	-	-	-	
Shrub 1	0.5-1	1	-	Lithomyrtus obtusa	
Shrub 2	-	-	-	-	
Ground	0-0.5	0.5	-	Eriachne pallescens var pallescens Lomandra leucocephala subsp. leucocephala	
BASAL AREA & STEM COUNTS					




Species	Basal area for plot (50X10m)					Volume/ha		Stem count for plot (50X10m)					
	E	T1	T2	T3	S1	T1	T2	E	T1	T2	T3	S1	S2
<i>Acacia disparrima</i> subsp. <i>disparrima</i>		1							8			1	
<i>Allocasuarina littoralis</i>		3							13			2	
<i>Acacia julifera</i>		1							3				
<i>Corymbia tessellaris</i>									2				
<i>Alphitonia excelsa</i>									1			1	
<i>Acacia leiocalyx</i> subsp. <i>leiocalyx</i>									1			23	
<i>Lithomyrtus obtusa</i>												71	

CANOPY COVER DATA (100m TRANSECT)			
Canopy Start (m)	Canopy finish (m)	Species	Strata
0	1	<i>Acacia disparrima</i> subsp. <i>disparrima</i>	T1
2.5	7	<i>Allocasuarina littoralis</i>	T1
6	19.5	<i>Acacia disparrima</i> subsp. <i>disparrima</i>	T1
10	11.5	<i>Allocasuarina littoralis</i>	T1
23.5	24.5	<i>Acacia julifera</i>	T1
27	28.5	<i>Acacia julifera</i>	T1
39	40	<i>Corymbia tessellaris</i>	T1
38.5	41	<i>Allocasuarina littoralis</i>	T1
45	46	<i>Acacia julifera</i>	T1
61	64	<i>Alphitonia excelsa</i>	T1
66.5	73.5	<i>Allocasuarina littoralis</i>	T1
80	85.5	<i>Allocasuarina littoralis</i>	T1
83	85	<i>Acacia julifera</i>	T1
87	91	<i>Acacia julifera</i>	T1
98.5	100	<i>Allocasuarina littoralis</i>	T1



# REFERENCE FOR 8.2.8a

<b>SITE NUMBER</b>	31		
<b>LEVEL</b>	2		
<b>DETAIL SP. LIST</b>	Y		
<b>REGIONAL ECOSYSTEM</b>	8.2.8a		
<b>DATE</b>	22/09/2010		
<b>RECORDER</b>	David Francis & Julia Olsen		
<b>LOCALITY</b>	Great Keppel Island		
<b>SITE DESCRIPTION</b> <i>Corymbia clarksoniana</i> open forest			
<b>GENERAL NOTES</b>			
<b>COMMUNITY AREA (ha)</b>	20-50	<b>COMMUNITY WIDTH (m)</b>	75-150
<b>MAPPED (Current RE)</b>	8.11.10/8.12.14x2c	<b>REFERENCE SITE</b>	Y
<b>LANDFORM</b>			
<b>Situation</b>	F	<b>Element</b>	HSL
<b>Eros pattern</b>	UL	<b>Pattern</b>	HIL
<b>SLOPE</b>			
<b>Type</b>	L	<b>Slope (%)</b>	5
<b>Aspect (°)</b>	290		
<b>SOILS</b>			
<b>Source</b>	S	<b>Reliability</b>	H
<b>Code</b>	A	<b>Add data</b>	-
<b>ISB/MU</b>	-	<b>Colour</b>	Light Brown
<b>Texture</b>	Sand		
<b>GEOLOGY</b>			
<b>Source</b>	Map	<b>Reliability</b>	Low
<b>Code</b>	A/K	<b>Map Unit</b>	Ccs
<b>SPECHT STRUCTURE CODE</b> Open Forest			
<b>GROUND (%)</b>			
<b>Litter</b>	55	<b>Rock</b>	0
<b>Bare ground</b>	0	<b>Cryptophyte</b>	0
<b>Vegetation</b>	45		
<b>RAINFOREST</b>			
<b>Struct. Complexity</b>	-	<b>Leaf Size</b>	-
<b>Leaf fall</b>	-	<b>Floor Comp</b>	-
<b>In. Gr Forms</b>	-		
<b>DISTURBANCE</b>			
<b>Storm damage (Proportion/Age)</b>	0	<b>Road Works (Proportion/Age)</b>	0
<b>Fire (Proportion/Age/Height)</b>	0	<b>Salinity</b>	0
<b>Logging (#)</b>	N	<b>Ringbarking /Thinning (#)</b>	N
<b>Grazing</b>	N	<b>Feral Digging</b>	N
<b>Weeds (% Cover)</b>	0	<b>Remnant</b>	
<b>Erosion (Type/Severity)</b>	0		

SITE NUMBER		31			continued	
STRUCTURAL SUMMARY						
Stratum	Height Range in Strata (m)	Median Height (m)	Cover (%) (100m transect)	Species		
Emergent	-	-	-	-		
Tree 1	8-13	10	63.5	Allocasuarina littoralis Alphitonia excelsa Banksia integrifolia subsp. compar Corymbia clarksoniana Corymbia tessellaris		
Tree 2	3-7	7	44	Acacia disparrima subsp. disparrima Allocasuarina littoralis Alphitonia excelsa Banksia integrifolia subsp. compar Corymbia clarksoniana Corymbia tessellaris		



				<i>Ficus obliqua</i> <i>Glochidion lobocarpum</i>
Tree 3	-	-	-	-
Shrub 1	1-2	2	-	<i>Alphitonia excelsa</i>
Shrub 2	0.5	1	-	<i>Lithomyrtus obtusa</i>
Ground	0-0.5	0.5	-	<i>Aristida calycina</i> var. <i>calycina</i> <i>Cyperus gracilis</i> <i>Eriachne pallescens</i> <i>Lomandra leucocephala</i> subsp. <i>leucocephala</i> <i>Passiflora suberosa</i> * <i>Stephania japonica</i> var. <i>discolor</i>

**BASAL AREA & STEM COUNTS**

Species	Basal area for plot (50X10m)					Volume/ha		Stem count for plot (50X10m)					
	E	T1	T2	T3	S1	T1	T2	E	T1	T2	T3	S1	S2
<i>Corymbia clarksoniana</i>		3							2			1	
<i>Corymbia tessellaris</i>		6	1						3				
<i>Allocasuarina littoralis</i>			2							3			
<i>Alphitonia excelsa</i>			1							14		11	1
<i>Banksia integrifolia</i> subsp. <i>compar</i>			1							8		1	
<i>Glochidion lobocarpum</i>			1							1		1	
<i>Lithomyrtus obtusa</i>													46
<i>Acacia disparrima</i> subsp. <i>disparrima</i>										1			


**CANOPY COVER DATA (100m TRANSECT)**

Canopy Start (m)	Canopy finish (m)	Species	Strata
0	2	<i>Glochidion lobocarpum</i>	T2
0	3	<i>Corymbia clarksoniana</i>	T1
10	11	<i>Alphitonia excelsa</i>	T2
10	20	<i>Corymbia clarksoniana</i>	T1
14.5	15	<i>Alphitonia excelsa</i>	T2
23.5	26.5	<i>Allocasuarina littoralis</i>	T2
24	25	<i>Corymbia clarksoniana</i>	T1
26	28.5	<i>Alphitonia excelsa</i>	T2
31	33.5	<i>Banksia integrifolia</i> subsp. <i>compar</i>	T2
32	38	<i>Corymbia tessellaris</i>	T1
34.5	38.5	<i>Alphitonia excelsa</i>	T2
38	41.5	<i>Banksia integrifolia</i> subsp. <i>compar</i>	T1
42	43.5	<i>Alphitonia excelsa</i>	T2
47	55.5	<i>Corymbia tessellaris</i>	T1
47.5	49	<i>Alphitonia excelsa</i>	T2
48	51	<i>Banksia integrifolia</i> subsp. <i>compar</i>	T1
50.5	55.5	<i>Alphitonia excelsa</i>	T2



59.5	74	<i>Glochidion lobocarpum</i>	T2
61	68	<i>Corymbia tessellaris</i>	T1
68	85	<i>Corymbia clarksoniana</i>	T1
77	78.5	<i>Glochidion lobocarpum</i>	T2
82.5	90	<i>Banksia integrifolia</i> subsp. <i>compar</i>	T1
89	94	<i>Allocasuarina littoralis</i>	T2
95.5	98	<i>Corymbia clarksoniana</i>	T1



<b>SITE NUMBER</b>	35												
<b>LEVEL</b>	2												
<b>DETAIL SP. LIST</b>	Y												
<b>REGIONAL ECOSYSTEM</b>	8.2.8a												
<b>DATE</b>	22/09/2010												
<b>RECORDER</b>	David Francis & Julia Olsen												
<b>LOCALITY</b>	Great Keppel Island												
<b>SITE DESCRIPTION</b>		<i>Lophostemon confertus</i> / <i>Eucalyptus portuensis</i> closed forest											
<b>GENERAL NOTES</b>													
<b>COMMUNITY AREA (ha)</b>		20-50				<b>COMMUNITY WIDTH (m)</b>		75-150					
<b>MAPPED (Current RE)</b>		8.11.10/8.12.14x2c				<b>REFERENCE SITE</b>		N					
<b>LANDFORM</b>													
<b>Situation</b>	F	<b>Element</b>	HSL	<b>Eros pattern</b>	UH	<b>Pattern</b>	HIL						
<b>SLOPE</b>													
<b>Type</b>	L	<b>Slope (%)</b>	<5%			<b>Aspect (°)</b>							
<b>SOILS</b>													
<b>Source</b>	S	<b>Reliability</b>	H	<b>Code</b>	A/K	<b>Add data</b>	-	<b>ISB/MU</b>	-	<b>Colour</b>	Brown	<b>Texture</b>	Sandy Clay
<b>GEOLOGY</b>													
<b>Source</b>	O	<b>Reliability</b>	H	<b>Code</b>	Rock		<b>Map Unit</b>	Ccs					
<b>SPECHT STRUCTURE CODE</b>				Low closed Forest									
<b>GROUND (%)</b>													
<b>Litter</b>	5	<b>Rock</b>	5	<b>Bare ground</b>	0	<b>Cryptophyte</b>	5	<b>Vegetation</b>	85				
<b>RAINFOREST</b>													
<b>Struct. Complexity</b>	-	<b>Leaf Size</b>	-	<b>Leaf fall</b>	-	<b>Floor Comp</b>	-	<b>In. Gr Forms</b>	-				
<b>DISTURBANCE</b>													
<b>Storm damage (Proportion/Age)</b>	0			<b>Road Works (Proportion/Age)</b>	0								
<b>Fire (Proportion/Age/Height)</b>	0			<b>Salinity</b>	0								
<b>Logging (#)</b>	N			<b>Ringbarking /Thinning (#)</b>	N								
<b>Grazing</b>	N			<b>Feral Digging</b>	N								
<b>Weeds (% Cover)</b>	<1%			<b>Remnant</b>	Y								
<b>Erosion (Type/Severity)</b>	0												

SITE NUMBER		35				continued	
STRUCTURAL SUMMARY							
Stratum	Height Range in Strata (m)	Median Height (m)	Cover (%) (100m transect)	Species			
Emergent	-	-	-	-			
Tree 1	7-12	8	85	<i>Eucalyptus crebra</i> <i>Eucalyptus portuensis</i> <i>Lophostemon suaveolens</i>			
Tree 2	3-7	5	14.5	<i>Acacia disparrima</i> subsp. <i>disparrima</i> <i>Eucalyptus portuensis</i> <i>Jagera pseudorhus</i> var. <i>pseudorhus</i> <i>Lophostemon suaveolens</i>			
Tree 3	-	-	-	-			
Shrub 1	1-2	1	-	<i>Xanthorrhoea latifolia</i>			



Shrub 2	-	-	-	-
Ground	0-0.5	0.5	-	<i>Alphitonia excelsa</i> (seedling) <i>Arundinella nepalensis</i> <i>Desmodium rhytidophyllum</i> <i>Enteropogon unispiceus</i> <i>Entolasia stricta</i> <i>Lepidosperma laterale</i> var. <i>laterale</i> <i>Lomandra confertifolia</i> subsp. <i>pallida</i> <i>Lomandra leucocephala</i> subsp. <i>leucocephala</i> <i>Panicum effusum</i> <i>Passiflora suberosa</i> * <i>Xanthorrhoea latifolia</i>

**BASAL AREA & STEM COUNTS**


Species	Basal area for plot (50X10m)					Volume/ha		Stem count for plot (50X10m)					
	E	T1	T2	T3	S1	T1	T2	E	T1	T2	T3	S1	S2
<i>Lophostemon suaveolens</i>									8	2			
<i>Eucalyptus portuensis</i>		10	1						16				
<i>Eucalyptus crebra</i>		3										1	
<i>Acacia disparrima</i> subsp. <i>disparrima</i>										1			

**CANOPY COVER DATA (100m TRANSECT)**

Canopy Start (m)	Canopy finish (m)	Species	Strata
0	2.5	<i>Lophostemon suaveolens</i>	T2
2.5	7.5	<i>Eucalyptus portuensis</i>	T1
6	11	<i>Lophostemon suaveolens</i>	T2
10	20	<i>Eucalyptus portuensis</i>	T1
21	42	<i>Eucalyptus portuensis</i>	T1
44	56	<i>Eucalyptus portuensis</i>	T1
60	91	<i>Eucalyptus portuensis</i>	T1
87	97	<i>Lophostemon confertus</i>	T1
93	100	<i>Jagera pseudorhus</i> var. <i>pseudorhus</i>	T2



REFERENCE SITE FOR 8.11.8a

<b>SITE NUMBER</b>	42		
<b>LEVEL</b>	2		
<b>DETAIL SP. LIST</b>	Y		
<b>REGIONAL ECOSYSTEM</b>	8.11.8a		
<b>DATE</b>	22/09/2010		
<b>RECORDER</b>	David Francis & Julia Olsen		
<b>LOCALITY</b>	Great Keppel Island		
<b>SITE DESCRIPTION</b>	<i>Corymbia citriodora</i> closed forest		
<b>GENERAL NOTES</b>	Colluvial fan at the toe of slopes		
<b>COMMUNITY AREA (ha)</b>	20-50	<b>COMMUNITY WIDTH (m)</b>	75-150
<b>MAPPED (Current RE)</b>	8.11.3a	<b>REFERENCE SITE</b>	Y
<b>LANDFORM</b>			
<b>Situation</b>	B	<b>Element</b>	VLF
<b>Eros pattern</b>	LP	<b>Pattern</b>	ALP
<b>SLOPE</b>			
<b>Type</b>	F	<b>Slope (%)</b>	1-3
<b>Aspect (°)</b>			
<b>SOILS</b>			
<b>Source</b>	S	<b>Reliability</b>	H
<b>Code</b>	K	<b>Add data</b>	-
<b>ISB/MU</b>	-	<b>Colour</b>	Dark Brown
<b>Texture</b>	Sandy Clay		
<b>GEOLOGY</b>			
<b>Source</b>	M	<b>Reliability</b>	Low
<b>Code</b>	B	<b>Map Unit</b>	Qa
<b>SPECHT STRUCTURE CODE</b>	Closed Forest		
<b>GROUND (%)</b>			
<b>Litter</b>	10	<b>Rock</b>	0
<b>Bare ground</b>	0	<b>Cryptophyte</b>	0
<b>Vegetation</b>	90		
<b>RAINFOREST</b>			
<b>Struct. Complexity</b>	-	<b>Leaf Size</b>	-
<b>Leaf fall</b>	-	<b>Floor Comp</b>	-
<b>In. Gr Forms</b>	-		
<b>DISTURBANCE</b>			
<b>Storm damage (Proportion/Age)</b>	0	<b>Road Works (Proportion/Age)</b>	0
<b>Fire (Proportion/Age/Height)</b>	0	<b>Salinity</b>	0
<b>Logging (#)</b>	N	<b>Ringbarking /Thinning (#)</b>	N
<b>Grazing</b>	N	<b>Feral Digging</b>	N
<b>Weeds (% Cover)</b>	1%	<b>Remnant</b>	Y
<b>Erosion (Type/Severity)</b>	0		

SITE NUMBER		42	continued	
STRUCTURAL SUMMARY				
Stratum	Height Range in Strata (m)	Median Height (m)	Cover (%) (100m transect)	Species
Emergent	-	-	-	-
Tree 1	15-25	18	93	<i>Corymbia citriodora</i> subsp. <i>citriodora</i> <i>Corymbia clarksoniana</i> <i>Eucalyptus platyphylla</i> <i>Eucalyptus tereticornis</i>
Tree 2	3-7	5	12.5	<i>Acacia disparrima</i> subsp. <i>disparrima</i> <i>Acacia leiocalyx</i> subsp. <i>leiocalyx</i> <i>Corymbia citriodora</i> subsp. <i>citriodora</i> <i>Planchonia careya</i>
Tree 3	-	-	-	-
Shrub 1	1-2	2	-	<i>Acacia disparrima</i> subsp. <i>disparrima</i> <i>Corymbia citriodora</i> subsp. <i>citriodora</i>
Shrub 2	-	-	-	-




Ground	0-0.5	0.5	-	<i>Arundinella nepalensis</i> <i>Cissus oblonga</i> <i>Clematocissus opaca</i> <i>Cyanthillium cinereum</i> <i>Desmodium rhytidophyllum</i> <i>Dianella rara</i> <i>Enteropogon unispiceus</i> <i>Gahnia aspera</i> <i>Hybanthus stellarioides</i> <i>Imperata cylindrica</i> <i>Lomandra confertifolia</i> subsp. <i>pallida</i> <i>Murdannia graminea</i> <i>Oplismenus aemulus</i> <i>Passiflora suberosa</i> * <i>Phyllanthus virgatus</i> <i>Sida cordifolia</i> * <i>Tetragium nitens</i> <i>Trema tomentosa</i> (seedling) <i>Triumfetta rhomboidea</i>
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#### BASAL AREA & STEM COUNTS

Species	Basal area for plot (50X10m)					Volume/ha		Stem count for plot (50X10m)					
	E	T1	T2	T3	S1	T1	T2	E	T1	T2	T3	S1	S2
<i>Corymbia citriodora</i> subsp. <i>citriodora</i>		7							2	2		4	
<i>Corymbia clarksoniana</i>		4							4				
<i>Eucalyptus platyphylla</i>		1							1				
<i>Acacia disparrima</i> subsp. <i>disparrima</i>										6		1	
<i>Planchonia careya</i>			1										
<i>Eucalyptus tereticornis</i>		1											
<i>Acacia leiocalyx</i> subsp. <i>leiocalyx</i>										1	1		

CANOPY COVER DATA (100m TRANSECT)			
Canopy Start (m)	Canopy finish (m)	Species	Strata
0	5.5	<i>Eucalyptus platyphylla</i>	T1
5.5	15.5	<i>Corymbia citriodora</i> subsp. <i>citriodora</i>	T1
20	29.5	<i>Corymbia citriodora</i> subsp. <i>citriodora</i>	T1
29.5	38	<i>Acacia disparrima</i> subsp. <i>disparrima</i>	T2
32	53	<i>Corymbia clarksoniana</i>	T1
41.5	45.5	<i>Acacia disparrima</i> subsp. <i>disparrima</i>	T2
55	57	<i>Corymbia clarksoniana</i>	T1
57	100	<i>Corymbia citriodora</i> subsp. <i>citriodora</i>	T1
61	63	<i>Corymbia clarksoniana</i>	T1



<b>SITE NUMBER</b>	46A														
<b>LEVEL</b>	2														
<b>DETAIL SP. LIST</b>	Y														
<b>REGIONAL ECOSYSTEM</b>	8.2.8a														
<b>DATE</b>	22/09/2010														
<b>RECORDER</b>	David Francis & Julia Olsen														
<b>LOCALITY</b>	Great Keppel Island														
<b>SITE DESCRIPTION</b>		<i>Eucalyptus portuensis</i> / <i>Lophostemon suaveolens</i> closed forest													
<b>GENERAL NOTES</b>															
<b>COMMUNITY AREA (ha)</b>		20-50				<b>COMMUNITY WIDTH (m)</b>		75-150							
<b>MAPPED (Current RE)</b>		8.11.10/8.12.14x2c				<b>REFERENCE SITE</b>		N							
<b>LANDFORM</b>															
<b>Situation</b>		A		<b>Element</b>		VLF		<b>Eros pattern</b>		UP		<b>Pattern</b>		PLA	
<b>SLOPE</b>															
<b>Type</b>		VG		<b>Slope (%)</b>		1		<b>Aspect (°)</b>		20					
<b>SOILS</b>															
<b>Source</b>	S	<b>Reliability</b>	H	<b>Code</b>	A	<b>Add data</b>	-	<b>ISB/MU</b>	-	<b>Colour</b>	Brown	<b>Texture</b>	Sand		
<b>GEOLOGY</b>															
<b>Source</b>	I	<b>Reliability</b>	Low	<b>Code</b>	B		<b>Map Unit</b>	Qa							
<b>SPECHT STRUCTURE CODE</b>						Closed Forest									
<b>GROUND (%)</b>															
<b>Litter</b>	5	<b>Rock</b>	0	<b>Bare ground</b>	0	<b>Cryptophyte</b>	0	<b>Vegetation</b>	85						
<b>RAINFOREST</b>															
<b>Struct. Complexity</b>	-	<b>Leaf Size</b>	-	<b>Leaf fall</b>	-	<b>Floor Comp</b>	-	<b>In. Gr Forms</b>	-						
<b>DISTURBANCE</b>															
<b>Storm damage (Proportion/Age)</b>		0				<b>Road Works (Proportion/Age)</b>		0							
<b>Fire (Proportion/Age/Height)</b>		0				<b>Salinity</b>		0							
<b>Logging (#)</b>		N				<b>Ringbarking /Thinning (#)</b>		N							
<b>Grazing</b>		N				<b>Feral Digging</b>		N							
<b>Weeds (% Cover)</b>		3%				<b>Remnant</b>		Y							
<b>Erosion (Type/Severity)</b>		0													

SITE NUMBER		46A			continued
STRUCTURAL SUMMARY					
Stratum	Height Range in Strata (m)	Median Height (m)	Cover (%) (100m transect)	Species	
Emergent	-	-	-	-	
Tree 1	8-14	10	74	Corymbia clarksoniana Corymbia tessellaris Eucalyptus portuensis Lophostemon suaveolens	
Tree 2	3-7	5	15	Acacia disparrima subsp. disparrima Allocasuarina littoralis Alphitonia excelsa Drypetes deplanchei Planchonia careya	
Tree 3	-	-	-	-	
Shrub 1	1-2	1.5		Acacia disparrima subsp. disparrima Alphitonia excelsa	



Shrub 2	-	-	-	-
Ground	0-0.5	0.5	-	<i>Cryptostegia grandiflora</i> <i>Enteropogon unispiceus</i> <i>Eriachne pallescens</i> <i>Eustrephus latifolius</i> <i>Imperata cylindrica</i> <i>Oplismenus aemulus</i> <i>Paspalidium gracile</i> <i>Passiflora suberosa</i> * <i>Sida cordifolia</i> * <i>Stephania japonica</i> var. <i>discolour</i> <i>Triumfetta rhomboides</i>

#### BASAL AREA & STEM COUNTS


Species	Basal area for plot (50X10m)					Volume/ha		Stem count for plot (50X10m)					
	E	T1	T2	T3	S1	T1	T2	E	T1	T2	T3	S1	S2
<i>Eucalyptus portuensis</i>		2							1				
<i>Corymbia tessellaris</i>		1							2				
<i>Allocasuarina littoralis</i>										1			
<i>Corymbia clarksoniana</i>		2											
<i>Lophostemon suaveolens</i>		1							2				
<i>Planchonia careya</i>										2			
<i>Alphitonia excelsa</i>										5		10	
<i>Drypetes deplanchei</i>												2	
<i>Acacia leiocalyx</i> subsp. <i>Leiocalyx</i>												6	

#### CANOPY COVER DATA (100m TRANSECT)

Canopy Start (m)	Canopy finish (m)	Species	Strata
0	4.5	<i>Lophostemon suaveolens</i>	T1
6.5	8.5	<i>Allocasuarina littoralis</i>	T2
11	16	<i>Alphitonia excelsa</i>	T2
11	26	<i>Corymbia clarksoniana</i>	T1
30	35.5	<i>Corymbia tessellaris</i>	T1
47	55	<i>Lophostemon suaveolens</i>	T1
54.5	66	<i>Corymbia clarksoniana</i>	T1
57.5	60	<i>Planchonia careya</i>	T2
62.5	66.5	<i>Acacia disparrima</i> subsp. <i>disparrima</i>	T2
66	78	<i>Corymbia tessellaris</i>	T1
70.5	72	<i>Alphitonia excelsa</i>	T2
78	83	<i>Corymbia clarksoniana</i>	T1
87.5	96	<i>Lophostemon suaveolens</i>	T1
96	100	<i>Corymbia clarksoniana</i>	T1



# Tertiary Site


<b>SITE NUMBER</b>	46B		
<b>LEVEL</b>	3		
<b>DETAIL SP. LIST</b>	Y		
<b>REGIONAL ECOSYSTEM</b>	8.2.8a		
<b>DATE</b>	23/09/2010		
<b>RECORDER</b>	David Francis & Julia Olsen		
<b>LOCALITY</b>	Great Keppel Island		
<b>SITE DESCRIPTION</b> <i>Corymbia clarksoniana</i> open forest			
<b>GENERAL NOTES</b>			
<b>COMMUNITY AREA (ha)</b>	20-50	<b>COMMUNITY WIDTH (m)</b>	75-150
<b>MAPPED (Current RE)</b>	8.11.10/8.12.14x2c	<b>REFERENCE SITE</b>	N
<b>LANDFORM</b>			
<b>Situation</b>	F	<b>Element</b>	HSL
<b>Eros pattern</b>	GE	<b>Pattern</b>	HIL
<b>SLOPE</b>			
<b>Type</b>	M	<b>Slope (%)</b>	5
<b>Aspect (°)</b>	20		
<b>SOILS</b>			
<b>Source</b>	S	<b>Reliability</b>	M
<b>Code</b>	A	<b>Add data</b>	-
<b>ISB/MU</b>	-	<b>Colour</b>	Orange Brown
<b>Texture</b>	Sand		
<b>GEOLOGY</b>			
<b>Source</b>	M	<b>Reliability</b>	L
<b>Code</b>	K	<b>Map Unit</b>	Ccs
<b>SPECHT STRUCTURE CODE</b> Open Forest			
<b>GROUND (%)</b>			
<b>Litter</b>	10	<b>Rock</b>	0
<b>Bare ground</b>	0	<b>Cryptophyte</b>	0
<b>Vegetation</b>	90		
<b>RAINFOREST</b>			
<b>Struct. Complexity</b>	-	<b>Leaf Size</b>	-
<b>Leaf fall</b>	-	<b>Floor Comp</b>	-
<b>In. Gr Forms</b>	-		
<b>DISTURBANCE</b>			
<b>Storm damage (Proportion/Age)</b>	0	<b>Road Works (Proportion/Age)</b>	0
<b>Fire (Proportion/Age/Height)</b>	0	<b>Salinity</b>	0
<b>Logging (#)</b>	N	<b>Ringbarking /Thinning (#)</b>	N
<b>Grazing</b>	N	<b>Feral Digging</b>	N
<b>Weeds (% Cover)</b>	5%	<b>Remnant</b>	Y
<b>Erosion (Type/Severity)</b>	0		

SITE NUMBER		46B	continued	
STRUCTURAL SUMMARY				
Stratum	Height Range in Strata (m)	Median Height (m)	Cover (%) (100m transect)	Species
Emergent	-	-	-	-
Tree 1				<i>Corymbia clarksoniana</i>
Tree 2				<i>Acacia julifera</i> subsp. <i>julifera</i> <i>Acronychia laevis</i> <i>Allocasuarina littoralis</i> <i>Alphitonia excelsa</i> <i>Banksia integrifolia</i> subsp. <i>compare</i>
Tree 3	-	-	-	-
Shrub 1	0.5-1.5	0.8	-	<i>Lithomyrtus obtusa</i>
Shrub 2	-	-	-	-
Ground	0-0.5	0.5	-	<i>Abutilon albescens</i> var. <i>australiense</i> <i>Eriachne pallescens</i> <i>Lomandra leucocephala</i> subsp. <i>leucocephala</i> <i>Triumfetta rhomboidea</i>



[illegible]



<b>SITE NUMBER</b>	48		
<b>LEVEL</b>	2		
<b>DETAIL SP. LIST</b>	Y		
<b>REGIONAL ECOSYSTEM</b>	Non-rem 8.2.7b		
<b>DATE</b>	23/09/2010		
<b>RECORDER</b>	David Francis & Julia Olsen		
<b>LOCALITY</b>	Great Keppel Island		
<b>SITE DESCRIPTION</b>	Corymbia clarksoniana open forest		
<b>GENERAL NOTES</b>			
<b>COMMUNITY AREA (ha)</b>	20-50	<b>COMMUNITY WIDTH (m)</b>	75-150
<b>MAPPED (Current RE)</b>	8.3.13c	<b>REFERENCE SITE</b>	n
<b>LANDFORM</b>			
<b>Situation</b>	A	<b>Element</b>	PLA
<b>Eros pattern</b>	UP	<b>Pattern</b>	PLA
<b>SLOPE</b>			
<b>Type</b>	F	<b>Slope (%)</b>	0
<b>Aspect (°)</b>	60		
<b>SOILS</b>			
<b>Source</b>	S	<b>Reliability</b>	M
<b>Code</b>	A	<b>Add data</b>	-
<b>ISB/MU</b>	-	<b>Colour</b>	Dark Brown
<b>Texture</b>	Sand		
<b>GEOLOGY</b>			
<b>Source</b>	M	<b>Reliability</b>	Low
<b>Code</b>	B	<b>Map Unit</b>	Qa
<b>SPECHT STRUCTURE CODE</b>		Open Forest	
<b>GROUND (%)</b>			
<b>Litter</b>	0	<b>Rock</b>	0
<b>Bare ground</b>	0	<b>Cryptophyte</b>	0
<b>Vegetation</b>	100		
<b>RAINFOREST</b>			
<b>Struct. Complexity</b>	-	<b>Leaf Size</b>	-
<b>Leaf fall</b>	-	<b>Floor Comp</b>	-
<b>In. Gr Forms</b>	-		
<b>DISTURBANCE</b>			
<b>Storm damage (Proportion/Age)</b>	0	<b>Road Works (Proportion/Age)</b>	0
<b>Fire (Proportion/Age/Height)</b>	0	<b>Salinity</b>	0
<b>Logging (#)</b>	N	<b>Ringbarking /Thinning (#)</b>	N
<b>Grazing</b>	N	<b>Feral Digging</b>	N
<b>Weeds (% Cover)</b>	5%	<b>Remnant</b>	Y
<b>Erosion (Type/Severity)</b>	0		

SITE NUMBER		48	continued	
STRUCTURAL SUMMARY				
Stratum	Height Range in Strata (m)	Median Height (m)	Cover (%) (100m transect)	Species
Emergent	-	-	-	-
Tree 1	9-17	10	40.5	<i>Banksia integrifolia</i> subsp. <i>compare</i> <i>Corymbia clarksoniana</i> <i>Corymbia tessellaris</i> <i>Eucalyptus crebra</i> <i>Melaleuca dealbata</i>
Tree 2	3-7	5	25	<i>Acacia disparrima</i> subsp. <i>disparrima</i> <i>Acacia leiocalyx</i> subsp. <i>leiocalyx</i> <i>Alphitonia excelsa</i> <i>Drypetes deplanchei</i> <i>Glochidion lobocarpum</i> <i>Planchonia careya</i>
Tree 3	-	-	-	-
Shrub 1	0.5-1.5	1.5		<i>Acacia disparrima</i> subsp. <i>disparrima</i>



				<i>Alphitonia excelsa</i> <i>Ficus opposita</i> <i>Lantana camara</i> * <i>Wikstroemia indica</i>
Shrub 2	-	-	-	-
Ground	0-0.5	0.5	-	<i>Abutilon albescens</i> var. <i>australiense</i> <i>Ageratum conyzoides</i> subsp. <i>conyzoides</i> <i>Cenchrus ciliaris</i> * <i>Cyanthillium cinereum</i> <i>Panicum effusum</i> <i>Passiflora suberosa</i> * <i>Sida cordifolia</i> * <i>Stephania japonica</i> var. <i>discolor</i> <i>Triumfetta rhomboides</i>

#### BASAL AREA & STEM COUNTS

Species	Basal area for plot (50X10m)					Volume/ha		Stem count for plot (50X10m)					
	E	T1	T2	T3	S1	T1	T2	E	T1	T2	T3	S1	S2
<i>Corymbia clarksoniana</i>													
<i>Banksia integrifolia</i> subsp. <i>compare</i>		2							1				
<i>Acacia leiocalyx</i> subsp. <i>leiocalyx</i>												2	
<i>Melaleuca dealbata</i>		1							1	21			
<i>Planchonia careya</i>													
<i>Acacia disparrima</i> subsp. <i>Disparrima</i>		2											
<i>Eucalyptus platyphylla</i>		1											
<i>Eucalyptus crebra</i>		2											
<i>Lantana camara</i> *												4	
<i>Ficus opposita</i>												1	
<i>Alphitonia excelsa</i>												2	
<i>Mallotus discolor</i>										1			
<i>Drypetes deplanchei</i>												2	

#### CANOPY COVER DATA (100m TRANSECT)


Canopy Start (m)	Canopy finish (m)	Species	Strata
0	9.5	<i>Ficus opposita</i>	T1
5.5	6	<i>Drypetes deplanchei</i>	T2
8.5	11.5	<i>Mallotus discolor</i>	T2
31.5	36	<i>Acacia disparrima</i> subsp. <i>disparrima</i>	T2
32	37.5	<i>Acacia leiocalyx</i> subsp. <i>leiocalyx</i>	T1
47.5	50	<i>Acacia disparrima</i> subsp. <i>disparrima</i>	T2
45	50	<i>Corymbia clarksoniana</i>	T1
53	56	<i>Corymbia tessellaris</i>	T2
57.5	60	<i>Acacia disparrima</i> subsp. <i>disparrima</i>	T2
60	63.5	<i>Alphitonia excelsa</i>	T2



60	70.5	<i>Corymbia tessellaris</i>	T1
63	63.5	<i>Planchonia careya</i>	T2
72	74	<i>Acacia disparrima subsp. disparrima</i>	T2
79	83.5	<i>Corymbia clarksoniana</i>	T1
89	90	<i>Corymbia tessellaris</i>	T1
95.5	100	<i>Corymbia clarksoniana</i>	T1
95	98	<i>Planchonia careya</i>	T2



# Tertiary Site

<b>SITE NUMBER</b>	50		
<b>LEVEL</b>	3		
<b>DETAIL SP. LIST</b>	Y		
<b>REGIONAL ECOSYSTEM</b>	Non-rem		
<b>DATE</b>	23/09/2010		
<b>RECORDER</b>	David Francis & Julia Olsen		
<b>LOCALITY</b>	Great Keppel Island		
<b>SITE DESCRIPTION</b>	Open Grassy Paddock		
<b>GENERAL NOTES</b>			
<b>COMMUNITY AREA (ha)</b>	C	<b>COMMUNITY WIDTH (m)</b>	E
<b>MAPPED (Current RE)</b>	Non-remnant	<b>REFERENCE SITE</b>	N
<b>LANDFORM</b>			
<b>Situation</b>	A	<b>Element</b>	PLA
<b>Eros pattern</b>	UP	<b>Pattern</b>	PLA
<b>SLOPE</b>			
<b>Type</b>	F	<b>Slope (%)</b>	0
<b>Aspect (°)</b>	50		
<b>SOILS</b>			
<b>Source</b>	I	<b>Reliability</b>	L
<b>Code</b>	A	<b>Add data</b>	-
<b>ISB/MU</b>	-	<b>Colour</b>	Brown
<b>Texture</b>	Sand		
<b>GEOLOGY</b>			
<b>Source</b>	I	<b>Reliability</b>	L
<b>Code</b>	B	<b>Map Unit</b>	Qa
<b>SPECHT STRUCTURE CODE</b>			
Tussock Grassland			
<b>GROUND (%)</b>			
<b>Litter</b>	0	<b>Rock</b>	0
<b>Bare ground</b>	0	<b>Cryptophyte</b>	0
<b>Vegetation</b>	100		
<b>RAINFOREST</b>			
<b>Struct. Complexity</b>	-	<b>Leaf Size</b>	-
<b>Leaf fall</b>	-	<b>Floor Comp</b>	-
<b>In. Gr Forms</b>	-		
<b>DISTURBANCE</b>			
<b>Storm damage (Proportion/Age)</b>	0	<b>Road Works (Proportion/Age)</b>	0
<b>Fire (Proportion/Age/Height)</b>	0	<b>Salinity</b>	0
<b>Logging (#)</b>	Y	<b>Ringbarking /Thinning (#)</b>	N
<b>Grazing</b>	N	<b>Feral Digging</b>	N
<b>Weeds (% Cover)</b>	95%	<b>Remnant</b>	N
<b>Erosion (Type/Severity)</b>	0		


SITE NUMBER		50	continued	
STRUCTURAL SUMMARY				
Stratum	Height Range in Strata (m)	Median Height (m)	Cover (%) (100m transect)	Species
Emergent	-	-	-	-
Tree 1	-	-	-	-
Tree 2	-	-	-	-
Tree 3	-	-	-	-
Shrub 1	-	-	-	-
Shrub 2	-	-	-	-
Ground	0-0.5	0.5	-	<i>Ageratum conyzoides</i> subsp. <i>Conyzoides</i> * <i>Bidens bipinnata</i> * <i>Cenchrus ciliaris</i> * <i>Chamaecrista rotundifolia</i> * <i>Chloris gayana</i> *



				<i>Cynodon dactylon</i> * <i>Epaltes australis</i> <i>Heteropogon contortus</i> <i>Malvastrum americanum</i> * <i>Sida cordifolia</i> * <i>Sida rhombifolia</i> * <i>Sida hakettiana</i> <i>Spermacoce remota</i> * <i>Stylosanthes humilis</i> *
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# Tertiary Site


<b>SITE NUMBER</b>	53		
<b>LEVEL</b>	3		
<b>DETAIL SP. LIST</b>	Y		
<b>REGIONAL ECOSYSTEM</b>	8.11.8a		
<b>DATE</b>	23/09/2010		
<b>RECORDER</b>	David Francis & Julia Olsen		
<b>LOCALITY</b>	Great Keppel Island		
<b>SITE DESCRIPTION</b> <i>Eucalyptus crebra</i> windswept low forest on rock			
<b>GENERAL NOTES</b>			
<b>COMMUNITY AREA (ha)</b>	F	<b>COMMUNITY WIDTH (m)</b>	E
<b>MAPPED (Current RE)</b>	8.11.3a	<b>REFERENCE SITE</b>	
<b>LANDFORM</b>			
<b>Situation</b>	F	<b>Element</b>	HSL
<b>Eros pattern</b>	SH	<b>Pattern</b>	HIL
<b>SLOPE</b>			
<b>Type</b>	R	<b>Slope (%)</b>	30
<b>Aspect (°)</b>	0		
<b>SOILS</b>			
<b>Source</b>	I	<b>Reliability</b>	L
<b>Code</b>	A/K	<b>Add data</b>	-
<b>ISB/MU</b>	-	<b>Colour</b>	Brown
<b>Texture</b>	Sandy Clay		
<b>GEOLOGY</b>			
<b>Source</b>	I	<b>Reliability</b>	L
<b>Code</b>	K	<b>Map Unit</b>	Ccs
<b>SPECHT STRUCTURE CODE</b>			
<b>GROUND (%)</b>			
<b>Litter</b>	0	<b>Rock</b>	10
<b>Bare ground</b>	0	<b>Cryptophyte</b>	0
<b>Vegetation</b>	90		
<b>RAINFOREST</b>			
<b>Struct. Complexity</b>	-	<b>Leaf Size</b>	-
<b>Leaf fall</b>	-	<b>Floor Comp</b>	-
<b>In. Gr Forms</b>	-		
<b>DISTURBANCE</b>			
<b>Storm damage (Proportion/Age)</b>	0	<b>Road Works (Proportion/Age)</b>	0
<b>Fire (Proportion/Age/Height)</b>	0	<b>Salinity</b>	0
<b>Logging (#)</b>	N	<b>Ringbarking /Thinning (#)</b>	N
<b>Grazing</b>	N	<b>Feral Digging</b>	N
<b>Weeds (% Cover)</b>	<1%	<b>Remnant</b>	Y
<b>Erosion (Type/Severity)</b>	0		

SITE NUMBER		53			continued
STRUCTURAL SUMMARY					
Stratum	Height Range in Strata (m)	Median Height (m)	Cover (%) (100m transect)	Species	
Emergent	-	-	-	-	
Tree 1				<i>Eucalyptus crebra</i> <i>Eucalyptus exserta</i> <i>Melaleuca nervosa</i>	
Tree 2	4-7	5		<i>Acacia leiocalyx</i> subsp. <i>leiocalyx</i> <i>Jacksonia scoparia</i> <i>Alphitonia excelsa</i>	
Tree 3	-	-	-	-	
Shrub 1	-	-	-	-	
Shrub 2	-	-	-	-	
Ground	0-0.5	0.5	-	<i>Brunoniella australis</i> <i>Cyanthillium cinereum</i> <i>Enteropogon unispiceus</i> <i>Eriachne pallescens</i> <i>Paspalidium gracile</i>	



				<i>Pterocaulon redolens</i> <i>Sida cordifolia</i> * <i>Triumfetta rhomboidea</i> <i>Xanthorrhoea latifolia</i>
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<b>SITE NUMBER</b>	56												
<b>LEVEL</b>	2												
<b>DETAIL SP. LIST</b>	Y												
<b>REGIONAL ECOSYSTEM</b>	8.2.8a												
<b>DATE</b>	23/09/2010												
<b>RECORDER</b>	David Francis & Julia Olsen												
<b>LOCALITY</b>	Great Keppel Island												
<b>SITE DESCRIPTION</b>		Lophostemon suaveolens / Eucalyptus portuensis open forest											
<b>GENERAL NOTES</b>													
<b>COMMUNITY AREA (ha)</b>		D			<b>COMMUNITY WIDTH (m)</b>		B						
<b>MAPPED (Current RE)</b>		8.11.10/8.12.14x2c			<b>REFERENCE SITE</b>		N						
<b>LANDFORM</b>													
<b>Situation</b>	A		<b>Element</b>	BAN		<b>Eros pattern</b>	UP		<b>Pattern</b>	ALP			
<b>SLOPE</b>													
<b>Type</b>	V		<b>Slope (%)</b>	3		<b>Aspect (°)</b>	290						
<b>SOILS</b>													
<b>Source</b>	S	<b>Reliability</b>	M	<b>Code</b>	A/K	<b>Add data</b>	-	<b>ISB/MU</b>	-	<b>Colour</b>	Dark Brown	<b>Texture</b>	Sandy Clay
<b>GEOLOGY</b>													
<b>Source</b>	M		<b>Reliability</b>	L		<b>Code</b>	K		<b>Map Unit</b>	Ccs			
<b>SPECHT STRUCTURE CODE</b>						Open Forest							
<b>GROUND (%)</b>													
<b>Litter</b>	15	<b>Rock</b>	0	<b>Bare ground</b>	0	<b>Cryptophyte</b>	0	<b>Vegetation</b>	85				
<b>RAINFOREST</b>													
<b>Struct. Complexity</b>	-	<b>Leaf Size</b>	-	<b>Leaf fall</b>	-	<b>Floor Comp</b>	-	<b>In. Gr Forms</b>	-				
<b>DISTURBANCE</b>													
<b>Storm damage (Proportion/Age)</b>		0				<b>Road Works (Proportion/Age)</b>		0					
<b>Fire (Proportion/Age/Height)</b>		0				<b>Salinity</b>		0					
<b>Logging (#)</b>		0				<b>Ringbarking /Thinning (#)</b>		0					
<b>Grazing</b>		0				<b>Feral Digging</b>		0					
<b>Weeds (% Cover)</b>		<5%				<b>Remnant</b>							
<b>Erosion (Type/Severity)</b>		0											

SITE NUMBER		56			continued	
STRUCTURAL SUMMARY						
Stratum	Height Range in Strata (m)	Median Height (m)	Cover (%) (100m transect)	Species		
Emergent	-	-	-	-		
Tree 1	10-16	15	46.5	Corymbia citriodora subsp. citriodora Eucalyptus moluccana Eucalyptus platyphylla Eucalyptus portuensis Lophostemon suaveolens Melaleuca quinquenervia		
Tree 2	3-7	5	90	Acacia disparrima subsp. disparrima Alphitonia excelsa Drypetes deplanchei Glochidion lobocarpum Planchonia careya Pouteria sericea		



Tree 3	-	-	-	-
Shrub 1			-	<i>Alyxia ruscifolia</i> <i>Breynia oblongifolia</i>
Shrub 2	-	-	-	<i>Lantana camara</i> *
Ground	0-0.5	0.5	-	<i>Ageratum houstonianum</i> * <i>Arundinella nepalensis</i> <i>Clematocissus opaca</i> <i>Geitonoplesium cymosum</i> <i>Gahnia aspera</i> <i>Hybanthus stellarioides</i> <i>Imperata cylindrica</i> <i>Lomandra confertifolia</i> subsp. <i>pallida</i> <i>Melinis minutiflora</i> * <i>Pandorea pandorana</i> <i>Stephania japonica</i> <i>Triumfetta rhomboides</i> <i>Vernonia cinerea</i>

#### BASAL AREA & STEM COUNTS

Species	Basal area for plot (50X10m)					Volume/ha		Stem count for plot (50X10m)					
	E	T1	T2	T3	S1	T1	T2	E	T1	T2	T3	S1	S2
<i>Corymbia tessellaris</i>		2							1				
<i>Lophostemon suaveolens</i>		6	2						7	2			
<i>Eucalyptus portuensis</i>		2							2				
<i>Corymbia citriodora</i> subsp. <i>citriodora</i>		1											
<i>Corymbia clarksoniana</i>			1						3	1			
<i>Alphitonia excelsa</i>										17		11	2
<i>Alphitonia dispurpureum</i>									2	3		1	1
<i>Drypetes deplanchei</i>										2		1	
<i>Melaleuca quinquenervia</i>		1							1				
<i>Lophostemon confertus</i>		1							2				
<i>Planchonia careya</i>			1							3			
<i>Lantana camara</i>												2	2
<i>Ficus opposita</i>													1

CANOPY COVER DATA (100m TRANSECT)			
Canopy Start (m)	Canopy finish (m)	Species	Strata
0	1	<i>Drypetes deplanchei</i>	
0	1.5	<i>Alphitonia excelsa</i>	
1.5	12.5	<i>Lophostemon suaveolens</i>	
4	15.5	<i>Alphitonia excelsa</i>	
14	20.5	<i>Eucalyptus portuensis</i>	
14	19	<i>Acacia disparrima</i> subsp. <i>disparrima</i>	
19	23.5	<i>Lophostemon suaveolens</i>	
20	28	<i>Alphitonia excelsa</i>	
20.5	26	<i>Corymbia tessellaris</i>	
24.5	40	<i>Eucalyptus portuensis</i>	




26.5	28	<i>Eucalyptus crebra</i>	
29	33.5	<i>Acacia disparrima subsp. disparrima</i>	
34	100	<i>Lophostemon suaveolens</i>	
36	37.5	<i>Planchonia careya</i>	
44	47	<i>Planchonia careya</i>	
61	63	<i>Eucalyptus portuensis</i>	
75	81	<i>Corymbia clarksoniana</i>	



## Tertiary Site REFERENCE SITE FOR 8.1.2

<b>SITE NUMBER</b>	59
<b>LEVEL</b>	3
<b>DETAIL SP. LIST</b>	Y
<b>REGIONAL ECOSYSTEM</b>	8.1.2
<b>DATE</b>	23/09/2010
<b>RECORDER</b>	David Francis & Julia Olsen
<b>LOCALITY</b>	Great Keppel Island



<b>SITE DESCRIPTION</b>	Saltpan tidal mudflats.														
<b>GENERAL NOTES</b>															
<b>COMMUNITY AREA (ha)</b>				D				<b>COMMUNITY WIDTH (m)</b>				B			
<b>MAPPED (Current RE)</b>				8.1.2				<b>REFERENCE SITE</b>				Y			
<b>LANDFORM</b>															
<b>Situation</b>		V		<b>Element</b>		TDF		<b>Eros pattern</b>		LP		<b>Pattern</b>		TID	
<b>SLOPE</b>															
<b>Type</b>		V		<b>Slope (%)</b>		<1%		<b>Aspect (°)</b>		-					
<b>SOILS</b>															
<b>Source</b>	S	<b>Reliability</b>	M	<b>Code</b>	E	<b>Add data</b>	-	<b>ISB/MU</b>	-	<b>Colour</b>	F	<b>Texture</b>	I		
<b>GEOLOGY</b>															
<b>Source</b>	O	<b>Reliability</b>	L	<b>Code</b>	K	<b>Map Unit</b>	Ccs								
<b>SPECHT STRUCTURE CODE</b>				Open Sedgeland											
<b>GROUND (%)</b>															
<b>Litter</b>	-	<b>Rock</b>	-	<b>Bare ground</b>	-	<b>Cryptophyte</b>	-	<b>Vegetation</b>	-						
<b>RAINFOREST</b>															
<b>Struct. Complexity</b>	-	<b>Leaf Size</b>	-	<b>Leaf fall</b>	-	<b>Floor Comp</b>	-	<b>In. Gr Forms</b>	-						
<b>DISTURBANCE</b>															
<b>Storm damage (Proportion/Age)</b>		0		<b>Road Works (Proportion/Age)</b>		0									
<b>Fire (Proportion/Age/Height)</b>		0		<b>Salinity</b>		1									
<b>Logging (#)</b>		N		<b>Ringbarking /Thinning (#)</b>		N									
<b>Grazing</b>		N		<b>Feral Digging</b>		N									
<b>Weeds (% Cover)</b>		0		<b>Remnant</b>											
<b>Erosion (Type/Severity)</b>		0													


SITE NUMBER		59				continued	
STRUCTURAL SUMMARY							
Stratum	Height Range in Strata (m)	Median Height (m)	Cover (%) (100m transect)	Species			
Emergent	-	-	-	-			
Tree 1	-	-	-	<i>Melaleuca nervosa</i> <i>Aegiceras corniculatum</i>  Out of Plot <i>Avicinna marina</i> <i>Excoecaria agallocha</i>			
Tree 2	-	-	-	-			
Tree 3	-	-	-	-			
Shrub 1	-	-	-	-			
Shrub 2	-	-	-	-			



Ground				<i>Ceriops tagal</i> <i>Epaltes australis</i> <i>Fimbristylis ferruginea</i> <i>Juncus kraussii</i> subsp. <i>australiensis</i> <i>Sarcocornia quinqueflora</i> <i>Schenkia australis</i> <i>Sporobolus virginicus</i>  Out of Plot <i>Crinum flaccidum</i>
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# REFERENCE SITE FOR 8.11.8b

<b>SITE NUMBER</b>	60		
<b>LEVEL</b>	2		
<b>DETAIL SP. LIST</b>	Y		
<b>REGIONAL ECOSYSTEM</b>	8.11.8b		
<b>DATE</b>	23/09/2010		
<b>RECORDER</b>	David Francis & Julia Olsen		
<b>LOCALITY</b>	Great Keppel Island		
<b>SITE DESCRIPTION</b>	<i>Eucalyptus moluccana</i> closed forest		
<b>GENERAL NOTES</b>	Soils appear colluvial in origin		
<b>COMMUNITY AREA (ha)</b>	20-50	<b>COMMUNITY WIDTH (m)</b>	75-150
<b>MAPPED (Current RE)</b>	8.11.3a	<b>REFERENCE SITE</b>	Y
<b>LANDFORM</b>			
<b>Situation</b>	A	<b>Element</b>	PLA
<b>Eros pattern</b>	LP	<b>Pattern</b>	PLA
<b>SLOPE</b>			
<b>Type</b>	F	<b>Slope (%)</b>	1
<b>Aspect (°)</b>	300		
<b>SOILS</b>			
<b>Source</b>	S	<b>Reliability</b>	M
<b>Code</b>	N	<b>Add data</b>	-
<b>ISB/MU</b>	-	<b>Colour</b>	Dark Brown
<b>Texture</b>	Sandy Clay		
<b>GEOLOGY</b>			
<b>Source</b>	M	<b>Reliability</b>	L
<b>Code</b>	B	<b>Map Unit</b>	Qa
<b>SPECHT STRUCTURE CODE</b>			
Closed Forest			
<b>GROUND (%)</b>			
<b>Litter</b>	35	<b>Rock</b>	0
<b>Bare ground</b>	5	<b>Cryptophyte</b>	0
<b>Vegetation</b>	60		
<b>RAINFOREST</b>			
<b>Struct. Complexity</b>	-	<b>Leaf Size</b>	-
<b>Leaf fall</b>	-	<b>Floor Comp</b>	-
<b>In. Gr Forms</b>	-		
<b>DISTURBANCE</b>			
<b>Storm damage (Proportion/Age)</b>	0	<b>Road Works (Proportion/Age)</b>	0
<b>Fire (Proportion/Age/Height)</b>	0	<b>Salinity</b>	0
<b>Logging (#)</b>	N	<b>Ringbarking /Thinning (#)</b>	N
<b>Grazing</b>	N	<b>Feral Digging</b>	N
<b>Weeds (% Cover)</b>	3%	<b>Remnant</b>	Y
<b>Erosion (Type/Severity)</b>	3/3		

SITE NUMBER		60	continued	
STRUCTURAL SUMMARY				
Stratum	Height Range in Strata (m)	Median Height (m)	Cover (%) (100m transect)	Species
Emergent	-	-	-	-
Tree 1	9-20	14	97	<i>Eucalyptus moluccana</i>
Tree 2	5-8	6		<i>Eucalyptus moluccana</i>
Tree 3	-	-	-	-
Shrub 1	0.5-2	1	-	<i>Alphitonia excelsa</i> <i>Eucalyptus moluccana</i> <i>Opuntia stricta</i> *
Shrub 2	-	-	-	-
Ground	0-0.5	0.5	-	<i>Achyranthes aspera</i> <i>Brunoniella australis</i> <i>Cenchrus ciliaris</i> * <i>Cyanthillium cinereum</i> <i>Enteropogon unispiceus</i>




																<i>Eriachne pallescens</i> <i>Heteropogon contortus</i> <i>Leptochloa decipiens subsp. decipiens</i> <i>Megathyrsus maximus</i> * <i>Opuntia stricta</i> * <i>Passiflora suberosa</i> * <i>Stachytarpheta jamaicensis</i> *
BASAL AREA & STEM COUNTS																
Species	Basal area for plot (50X10m)					Volume/ha		Stem count for plot (50X10m)								
	E	T1	T2	T3	S1	T1	T2	E	T1	T2	T3	S1	S2			
<i>Eucalyptus moluccana</i>		11	3						7	13		4				
<i>Alphitonia excelsa</i>												1				
<i>Opuntia stricta</i> *												4				

CANOPY COVER DATA (100m TRANSECT)			
Canopy Start (m)	Canopy finish (m)	Species	Strata
0	51.5	<i>Eucalyptus moluccana</i>	T1
50	59	Stag	T1
59	97	<i>Eucalyptus moluccana</i>	T1



REFERENCE SITE FOR 8.11.8a

<b>SITE NUMBER</b>	61
<b>LEVEL</b>	2
<b>DETAIL SP. LIST</b>	Y
<b>REGIONAL ECOSYSTEM</b>	8.11.8a
<b>DATE</b>	23/09/2010
<b>RECORDER</b>	David Francis & Julia Olsen
<b>LOCALITY</b>	Great Keppel Island



<b>SITE DESCRIPTION</b>	<i>Eucalyptus crebra</i> closed forest on upper rocky hillside												
<b>GENERAL NOTES</b>													
<b>COMMUNITY AREA (ha)</b>	20-50				<b>COMMUNITY WIDTH (m)</b>	75-150							
<b>MAPPED (Current RE)</b>	8.11.3a				<b>REFERENCE SITE</b>	Y							
<b>LANDFORM</b>													
<b>Situation</b>	F	<b>Element</b>	SH	<b>Eros pattern</b>	UH	<b>Pattern</b>	HIL						
<b>SLOPE</b>													
<b>Type</b>	U	<b>Slope (%)</b>	35			<b>Aspect (°)</b>	80						
<b>SOILS</b>													
<b>Source</b>	S	<b>Reliability</b>	M	<b>Code</b>	N	<b>Add data</b>	-	<b>ISB/MU</b>	-	<b>Colour</b>	Brown	<b>Texture</b>	Sandy Clay
<b>GEOLOGY</b>													
<b>Source</b>	M	<b>Reliability</b>	L	<b>Code</b>	K	<b>Map Unit</b>	Ccs						
<b>SPECHT STRUCTURE CODE</b>	Low Closed Forest												
<b>GROUND (%)</b>													
<b>Litter</b>	10	<b>Rock</b>	5	<b>Bare ground</b>	0	<b>Cryptophyte</b>	0	<b>Vegetation</b>	85				
<b>RAINFOREST</b>													
<b>Struct. Complexity</b>	-	<b>Leaf Size</b>	-	<b>Leaf fall</b>	-	<b>Floor Comp</b>	-	<b>In. Gr Forms</b>	-				
<b>DISTURBANCE</b>													
<b>Storm damage (Proportion/Age)</b>	0				<b>Road Works (Proportion/Age)</b>	0							
<b>Fire (Proportion/Age/Height)</b>	0				<b>Salinity</b>	0							
<b>Logging (#)</b>	N				<b>Ringbarking /Thinning (#)</b>	N							
<b>Grazing</b>	N				<b>Feral Digging</b>	N							
<b>Weeds (% Cover)</b>	5				<b>Remnant</b>	Y							
<b>Erosion (Type/Severity)</b>	0												

SITE NUMBER		61	continued		
STRUCTURAL SUMMARY					
Stratum	Height Range in Strata (m)	Median Height (m)	Cover (%) (100m transect)	Species	
Emergent	-	-	-	-	
Tree 1	3-8	5	72.5	<i>Acacia disparrima</i> subsp. <i>disparrima</i> <i>Acacia leiocalyx</i> subsp. <i>leiocalyx</i> <i>Corymbia clarksoniana</i> <i>Eucalyptus crebra</i> <i>Eucalyptus drepanophylla</i> <i>Eucalyptus portuensis</i> <i>Lophostemon confertus</i>	
Tree 2	-	-	-	-	
Tree 3	-	-	-	-	
Shrub 1	1.5-3	1.5	-	<i>Jacksonia scoparia</i>	
Shrub 2	0-1	1	-	<i>Xanthorrhoea latifolia</i>	




Ground	0-0.5	0.5				-	<i>Arundinella nepalensis</i> <i>Brunoniella australis</i> <i>Cymbopogon bombycinus</i> <i>Dianella rara</i> <i>Eremochloa bimaculata</i> <i>Indigofera pratensis</i> <i>Lepidosperma laterale</i> var. <i>laterale</i> <i>Lomandra confertifolia</i> subsp. <i>pallida</i> <i>Periplura diffusa</i> <i>Glycine tabacina</i> <i>Tephrosia filipes</i> subsp. <i>filipes</i> <i>Xanthorrhoea latifolia</i>							
BASAL AREA & STEM COUNTS														
Species	Basal area for plot (50X10m)					Volume/ha		Stem count for plot (50X10m)						
	E	T1	T2	T3	S1	T1	T2	E	T1	T2	T3	S1	S2	
<i>Eucalyptus fibrosa</i>		1							3					
<i>Eucalyptus crebra</i>		10							4					
<i>Eucalyptus portuensis</i>		2							5					
<i>Lophostemon confertus</i>		3							5					
<i>Corymbia clarksoniana</i>									1	1				
<i>Acacia disparrima</i> subsp. <i>disparrima</i>														
<i>Grevillea banksii</i>									1			1	1	
<i>Jacksonia scoparia</i>												2		
<i>Acacia leiocalyx</i> subsp. <i>leiocalyx</i>														
<i>Alphitonia excelsa</i>										1		6		

CANOPY COVER DATA (100m TRANSECT)			
Canopy Start (m)	Canopy finish (m)	Species	Strata
0	6	<i>Eucalyptus drepanophylla</i>	T1
15	20	<i>Eucalyptus drepanophylla</i>	T1
22	23	<i>Eucalyptus drepanophylla</i>	T1
24.5	26	<i>Lophostemon confertus</i>	T1
26	40	<i>Eucalyptus drepanophylla</i>	T1
31	40	<i>Lophostemon confertus</i>	T1
40.5	43	<i>Acacia leiocalyx</i> subsp. <i>leiocalyx</i>	T2
40	46	<i>Eucalyptus drepanophylla</i>	T1
46	53.5	<i>Lophostemon confertus</i>	T1
58	64	<i>Eucalyptus crebra</i>	T1
62	66	<i>Lophostemon confertus</i>	T1
67	72.5	<i>Lophostemon confertus</i>	T1
72.5	77	<i>Eucalyptus drepanophylla</i>	T1
75.5	76	<i>Acacia leiocalyx</i> subsp. <i>leiocalyx</i>	T1
79	84.5	<i>Eucalyptus drepanophylla</i>	T1



80	81	<i>Lophostemon confertus</i>	T1
83	84	<i>Lophostemon confertus</i>	T1
86.5	90	<i>Eucalyptus portuensis</i>	T1
91.5	96.5	<i>Lophostemon confertus</i>	T1
97	100	<i>Eucalyptus portuensis</i>	T1



<b>SITE NUMBER</b>	88						
<b>LEVEL</b>	2						
<b>DETAIL SP. LIST</b>	Y						
<b>REGIONAL ECOSYSTEM</b>	Non-rem 8.2.8a						
<b>DATE</b>	24/09/2010						
<b>RECORDER</b>	David Francis & Julia Olsen						
<b>LOCALITY</b>	Great Keppel Island						
<b>SITE DESCRIPTION</b> <i>Corymbia clarksoniana</i> open forest							
<b>GENERAL NOTES</b>							
<b>COMMUNITY AREA (ha)</b>	20-50	<b>COMMUNITY WIDTH (m)</b> 75-150					
<b>MAPPED (Current RE)</b>	8.2.8a	<b>REFERENCE SITE</b> N					
<b>LANDFORM</b>							
<b>Situation</b>	A	<b>Element</b> PLA	<b>Eros pattern</b> GP	<b>Pattern</b> PLA			
<b>SLOPE</b>							
<b>Type</b>	M	<b>Slope (%)</b> 5	<b>Aspect (°)</b> 0				
<b>SOILS</b>							
<b>Source</b>	S	<b>Reliability</b> M	<b>Code</b> A	<b>Add data</b> -	<b>ISB/MU</b> -	<b>Colour</b> Brown	<b>Texture</b> Sand
<b>GEOLOGY</b>							
<b>Source</b>	M	<b>Reliability</b> M	<b>Code</b> O	<b>Map Unit</b> Qhcd			
<b>SPECHT STRUCTURE CODE</b>					Open Forest		
<b>GROUND (%)</b>							
<b>Litter</b>	60	<b>Rock</b> 0	<b>Bare ground</b> 0	<b>Cryptophyte</b> F	<b>Vegetation</b> 40		
<b>RAINFOREST</b>							
<b>Struct. Complexity</b>	-	<b>Leaf Size</b> -	<b>Leaf fall</b> -	<b>Floor Comp</b> -	<b>In. Gr Forms</b> -		
<b>DISTURBANCE</b>							
<b>Storm damage (Proportion/Age)</b>	0	<b>Road Works (Proportion/Age)</b>	0				
<b>Fire (Proportion/Age/Height)</b>	0	<b>Salinity</b>	0				
<b>Logging (#)</b>	Y	<b>Ringbarking /Thinning (#)</b>	N				
<b>Grazing</b>	N	<b>Feral Digging</b>	N				
<b>Weeds (% Cover)</b>	<1%	<b>Remnant</b>	Y				
<b>Erosion (Type/Severity)</b>	0						

SITE NUMBER		88				continued	
STRUCTURAL SUMMARY							
Stratum	Height Range in Strata (m)	Median Height (m)	Cover (%) (100m transect)	Species			
Emergent	-	-	-	-			
Tree 1	10-16	13	26.5	Alphitonia excelsa Banksia integrifolia subsp. compar Corymbia clarksoniana			
Tree 2	3-8	5	54.5	Acacia julifera subsp. julifera Allocasuarina littoralis Alphitonia excelsa Planchonia careya			
Tree 3	-	-	-	-			
Shrub 1	1-1.5	1	-	Alphitonia excelsa Lithomyrtus obtusa Opuntia stricta*			



Shrub 2	0.5-1	0.5	-	<i>Breynia oblongifolia</i>									
Ground	0-0.5	0.5	-	<i>Amyema conspicua</i> subsp. <i>conspicua</i> <i>Clematicissus opaca</i> <i>Eriachne pallescens</i> <i>Imperata cylindrica</i> <i>Megathyrsus maximus</i> * <i>Passiflora suberosa</i> *									
BASAL AREA & STEM COUNTS													
Species	Basal area for plot (50X10m)					Volume/ha		Stem count for plot (50X10m)					
	E	T1	T2	T3	S1	T1	T2	E	T1	T2	T3	S1	S2
<i>Acacia julifera</i> subsp. <i>julifera</i>			1							2			
<i>Corymbia clarksoniana</i>		2							1	2			
<i>Banksia integrifolia</i> subsp. <i>compar</i>			1							4			
<i>Planchonia careya</i>										6			
<i>Alphitonia excelsa</i>			6							27			2
<i>Allocasuarina littoralis</i>			1							11		1	1
<i>Lithomyrtus obtusa</i>												1	1
<i>Breynia oblongifolia</i>													1
<i>Grevillea banksii</i>												1	
<i>Opuntia stricta</i> *												1	1
<i>Ficus opposita</i>										1			
<i>Acacia leiocalyx</i> subsp. <i>leiocalyx</i>										1			

CANOPY COVER DATA (100m TRANSECT)			
Canopy Start (m)	Canopy finish (m)	Species	Strata
0	2	<i>Alphitonia excelsa</i>	T2
4	9	<i>Alphitonia excelsa</i>	T2
9.5	16.5	<i>Planchonia careya</i>	T2
10	20	<i>Corymbia clarksoniana</i>	T1
15.5	18	<i>Allocasuarina littoralis</i>	T2
18	20.5	<i>Alphitonia excelsa</i>	T1
19.5	22.5	<i>Allocasuarina littoralis</i>	T2
23.5	26.5	<i>Alphitonia excelsa</i>	T2
26.5	28.5	<i>Allocasuarina littoralis</i>	T2
29.5	32.5	<i>Alphitonia excelsa</i>	T2
34.5	37.5	<i>Alphitonia excelsa</i>	T2
36.5	39	<i>Planchonia careya</i>	T2
39	42.5	<i>Alphitonia excelsa</i>	T2
45.5	47	<i>Corymbia clarksoniana</i>	T2
48	51	<i>Acacia leiocalyx</i> subsp. <i>leiocalyx</i>	T2
49	51.5	<i>Allocasuarina littoralis</i>	T2




55	56.5	<i>Banksia integrifolia</i> subsp. <i>compar</i>	T2
58.5	67	<i>Corymbia clarksoniana</i>	T1
65	67.5	<i>Alphitonia excelsa</i>	T2
67	68	<i>Allocasuarina littoralis</i>	T2
72.5	77	<i>Alphitonia excelsa</i>	T2
74	76	<i>Allocasuarina littoralis</i>	T2
79	80	<i>Corymbia clarksoniana</i>	T1
80	86	<i>Alphitonia excelsa</i>	T2
82.5	84	<i>Glochidion lobocarpum</i>	T2
87	90	<i>Allocasuarina littoralis</i>	T2
95.5	99.5	<i>Banksia integrifolia</i> subsp. <i>compar</i>	T1
99	100	<i>Allocasuarina littoralis</i>	T1



## Tertiary

<b>SITE NUMBER</b>	89
<b>LEVEL</b>	3
<b>DETAIL SP. LIST</b>	Y
<b>REGIONAL ECOSYSTEM</b>	Non-rem 8.2.8a
<b>DATE</b>	24/09/2010
<b>RECORDER</b>	David Francis & Julia Olsen
<b>LOCALITY</b>	Great Keppel Island



<b>SITE DESCRIPTION</b>	Corymbia tessellaris and Acacia julifera open forest												
<b>GENERAL NOTES</b>													
<b>COMMUNITY AREA (ha)</b>	20-50				<b>COMMUNITY WIDTH (m)</b>	75-150							
<b>MAPPED (Current RE)</b>	8.2.8a				<b>REFERENCE SITE</b>	N							
<b>LANDFORM</b>													
<b>Situation</b>	A		<b>Element</b>	PLA		<b>Eros pattern</b>	GP		<b>Pattern</b>	PLA			
<b>SLOPE</b>													
<b>Type</b>	M		<b>Slope (%)</b>	5		<b>Aspect (°)</b>	320						
<b>SOILS</b>													
<b>Source</b>	S	<b>Reliability</b>	M	<b>Code</b>	A	<b>Add data</b>	-	<b>ISB/MU</b>	-	<b>Colour</b>	Brown	<b>Texture</b>	Sand
<b>GEOLOGY</b>													
<b>Source</b>	M		<b>Reliability</b>	L		<b>Code</b>	F		<b>Map Unit</b>	Qchd			
<b>SPECHT STRUCTURE CODE</b>													
<b>GROUND (%)</b>													
<b>Litter</b>	60	<b>Rock</b>	0	<b>Bare ground</b>	0	<b>Cryptophyte</b>	0	<b>Vegetation</b>	40				
<b>RAINFOREST</b>													
<b>Struct. Complexity</b>	-	<b>Leaf Size</b>	-	<b>Leaf fall</b>	-	<b>Floor Comp</b>	-	<b>In. Gr Forms</b>	-				
<b>DISTURBANCE</b>													
<b>Storm damage (Proportion/Age)</b>	0				<b>Road Works (Proportion/Age)</b>	0							
<b>Fire (Proportion/Age/Height)</b>	0				<b>Salinity</b>	0							
<b>Logging (#)</b>	Y				<b>Ringbarking /Thinning (#)</b>	N							
<b>Grazing</b>	N				<b>Feral Digging</b>	N							
<b>Weeds (% Cover)</b>	<5%				<b>Remnant</b>	Y							
<b>Erosion (Type/Severity)</b>	0												

SITE NUMBER		89			continued	
STRUCTURAL SUMMARY						
Stratum		Height Range in Strata (m)	Median Height (m)	Cover (%) (100m transect)	Species	
Emergent		-	-	-	-	
Tree 1		6-9	8	-	Corymbia clarksoniana	
Tree 2		3-6	6	-	Acacia julifera subsp. julifera Alphitonia excelsa	
Tree 3		-	-	-	-	
Shrub 1		0.5-0.75	0.75	-	Lithomyrtus obtusa Xanthorrhoea latifolia	
Shrub 2		-	-	-	-	
Ground		0-0.5	0.5	-	Lomandra confertifolia subsp. pallida	




[illegible]



# REFERENCE SITE FOR 8.2.6a

<b>SITE NUMBER</b>	98
<b>LEVEL</b>	2
<b>DETAIL SP. LIST</b>	Y
<b>REGIONAL ECOSYSTEM</b>	8.2.6a
<b>DATE</b>	24/09/2010
<b>RECORDER</b>	David Francis & Julia Olsen
<b>LOCALITY</b>	Great Keppel Island



<b>SITE DESCRIPTION</b>	<i>Eucalyptus camaldulensis</i> open forest												
<b>GENERAL NOTES</b>													
<b>COMMUNITY AREA (ha)</b>		20-50			<b>COMMUNITY WIDTH (m)</b>		75-150						
<b>MAPPED (Current RE)</b>		8.2.8a			<b>REFERENCE SITE</b>		Y						
<b>LANDFORM</b>													
<b>Situation</b>	F	<b>Element</b>	FOO	<b>Eros pattern</b>	GP	<b>Pattern</b>	RIS						
<b>SLOPE</b>													
<b>Type</b>	L	<b>Slope (%)</b>	1	<b>Aspect (°)</b>	200								
<b>SOILS</b>													
<b>Source</b>	S	<b>Reliability</b>	M	<b>Code</b>	D	<b>Add data</b>	-	<b>ISB/MU</b>	-	<b>Colour</b>	Brown	<b>Texture</b>	Loamy Sandy Clay
<b>GEOLOGY</b>													
<b>Source</b>	M	<b>Reliability</b>	L	<b>Code</b>	F		<b>Map Unit</b>	Qhcd					
<b>SPECHT STRUCTURE CODE</b>													
Open Forest													
<b>GROUND (%)</b>													
<b>Litter</b>	60	<b>Rock</b>	0	<b>Bare ground</b>	0	<b>Cryptophyte</b>	0	<b>Vegetation</b>	40				
<b>RAINFOREST</b>													
<b>Struct. Complexity</b>	-	<b>Leaf Size</b>	-	<b>Leaf fall</b>	-	<b>Floor Comp</b>	-	<b>In. Gr Forms</b>	-				
<b>DISTURBANCE</b>													
<b>Storm damage (Proportion/Age)</b>	0			<b>Road Works (Proportion/Age)</b>	0								
<b>Fire (Proportion/Age/Height)</b>	0			<b>Salinity</b>	0								
<b>Logging (#)</b>	N			<b>Ringbarking /Thinning (#)</b>	N								
<b>Grazing</b>	N			<b>Feral Digging</b>	N								
<b>Weeds (% Cover)</b>	<5%			<b>Remnant</b>	Y								
<b>Erosion (Type/Severity)</b>	0												

SITE NUMBER		98				continued	
STRUCTURAL SUMMARY							
Stratum	Height Range in Strata (m)	Median Height (m)	Cover (%) (100m transect)	Species			
Emergent	-	-	-	-			
Tree 1	10-16	15	54.5	<i>Corymbia clarksoniana</i> <i>Eucalyptus camaldulensis</i> <i>Eucalyptus tereticornis</i>			
Tree 2	4-10	7	66	<i>Alphitonia excelsa</i> <i>Banksia integrifolia</i> subsp. <i>compar</i> <i>Lophostemon confertus</i> <i>Planchonia careya</i>			
Tree 3	-	-	-	-			
Shrub 1	2-3	3	-	<i>Acronvchia laevis</i>			



				<i>Breynia oblongifolia</i> <i>Lantana camara</i> *
Shrub 2	0.5-1	1	-	<i>Opuntia stricta</i> * <i>Xanthorrhoea latifolia</i>
Ground	0-0.5	0.5	-	<i>Cenchrus echinatus</i> * <i>Chamaecrista concinna</i> <i>Dianella caerulea</i> var. <i>protensa</i> <i>Eriachne pallescens</i> <i>Imperata cylindrica</i> <i>Melinis minutiflora</i> * <i>Melinis repens</i> * <i>Neptunia gracilis</i> <i>Oplismenus aemulus</i> <i>Passiflora suberosa</i> * <i>Xanthorrhoea latifolia</i>

Deleted: ¶

BASAL AREA & STEM COUNTS													
Species	Basal area for plot (50X10m)					Volume/ha		Stem count for plot (50X10m)					
	E	T1	T2	T3	S1	T1	T2	E	T1	T2	T3	S1	S2
<i>Eucalyptus tereticornis</i>		1							1				
<i>Eucalyptus camaldulensis</i>		3							2			1	
<i>Lophostemon confertus</i>			5						2	14		2	1
<i>Alphitonia excelsa</i>			1							12		3	2
<i>Lantana camara</i> *												3	
<i>Planchonia careya</i>			3							6			2
<i>Acacia disparrima</i> subsp. <i>disparrima</i>			1							1		1	
<i>Corymbia clarksoniana</i>		2							1	1			
<i>Breynia oblongifolia</i>												20	12
<i>Ficus obliqua</i>			1							1			
<i>Allocasuarina littoralis</i>												3	
<i>Opuntia stricta</i> *												1	
<i>Glochidion lobocarpum</i>												1	


CANOPY COVER DATA (100m TRANSECT)			
Canopy Start (m)	Canopy finish (m)	Species	Strata
0	3	<i>Eucalyptus tereticornis</i>	T1
0	6.5	<i>Lophostemon confertus</i>	T2
2	3.5	<i>Alphitonia excelsa</i>	T2
3.5	5	<i>Planchonia careya</i>	T2
8.5	20	<i>Lophostemon confertus</i>	T2
8.5	15	<i>Eucalyptus camaldulensis</i>	T1
20	20.5	<i>Alphitonia excelsa</i>	T2
21	32	<i>Lophostemon confertus</i>	T2
26.5	38	<i>Eucalyptus camaldulensis</i>	T1
34.5	38	<i>Alphitonia excelsa</i>	T2



44	48	<i>Alphitonia excelsa</i>	T2
43.5	44	<i>Lophostemon confertus</i>	T2
56	58.5	<i>Alphitonia excelsa</i>	T2
59	70.5	<i>Lophostemon confertus</i>	T2
64	69.5	<i>Eucalyptus tereticornis</i>	T1
70	84.5	<i>Eucalyptus camaldulensis</i>	T1
71	77	<i>Lophostemon confertus</i>	T2
84.5	98	<i>Corymbia clarksoniana</i>	T1
86	100	<i>Lophostemon confertus</i>	T2



# Tertiary

<b>SITE NUMBER</b>	99		
<b>LEVEL</b>	3		
<b>DETAIL SP. LIST</b>	Y		
<b>REGIONAL ECOSYSTEM</b>	8.11.8a		
<b>DATE</b>	24/09/2010		
<b>RECORDER</b>	David Francis & Julia Olsen		
<b>LOCALITY</b>	Great Keppel Island		
<b>SITE DESCRIPTION</b>	Corymbia citriodora open forest		
<b>GENERAL NOTES</b>			
<b>COMMUNITY AREA (ha)</b>	20-50	<b>COMMUNITY WIDTH (m)</b>	75-150
<b>MAPPED (Current RE)</b>	8.2.8a	<b>REFERENCE SITE</b>	N
<b>LANDFORM</b>			
<b>Situation</b>	F	<b>Element</b>	HSL
<b>Eros pattern</b>	UL	<b>Pattern</b>	HIL
<b>SLOPE</b>			
<b>Type</b>	M	<b>Slope (%)</b>	5%
<b>Aspect (°)</b>	260		
<b>SOILS</b>			
<b>Source</b>	S	<b>Reliability</b>	M
<b>Code</b>	A/K	<b>Add data</b>	-
<b>ISB/MU</b>	-	<b>Colour</b>	Brown
<b>Texture</b>	Sandy Clay		
<b>GEOLOGY</b>			
<b>Source</b>	I	<b>Reliability</b>	L
<b>Code</b>	F	<b>Map Unit</b>	Qhcd
<b>SPECHT STRUCTURE CODE</b>			
Open Forest			
<b>GROUND (%)</b>			
<b>Litter</b>	40	<b>Rock</b>	0
<b>Bare ground</b>	20	<b>Cryptophyte</b>	0
<b>Vegetation</b>	40		
<b>RAINFOREST</b>			
<b>Struct. Complexity</b>	-	<b>Leaf Size</b>	-
<b>Leaf fall</b>	-	<b>Floor Comp</b>	-
<b>In. Gr Forms</b>	-		
<b>DISTURBANCE</b>			
<b>Storm damage (Proportion/Age)</b>	0	<b>Road Works (Proportion/Age)</b>	0
<b>Fire (Proportion/Age/Height)</b>	0	<b>Salinity</b>	0
<b>Logging (#)</b>	N	<b>Ringbarking /Thinning (#)</b>	N
<b>Grazing</b>	N	<b>Feral Digging</b>	N
<b>Weeds (% Cover)</b>	0	<b>Remnant</b>	Y
<b>Erosion (Type/Severity)</b>	0		


SITE NUMBER		99				continued	
STRUCTURAL SUMMARY							
Stratum	Height Range in Strata (m)	Median Height (m)	Cover (%) (100m transect)	Species			
Emergent	-	-	-	-			
Tree 1	10-16	15	-	Corymbia citriodora subsp. citriodora Eucalyptus crebra Eucalyptus exserta			
Tree 2	3-5	4	-	Acacia leiocalyx subsp. leiocalyx Alphitonia excelsa			
Tree 3	-	-	-	-			
Shrub 1	0.5-1.5	1	-	Acacia leiocalyx subsp. leiocalyx Breynia oblongifolia Wikstroemia indica			
Shrub 2	-	-	-	-			
Ground	0-0.5	0.5	-	Amyema conspicua subsp. conspicua			



[illegible]



## Tertiary

<b>SITE NUMBER</b>	103		
<b>LEVEL</b>	3		
<b>DETAIL SP. LIST</b>	Y		
<b>REGIONAL ECOSYSTEM</b>	8.2.8a		
<b>DATE</b>	24/09/2010		
<b>RECORDER</b>	David Francis & Julia Olsen		
<b>LOCALITY</b>	Great Keppel Island		
<b>SITE DESCRIPTION</b> <i>Corymbia clarksoniana</i> open forest			
<b>GENERAL NOTES</b>			
<b>COMMUNITY AREA (ha)</b>	20-50	<b>COMMUNITY WIDTH (m)</b>	75-150
<b>MAPPED (Current RE)</b>	8.2.8a	<b>REFERENCE SITE</b>	N
<b>LANDFORM</b>			
<b>Situation</b>	F	<b>Element</b>	HSL
<b>Eros pattern</b>	UL	<b>Pattern</b>	HIL
<b>SLOPE</b>			
<b>Type</b>	M	<b>Slope (%)</b>	35
<b>Aspect (°)</b>			
<b>SOILS</b>			
<b>Source</b>	S	<b>Reliability</b>	M
<b>Code</b>	D	<b>Add data</b>	-
<b>ISB/MU</b>	-	<b>Colour</b>	Dark Brown
<b>Texture</b>	Loamy Sand		
<b>GEOLOGY</b>			
<b>Source</b>	M	<b>Reliability</b>	L
<b>Code</b>	F	<b>Map Unit</b>	Qchd
<b>SPECHT STRUCTURE CODE</b>			
<b>GROUND (%)</b>			
<b>Litter</b>	40	<b>Rock</b>	0
<b>Bare ground</b>	0	<b>Cryptophyte</b>	0
<b>Vegetation</b>	60		
<b>RAINFOREST</b>			
<b>Struct. Complexity</b>	-	<b>Leaf Size</b>	-
<b>Leaf fall</b>	-	<b>Floor Comp</b>	-
<b>In. Gr Forms</b>	-		
<b>DISTURBANCE</b>			
<b>Storm damage (Proportion/Age)</b>	0	<b>Road Works (Proportion/Age)</b>	0
<b>Fire (Proportion/Age/Height)</b>	0	<b>Salinity</b>	0
<b>Logging (#)</b>	Y	<b>Ringbarking /Thinning (#)</b>	N
<b>Grazing</b>	N	<b>Feral Digging</b>	N
<b>Weeds (% Cover)</b>	1%	<b>Remnant</b>	Y
<b>Erosion (Type/Severity)</b>	0		

SITE NUMBER		103			continued
STRUCTURAL SUMMARY					
Stratum	Height Range in Strata (m)	Median Height (m)	Cover (%) (100m transect)	Species	
Emergent	-	-	-	-	
Tree 1	7-12	8	-	<i>Allocasuarina littoralis</i> <i>Corymbia clarksoniana</i>	
Tree 2	3-5	4	-	<i>Allocasuarina littoralis</i> <i>Banksia integrifolia</i> subsp. <i>compar</i> <i>Grevillea banksii</i> <i>Petalostigma pubescens</i>	
Tree 3	-	-	-	-	
Shrub 1	2-3	2	-	<i>Acacia disparrima</i> subsp. <i>disparrima</i> <i>Acacia julifera</i> subsp. <i>julifera</i> <i>Grevillea banksii</i> <i>Xanthorrhoea latifolia</i>	




[illegible]



# Vegetation Mapping Records - Great Keppel Island

## February 2011

<b>SITE NUMBER</b>	16												
<b>LEVEL</b>	2												
<b>DETAIL SP. LIST</b>	Y												
<b>REGIONAL ECOSYSTEM</b>	8.2.7e												
<b>DATE</b>	21/09/2010												
<b>RECORDER</b>	David Francis												
<b>LOCALITY</b>	Great Keppel Island												
<b>SITE DESCRIPTION</b>	<i>Corymbia clarksoniana</i> and <i>Melaleuca dealbata</i> open forest												
<b>GENERAL NOTES</b>													
<b>COMMUNITY AREA (ha)</b>			5-20			<b>COMMUNITY WIDTH (m)</b>			Not linear				
<b>MAPPED (Current RE)</b>			8.2.7e			<b>REFERENCE SITE</b>							
<b>LANDFORM</b>													
<b>Situation</b>	R	<b>Element</b>		<b>Eros pattern</b>	LP	<b>Pattern</b>		<b>BEA</b>					
<b>SLOPE</b>													
<b>Type</b>	VG	<b>Slope (%)</b>	<5%			<b>Aspect (°)</b>	280						
<b>SOILS</b>													
<b>Source</b>	S	<b>Reliability</b>	L	<b>Code</b>	A	<b>Add data</b>	-	<b>ISB/MU</b>	-	<b>Colour</b>	B	<b>Texture</b>	F
<b>GEOLOGY</b>													
<b>Source</b>	0	<b>Reliability</b>	L	<b>Code</b>	F			<b>Map Unit</b>	Qhcb				
<b>SPECHT STRUCTURE CODE</b>						Open Forest							
<b>GROUND (%)</b>													
<b>Litter</b>		<b>Rock</b>		<b>Bare ground</b>		<b>Cryptophyte</b>		<b>Vegetation</b>					
<b>RAINFOREST</b>													
<b>Struct. Complexity</b>	-	<b>Leaf Size</b>	-	<b>Leaf fall</b>	-	<b>Floor Comp</b>	-	<b>In. Gr Forms</b>	-				
<b>DISTURBANCE</b>													
<b>Storm damage (Proportion/Age)</b>		1/2		<b>Road Works (Proportion/Age)</b>		0							
<b>Fire (Proportion/Age/Height)</b>		0		<b>Salinity</b>		0							
<b>Logging (#)</b>		-		<b>Ringbarking /Thinning (#)</b>		-							
<b>Grazing</b>		N		<b>Feral Digging</b>		N							
<b>Weeds (% Cover)</b>		0		<b>Remnant</b>		Y							
<b>Erosion (Type/Severity)</b>		0											

SITE NUMBER		16			continued
STRUCTURAL SUMMARY					
Stratum	Height Range in Strata (m)	Median Height (m)	Cover (%) (100m transect)	Species	
Emergent	-	-	-	-	
Tree 1	8-15	13	51	<i>Corymbia clarksoniana</i> <i>Leptospermum neglectum</i> <i>Melaleuca dealbata</i>	
Tree 2	3-6	5	51	<i>Allocasuarina littoralis</i> <i>Banksia integrifolia</i> <i>Dodonaea viscosa</i>	



Tree 3				-
Shrub 1	1-2	2		<i>Dodonaea viscosa</i> <i>Lantana camara</i> *
Shrub 2				-
Ground/ vines/ epiphytes/ mistletoes				<i>Abrus precatorius</i> <i>Dianella caerulea</i> <i>Eriachne pallescens</i> subsp. <i>pallescens</i> <i>Cyperus stradbrogensis</i> <i>Imperata cylindrica</i> <i>Lomandra longifolia</i> <i>Oplismenus hirtellus</i> <i>Passiflora suberosa</i> *




BASAL AREA & STEM COUNTS													
Species	Basal area for plot (50X10m)					Volume/ha		Stem count for plot (50X10m)					
	E	T1	T2	T3	S1	T1	T2	E	T1	T2	T3	S1	S2
<i>Acacia disparrima</i>												1	
<i>Allocasuarina littoralis</i>			1							19		1	
<i>Alphitonia excelsa</i>			4							4		11	
<i>Banksia integrifolia</i>			1						2	3		2	
<i>Breynia oblongifolia</i>													3
<i>Corymbia clarksoniana</i>													
<i>Dodonaea viscosa</i>			1							8		27	2
<i>Lantana camara</i>												2	3
<i>Leptospermum neglectum</i>		1											
<i>Melaleuca dealbata</i>													
<i>Melaleuca quinquenervia</i>									2				
<i>Opuntia stricta</i>												1	
<i>Planchonia careya</i>													1

CANOPY COVER DATA (100m TRANSECT)			
Canopy Start (m)	Canopy finish (m)	Species	Strata
0	2.5	<i>Dodonaea viscosa</i>	T2
1	6.5	<i>Allocasuarina littoralis</i>	T2
2	20.5	<i>Corymbia clarksoniana</i>	T1
6	6.5	<i>Dodonaea viscosa</i>	T2
8	12	<i>Allocasuarina littoralis</i>	T2
13.5	20.5	<i>Dodonaea viscosa</i>	T2
26	28	<i>Dodonaea viscosa</i>	T2
28.5	32	<i>Alphitonia excelsa</i>	T2
32.5	54.5	<i>Allocasuarina littoralis</i>	T2
34	37	<i>Dodonaea viscosa</i>	T2
36	41.5	<i>Melaleuca quinquenervia</i>	T1
40.5	43	<i>Allocasuarina littoralis</i>	T2
42.5	51	<i>Banksia integrifolia</i>	T1
52.5	58	<i>Acacia disparrima</i>	T1
63	67	<i>Planchonia careya</i>	T2
89	77	<i>Melaleuca dealbata</i>	T1
89	72.5	<i>Banksia integrifolia</i>	T2
77	84	<i>Allocasuarina littoralis</i>	T2
95.5	98.5	<i>Allocasuarina littoralis</i>	T2



# REFERENCE SITE FOR 8.11.10

<b>SITE NUMBER</b>	52
<b>LEVEL</b>	2
<b>DETAIL SP. LIST</b>	A
<b>REGIONAL ECOSYSTEM</b>	8.11.10
<b>DATE</b>	14/2/11
<b>RECORDER</b>	David Francis & Dan Potter
<b>LOCALITY</b>	Great Keppel Island



<b>SITE DESCRIPTION</b>	<i>Lophostemon confertus</i> low closed forest												
<b>GENERAL NOTES</b>													
<b>COMMUNITY AREA (ha)</b>	>50ha				<b>COMMUNITY WIDTH (m)</b>	Not linear							
<b>MAPPED (Current RE)</b>	8.11.10/8.12.14 x 2c				<b>REFERENCE SITE</b>	Y							
<b>LANDFORM</b>													
<b>Situation</b>	F	<b>Element</b>	FOO	<b>Eros pattern</b>	UL	<b>Pattern</b>	HIL						
<b>SLOPE</b>													
<b>Type</b>	VG	<b>Slope (%)</b>	1-3%		<b>Aspect (°)</b>	130							
<b>SOILS</b>													
<b>Source</b>	S	<b>Reliability</b>	L	<b>Code</b>	H	<b>Add data</b>	-	<b>ISB/MU</b>	-	<b>Colour</b>	F	<b>Texture</b>	B
<b>GEOLOGY</b>													
<b>Source</b>	O	<b>Reliability</b>	L	<b>Code</b>	O	<b>Map Unit</b>	Ccs						
<b>SPECHT STRUCTURE CODE</b>	Low Closed Forest												
<b>GROUND (%)</b>													
<b>Litter</b>	30	<b>Rock</b>	-	<b>Bare ground</b>	0	<b>Cryptophyte</b>	0	<b>Vegetation</b>	70				
<b>RAINFOREST</b>													
<b>Struct. Complexity</b>	-	<b>Leaf Size</b>	-	<b>Leaf fall</b>	-	<b>Floor Comp</b>	-	<b>In. Gr Forms</b>	-				
<b>DISTURBANCE</b>													
<b>Storm damage (Proportion/Age)</b>	0				<b>Road Works (Proportion/Age)</b>	N							
<b>Fire (Proportion/Age/Height)</b>	0				<b>Salinity</b>	0							
<b>Logging (#)</b>	0				<b>Ringbarking /Thinning (#)</b>	0							
<b>Grazing</b>	N				<b>Feral Digging</b>	N							
<b>Weeds (% Cover)</b>	0				<b>Remnant</b>								
<b>Erosion (Type/Severity)</b>	0												


SITE NUMBER		52	continued		
STRUCTURAL SUMMARY					
Stratum	Height Range in Strata (m)	Median Height (m)	Cover (%) (100m transect)	Species	
Emergent	-	-	-	-	
Tree 1	3-6	5	90.5	<i>Lophostemon confertus</i> (D) <i>Lophostemon suaveolens</i> (A) <i>Melaleuca nervosa</i> (S)	
Tree 2	1-2	1.5	-	<i>Diospyros geminata</i> <i>Glochidion lobocarpum</i> <i>Scolopia braunii</i>	
Tree 3					
Shrub 1					
Shrub 2					
Ground/ vines/ epiphytes/ mistletoes	0.5-1	0.5	-	<i>Digitaria ramularis</i> <i>Enteropogon unispiceus</i> <i>Gahnia aspera</i> <i>Lepidosperma laterale</i>	



					<i>Lomandra filiformis</i> <i>Lomandra leucocephala</i> <i>Oplismenus hirtellus</i> <i>Panicum effusum</i> <i>Xanthorrhoea latifolia</i>								
BASAL AREA & STEM COUNTS													
Species	Basal area for plot (50X10m)					Volume/ha		Stem count for plot (50X10m)					
	E	T1	T2	T3	S1	T1	T2	E	T1	T2	T3	S1	S2
<i>Acacia disparrima</i>												7	
<i>Corymbia clarksoniana</i>		1											
<i>Eucalyptus crebra</i>		1											1
<i>Glochidion lobocarpum</i>												1	1
<i>Lophostemon confertus</i>		19							20				
<i>Lophostemon suaveolens</i>		1							6				
<i>Melaleuca nervosa</i>									2				

CANOPY COVER DATA (100m TRANSECT)			
Canopy Start (m)	Canopy finish (m)	Species	Strata
0	7.5	<i>Lophostemon confertus</i>	T1
7.5	17.5	<i>Melaleuca nervosa</i>	T1
17	32.5	<i>Lophostemon confertus</i>	T1
34	43.5	<i>Lophostemon confertus</i>	T1
43.5	44	<i>Lophostemon suaveolens</i>	T1
44	88.5	<i>Lophostemon confertus</i>	T1
55	62	<i>Alphitonia excelsa</i>	T1
68	70.5	<i>Lophostemon suaveolens</i>	T1
88	90	<i>Acacia disparrima</i>	T1
96	98	<i>Acacia disparrima</i>	T1



<b>SITE NUMBER</b>	55												
<b>LEVEL</b>	2												
<b>DETAIL SP. LIST</b>	A												
<b>REGIONAL ECOSYSTEM</b>													
<b>DATE</b>	15/2/11												
<b>RECORDER</b>	David Francis & Dan Potter												
<b>LOCALITY</b>	Great Keppel Island												
<b>SITE DESCRIPTION</b>	<i>Acacia julifera</i> regrowth												
<b>GENERAL NOTES</b>													
<b>COMMUNITY AREA (ha)</b>		>50ha				<b>COMMUNITY WIDTH (m)</b>		Not linear					
<b>MAPPED (Current RE)</b>		8.2.8a				<b>REFERENCE SITE</b>		N					
<b>LANDFORM</b>													
<b>Situation</b>	T	<b>Element</b>	FOO		<b>Eros pattern</b>	UH		<b>Pattern</b>	HIL				
<b>SLOPE</b>													
<b>Type</b>	GE		<b>Slope (%)</b>		3-10%		<b>Aspect (°)</b>		30				
<b>SOILS</b>													
<b>Source</b>	S	<b>Reliability</b>	L	<b>Code</b>	A	<b>Add data</b>	-	<b>ISB/MU</b>	-	<b>Colour</b>	B	<b>Texture</b>	F
<b>GEOLOGY</b>													
<b>Source</b>	O	<b>Reliability</b>	L	<b>Code</b>	F		<b>Map Unit</b>	Qhcb					
<b>SPECHT STRUCTURE CODE</b>						Low Closed Forest							
<b>GROUND (%)</b>													
<b>Litter</b>		<b>Rock</b>		<b>Bare ground</b>		<b>Cryptophyte</b>		<b>Vegetation</b>					
<b>RAINFOREST</b>													
<b>Struct. Complexity</b>	-	<b>Leaf Size</b>	-	<b>Leaf fall</b>	-	<b>Floor Comp</b>	-	<b>In. Gr Forms</b>	-				
<b>DISTURBANCE</b>													
<b>Storm damage (Proportion/Age)</b>		0				<b>Road Works (Proportion/Age)</b>		0					
<b>Fire (Proportion/Age/Height)</b>		0				<b>Salinity</b>		0					
<b>Logging (#)</b>		0				<b>Ringbarking /Thinning (#)</b>		0					
<b>Grazing</b>		N				<b>Feral Digging</b>		N					
<b>Weeds (% Cover)</b>		0				<b>Remnant</b>		N					
<b>Erosion (Type/Severity)</b>		0											

SITE NUMBER		55			continued
STRUCTURAL SUMMARY					
Stratum	Height Range in Strata (m)	Median Height (m)	Cover (%) (100m transect)	Species	
Emergent	-	-	-	-	
Tree 1	5-10	7	87.5	Acacia julifera (D) Allocasuarina littoralis (C) Alphitonia excelsa (S)	
Tree 2	1-3	3		Alphitonia excelsa Grevillea banksii	
Tree 3					
Shrub 1	1-1.5	1	3	Alphitonia excelsa	
Shrub 2	0.5-1	0.5		Lithomyrtus obtusa	
Ground/ vines/ epiphytes/ mistletoes				Cenchrus echinatus* Eriachne pallescens Gahnia aspera	




[illegible]

CANOPY COVER DATA (100m TRANSECT)			
Canopy Start (m)	Canopy finish (m)	Species	Strata
0	17	<i>Acacia julifera</i>	T1
18.5	20.5	<i>Acacia julifera</i>	T1
21.5	22.5	<i>Acacia julifera</i>	T1
27.5	30	<i>Acacia julifera</i>	T1
30.5	43.5	<i>Acacia julifera</i>	T1
32.5	34	<i>Leptospermum neglectum</i>	S1
34.5	36	<i>Alphitonia excelsa</i>	T1
40	41.5	<i>Alphitonia excelsa</i>	T1
43.5	46	<i>Alphitonia excelsa</i>	T1
44	47	<i>Allocasuarina littoralis</i>	T1
47.5	49	<i>Alphitonia excelsa</i>	S1
50	60.5	<i>Alphitonia excelsa</i>	T1
50	55	<i>Petalostigma pubescens</i>	T1
57	80	<i>Acacia julifera</i>	T1
67.5	68.5	<i>Allocasuarina littoralis</i>	T1
82	84	<i>Acacia julifera</i>	T1
84	86.5	<i>Allocasuarina littoralis</i>	T1
86.5	100	<i>Acacia julifera</i>	T1



# REFERENCE SITE FOR 8.2.6a

<b>SITE NUMBER</b>	61
<b>LEVEL</b>	2
<b>DETAIL SP. LIST</b>	A
<b>REGIONAL ECOSYSTEM</b>	8.2.6a
<b>DATE</b>	15/2/11
<b>RECORDER</b>	David Francis & Dan Potter
<b>LOCALITY</b>	Great Keppel Island



<b>SITE DESCRIPTION</b>	Corymbia tessellaris and Corymbia clarksoniana open forest												
<b>GENERAL NOTES</b>													
<b>COMMUNITY AREA (ha)</b>	>50ha				<b>COMMUNITY WIDTH (m)</b>	Not linear							
<b>MAPPED (Current RE)</b>	8.2.8a				<b>REFERENCE SITE</b>	Y							
<b>LANDFORM</b>													
<b>Situation</b>	T	<b>Element</b>	FOO	<b>Eros pattern</b>	UH	<b>Pattern</b>	HIL						
<b>SLOPE</b>													
<b>Type</b>	MO	<b>Slope (%)</b>	10-32%		<b>Aspect (°)</b>	320							
<b>SOILS</b>													
<b>Source</b>	S	<b>Reliability</b>	L	<b>Code</b>	A	<b>Add data</b>	-	<b>ISB/MU</b>	-	<b>Colour</b>	B	<b>Texture</b>	F
<b>GEOLOGY</b>													
<b>Source</b>	O	<b>Reliability</b>	L	<b>Code</b>	F	<b>Map Unit</b>	Qchb						
<b>SPECHT STRUCTURE CODE</b>	Open Forest												
<b>GROUND (%)</b>													
<b>Litter</b>		<b>Rock</b>		<b>Bare ground</b>		<b>Cryptophyte</b>		<b>Vegetation</b>					
<b>RAINFOREST</b>													
<b>Struct. Complexity</b>	-	<b>Leaf Size</b>	-	<b>Leaf fall</b>	-	<b>Floor Comp</b>	-	<b>In. Gr Forms</b>	-				
<b>DISTURBANCE</b>													
<b>Storm damage (Proportion/Age)</b>	0				<b>Road Works (Proportion/Age)</b>	0							
<b>Fire (Proportion/Age/Height)</b>	0				<b>Salinity</b>	0							
<b>Logging (#)</b>	0				<b>Ringbarking /Thinning (#)</b>	0							
<b>Grazing</b>	N				<b>Feral Digging</b>	N							
<b>Weeds (% Cover)</b>	0				<b>Remnant</b>								
<b>Erosion (Type/Severity)</b>	0												

SITE NUMBER		61			continued
STRUCTURAL SUMMARY					
Stratum	Height Range in Strata (m)	Median Height (m)	Cover (%) (100m transect)	Species	
Emergent	-	-	-	-	
Tree 1	18-22	16	72.3	<i>Corymbia clarksoniana</i> (D) <i>Corymbia tessellaris</i> (S)	
Tree 2	4-8	7	55.5	<i>Allocasuarina littoralis</i> (S) <i>Alphitonia excelsa</i> (A) <i>Banksia integrifolia</i> (D) <i>Planchonia careya</i>	
Tree 3					
Shrub 1	1-3	2		<i>Grevillea banksii</i>	
Shrub 2	0.5-1	1		<i>Breynia oblongifolia</i> <i>Trema tomentosa</i>	
Ground/ vines/ epiphytes/ mistletoes				<i>Abrus precatorius</i> <i>Eriachne pallescens</i>	




															<i>Imperata cylindrica</i> <i>Jasminum didymum</i> <i>Passiflora suberosa</i> * <i>Stachytarpheta jamaicensis</i> * <i>Triumfetta rhomboidea</i> <i>Xanthorrhoea latifolia</i>
BASAL AREA & STEM COUNTS															
Species	Basal area for plot (50X10m)					Volume/ha		Stem count for plot (50X10m)							
	E	T1	T2	T3	S1	T1	T2	E	T1	T2	T3	S1	S2		
<i>Acacia disparrima</i>			1							1			1		
<i>Allocasuarina littoralis</i>										1					
<i>Alphitonia excelsa</i>			3												
<i>Banksia integrifolia</i>			3							12		3	1		
<i>Breynia oblongifolia</i>												4	5		
<i>Corymbia clarksoniana</i>		3							4						
<i>Corymbia tessellaris</i>									1						
<i>Ficus opposita</i>												1			
<i>Grevillea banksii</i>										1		2			
<i>Planchonia careya</i>			1							2		4			
<i>Trema tomentosa</i>															

CANOPY COVER DATA (100m TRANSECT)			
Canopy Start (m)	Canopy finish (m)	Species	Strata
0	2.5	<i>Banksia integrifolia</i>	T2
0	10	<i>Corymbia clarksoniana</i>	T1
0	9.5	<i>Corymbia tessellaris</i>	T1
6.5	11	<i>Banksia integrifolia</i>	T2
11.5	23.5	<i>Alphitonia excelsa</i>	T2
16	27	<i>Corymbia clarksoniana</i>	T1
24	32.5	<i>Banksia integrifolia</i>	T2
28	70	<i>Corymbia clarksoniana</i>	T1
31.5	35.5	<i>Planchonia careya</i>	T2
38.5	39.5	<i>Banksia integrifolia</i>	T2
42	44	<i>Banksia integrifolia</i>	T2
47	50	<i>Banksia integrifolia</i>	T2
50	52.5	<i>Grevillea banksii</i>	T2
59	61.5	<i>Banksia integrifolia</i>	T2
64	67	<i>Allocasuarina littoralis</i>	T2
69.5	78	<i>Allocasuarina littoralis</i>	T2
72.5	75.8	<i>Corymbia clarksoniana</i>	T1
79	82.5	<i>Corymbia clarksoniana</i>	T2
92	100	<i>Corymbia clarksoniana</i>	T1



## REFERENCE FOR RE 8.3.13c

<b>SITE NUMBER</b>	71
<b>LEVEL</b>	2
<b>DETAIL SP. LIST</b>	A
<b>REGIONAL ECOSYSTEM</b>	8.3.13c
<b>DATE</b>	16/2/11
<b>RECORDER</b>	David Francis & Dan Potter
<b>LOCALITY</b>	Great Keppel Island



<b>SITE DESCRIPTION</b>	Melaleuca quinquenervia open forest												
<b>GENERAL NOTES</b>													
<b>COMMUNITY AREA (ha)</b>								<b>COMMUNITY WIDTH (m)</b>		Non linear			
<b>MAPPED (Current RE)</b>				8.3.13c				<b>REFERENCE SITE</b>		Y			
<b>LANDFORM</b>													
<b>Situation</b>	B			<b>Element</b>	VLF			<b>Eros pattern</b>	LP		<b>Pattern</b>	SAN	
<b>SLOPE</b>													
<b>Type</b>	VG			<b>Slope (%)</b>	1-3%			<b>Aspect (°)</b>	260				
<b>SOILS</b>													
<b>Source</b>	S	<b>Reliability</b>	L	<b>Code</b>	A	<b>Add data</b>	-	<b>ISB/MU</b>	-	<b>Colour</b>	I	<b>Texture</b>	F
<b>GEOLOGY</b>													
<b>Source</b>	O	<b>Reliability</b>	L	<b>Code</b>	F	<b>Map Unit</b>	Qe/m - Qa						
<b>SPECHT STRUCTURE CODE</b>													
Open Forest													
<b>GROUND (%)</b>													
<b>Litter</b>				<b>Rock</b>				<b>Bare ground</b>			<b>Cryptophyte</b>		
<b>RAINFOREST</b>													
<b>Struct. Complexity</b>	-	<b>Leaf Size</b>	-	<b>Leaf fall</b>	-			<b>Floor Comp</b>	-	<b>In. Gr Forms</b>	-		
<b>DISTURBANCE</b>													
<b>Storm damage (Proportion/Age)</b>	0			<b>Road Works (Proportion/Age)</b>	0								
<b>Fire (Proportion/Age/Height)</b>	0			<b>Salinity</b>	0								
<b>Logging (#)</b>	0			<b>Ringbarking /Thinning (#)</b>	0								
<b>Grazing</b>	N			<b>Feral Digging</b>	N								
<b>Weeds (% Cover)</b>	<5			<b>Remnant</b>									
<b>Erosion (Type/Severity)</b>	0												

SITE NUMBER		71			continued
STRUCTURAL SUMMARY					
Stratum	Height Range in Strata (m)	Median Height (m)	Cover (%) (100m transect)	Species	
Emergent	-	-	-	-	
Tree 1	11-16	15	68	Melaleuca quinquenervia	
Tree 2	4-10	8	52	Alphitonia excelsa Planchonia careya Timonius timon	
Tree 3					
Shrub 1	1-3	2		Ficus hispida	
Shrub 2	0.5-1	0.5			
Ground/ vines/ epiphytes/ mistletoes				Baumea juncea Bidens bipinnata* Blechnum indicum Eriachne pallescens	



				<i>Imperata cylindrica</i> <i>Megathyrsus maximus*</i> <i>Melinis minutiflora*</i> <i>Oplismenus hirtellus</i> <i>Pteridium esculentum</i> <i>Stephania japonica</i> <i>Triumfetta rhomboidea</i>
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**BASAL AREA & STEM COUNTS**

Species	Basal area for plot (50X10m)					Volume/ha		Stem count for plot (50X10m)					
	E	T1	T2	T3	S1	T1	T2	E	T1	T2	T3	S1	S2
<i>Acacia disparrima</i>			1									1	
<i>Acacia leiocalyx</i>												1	
<i>Alphitonia excelsa</i>										1		2	1
<i>Banksia integrifolia</i>		2							2	2			
<i>Breynia oblongifolia</i>													2
<i>Clerodendron floribundum</i>												1	
<i>Ficus hispida</i>													
<i>Glochidion sumatranum</i>													1
<i>Melaleuca quinquenervia</i>		13							13				
<i>Pittosporum ferrugineum</i>													2
<i>Planchonia careya</i>										2		2	
<i>Timonius timon</i>									1	2			
<i>Trema tomentosa</i>												3	

**CANOPY COVER DATA (100m TRANSECT)**

Canopy Start (m)	Canopy finish (m)	Species	Strata
0	2.5	<i>Banksia integrifolia</i>	T1
0	5	<i>Melaleuca quinquenervia</i>	T1
3	4	<i>Planchonia careya</i>	T2
9.5	39.5	<i>Melaleuca quinquenervia</i>	T1
10.5	15.5	<i>Banksia integrifolia</i>	T2
16	18.5	<i>Alphitonia excelsa</i>	T2
18	20	<i>Banksia integrifolia</i>	T1
43.5	56.5	<i>Timonius timon</i>	T2
45.5	60	<i>Melaleuca quinquenervia</i>	T1
60	69	<i>Planchonia careya</i>	T2
62	100	<i>Melaleuca quinquenervia</i>	T1
67.5	80	<i>Alphitonia excelsa</i>	T2
86	88	<i>Planchonia careya</i>	T2
89.5	100	<i>Alphitonia excelsa</i>	T2



<b>SITE NUMBER</b>	75												
<b>LEVEL</b>	2												
<b>DETAIL SP. LIST</b>	A												
<b>REGIONAL ECOSYSTEM</b>													
<b>DATE</b>	16/2/11												
<b>RECORDER</b>	David Francis & Dan Potter												
<b>LOCALITY</b>	Great Keppel Island												
<b>SITE DESCRIPTION</b>		Acacia low open forest											
<b>GENERAL NOTES</b>													
<b>COMMUNITY AREA (ha)</b>		>50				<b>COMMUNITY WIDTH (m)</b>		Not linear					
<b>MAPPED (Current RE)</b>		8.3.13c				<b>REFERENCE SITE</b>							
<b>LANDFORM</b>													
<b>Situation</b>	B	<b>Element</b>	VLF	<b>Eros pattern</b>	LP	<b>Pattern</b>	SAN						
<b>SLOPE</b>													
<b>Type</b>	GE	<b>Slope (%)</b>	1-3%		<b>Aspect (°)</b>	80							
<b>SOILS</b>													
<b>Source</b>	S	<b>Reliability</b>	L	<b>Code</b>	A	<b>Add data</b>	-	<b>ISB/MU</b>	-	<b>Colour</b>	B	<b>Texture</b>	F
<b>GEOLOGY</b>													
<b>Source</b>	O	<b>Reliability</b>	L	<b>Code</b>	F	<b>Map Unit</b>	Qa						
<b>SPECHT STRUCTURE CODE</b>						Low Open Forest							
<b>GROUND (%)</b>													
<b>Litter</b>		<b>Rock</b>		<b>Bare ground</b>		<b>Cryptophyte</b>		<b>Vegetation</b>					
<b>RAINFOREST</b>													
<b>Struct. Complexity</b>	-	<b>Leaf Size</b>	-	<b>Leaf fall</b>	-	<b>Floor Comp</b>	-	<b>In. Gr Forms</b>	-				
<b>DISTURBANCE</b>													
<b>Storm damage (Proportion/Age)</b>		0		<b>Road Works (Proportion/Age)</b>		0							
<b>Fire (Proportion/Age/Height)</b>		0		<b>Salinity</b>		0							
<b>Logging (#)</b>		0		<b>Ringbarking /Thinning (#)</b>		0							
<b>Grazing</b>		N		<b>Feral Digging</b>		N							
<b>Weeds (% Cover)</b>		<5		<b>Remnant</b>		N							
<b>Erosion (Type/Severity)</b>		0											

SITE NUMBER		75	continued		
STRUCTURAL SUMMARY					
Stratum	Height Range in Strata (m)	Median Height (m)	Cover (%) (100m transect)	Species	
Emergent	-	-	-	-	
Tree 1	6-13	7	78.5	Acacia disparrima Acacia leiocalyx (D) Melaleuca quinquenervia Melaleuca viridiflora	
Tree 2	2-5	4	0.5	Acacia disparrima Acacia leiocalyx	
Tree 3					
Shrub 1				Lantana camara*	
Shrub 2					
Ground/ vines/ epiphytes/ mistletoes					
BASAL AREA & STEM COUNTS					
		Basal area for plot		Volume/ha	
				Stem count for plot (50X10m)	




Species	(50X10m)												
	E	T1	T2	T3	S1	T1	T2	E	T1	T2	T3	S1	S2
<i>Acacia leiocalyx</i>		5							13				
<i>Acacia disparrima</i>		1							3	2			
<i>Acacia leiocalyx</i>									8	1		3	1
<i>Alphitonia excelsa</i>									1				
<i>Breynia oblongifolia</i>													1
<i>Corymbia clarksoniana</i>									3				
<i>Corymbia tessellaris</i>										1			
<i>Ficus opposita</i>												2	
<i>Lantana camara*</i>													
<i>Lithomyrtus obtusa</i>													1
<i>Melaleuca dealbata</i>		1							1	1		2	
<i>Melaleuca quinquenervia</i>		1							3				

CANOPY COVER DATA (100m TRANSECT)			
Canopy Start (m)	Canopy finish (m)	Species	Strata
0	3.5	<i>Melaleuca quinquenervia</i>	T1
1.5	4.5	<i>Acacia disparrima</i>	T1
5.5	6	<i>Melaleuca viridiflora</i>	T2
6.5	11	<i>Acacia leiocalyx</i>	T1
6.5	8.5	<i>Melaleuca quinquenervia</i>	T1
11.5	13.5	<i>Corymbia tessellaris</i>	T1
14.5	18.5	<i>Acacia leiocalyx</i>	T1
19.5	29.5	<i>Acacia leiocalyx</i>	T1
29.5	33	<i>Acacia disparrima</i>	T1
33	37.5	<i>Acacia leiocalyx</i>	T1
37	46	<i>Corymbia clarksoniana</i>	T1
37.5	41.5	<i>Acacia leiocalyx</i>	T1
41	43	<i>Acacia disparrima</i>	T1
44	46.5	<i>Acacia leiocalyx</i>	T1
49	53	<i>Acacia disparrima</i>	T1
53.5	55	<i>Acacia leiocalyx</i>	T1
54	63	<i>Acacia disparrima</i>	T1
63	65	<i>Acacia leiocalyx</i>	T1
64.5	69	<i>Alphitonia excelsa</i>	T1
68	72	<i>Acacia leiocalyx</i>	T1
71.5	76.5	<i>Alphitonia excelsa</i>	T1
77.5	78.5	<i>Acacia disparrima</i>	T1
79.5	87.5	<i>Acacia leiocalyx</i>	T1
89.5	94.5	<i>Acacia leiocalyx</i>	T1
89.5	100	<i>Acacia disparrima</i>	T1



<b>SITE NUMBER</b>	77
<b>LEVEL</b>	2
<b>DETAIL SP. LIST</b>	A
<b>REGIONAL ECOSYSTEM</b>	
<b>DATE</b>	16/2/11
<b>RECORDER</b>	David Francis & Dan Potter
<b>LOCALITY</b>	Great Keppel Island



<b>SITE DESCRIPTION</b>	<i>Acacia leiocalyx</i> closed forest												
<b>GENERAL NOTES</b>													
<b>COMMUNITY AREA (ha)</b>	>50			<b>COMMUNITY WIDTH (m)</b>	Not linear								
<b>MAPPED (Current RE)</b>	8.3.13c/non-rem			<b>REFERENCE SITE</b>	no								
<b>LANDFORM</b>													
<b>Situation</b>	B	<b>Element</b>	PLA	<b>Eros pattern</b>	LP	<b>Pattern</b>	PLA						
<b>SLOPE</b>													
<b>Type</b>	GE		<b>Slope (%)</b>	1-3%		<b>Aspect (°)</b>	55						
<b>SOILS</b>													
<b>Source</b>	S	<b>Reliability</b>	L	<b>Code</b>	D	<b>Add data</b>	-	<b>ISB/MU</b>	-	<b>Colour</b>	D	<b>Texture</b>	I
<b>GEOLOGY</b>													
<b>Source</b>	O	<b>Reliability</b>	L	<b>Code</b>	F	<b>Map Unit</b>	Ccs						
<b>SPECHT STRUCTURE CODE</b>	Low Closed Forest												
<b>GROUND (%)</b>													
<b>Litter</b>		<b>Rock</b>		<b>Bare ground</b>		<b>Cryptophyte</b>		<b>Vegetation</b>					
<b>RAINFOREST</b>													
<b>Struct. Complexity</b>	-	<b>Leaf Size</b>	-	<b>Leaf fall</b>	-	<b>Floor Comp</b>	-	<b>In. Gr Forms</b>	-				
<b>DISTURBANCE</b>													
<b>Storm damage (Proportion/Age)</b>	0			<b>Road Works (Proportion/Age)</b>	0								
<b>Fire (Proportion/Age/Height)</b>	0			<b>Salinity</b>	0								
<b>Logging (#)</b>	0			<b>Ringbarking /Thinning (#)</b>	0								
<b>Grazing</b>	N			<b>Feral Digging</b>	N								
<b>Weeds (% Cover)</b>				<b>Remnant</b>	N								
<b>Erosion (Type/Severity)</b>	0												

SITE NUMBER		77			continued
STRUCTURAL SUMMARY					
Stratum	Height Range in Strata (m)	Median Height (m)	Cover (%) (100m transect)	Species	
Emergent	-	-	-	-	
Tree 1	4-8	6	89	Acacia disparrima Acacia leiocalyx Melaleuca nervosa	
Tree 2	2-3.5	2.5	1	Acacia disparrima Acacia leiocalyx Melaleuca nervosa	
Tree 3					
Shrub 1				Lantana camara*	
Shrub 2					
Ground/ vines/ epiphytes/ mistletoes				Megathyrsus maximus* Stephania japonica Stylosanthes humilis	




[illegible]

CANOPY COVER DATA (100m TRANSECT)			
Canopy Start (m)	Canopy finish (m)	Species	Strata
0	13	<i>Acacia leiocalyx</i>	T1
15.5	20	<i>Acacia leiocalyx</i>	T1
20.5	27.5	<i>Acacia disparrima</i>	T1
25.5	29	<i>Melaleuca nervosa</i>	T1
25	30	<i>Acacia leiocalyx</i>	T1
30.5	31	<i>Melaleuca nervosa</i>	T1
30.5	34.5	<i>Acacia disparrima</i>	T1
36	41	<i>Acacia leiocalyx</i>	T1
44	46.5	<i>Melaleuca nervosa</i>	T1
49	54	<i>Acacia leiocalyx</i>	T1
54.5	60	<i>Corymbia tessellaris</i>	T1
55	56	<i>Melaleuca nervosa</i>	T2
56	61	<i>Acacia leiocalyx</i>	T1
61	63	<i>Melaleuca nervosa</i>	T1
63	66.5	<i>Acacia disparrima</i>	T1
65	66.5	<i>Acacia leiocalyx</i>	T1
67	70	<i>Corymbia tessellaris</i>	T1
67	68.5	<i>Acacia leiocalyx</i>	T1
70.5	73	<i>Melaleuca nervosa</i>	T1
70.5	75	<i>Corymbia tessellaris</i>	T1
76	76	<i>Melaleuca nervosa</i>	T1
77.5	78.5	<i>Alphitonia excelsa</i>	T1
79	80	<i>Acacia leiocalyx</i>	T1
82	82	<i>Corymbia tessellaris</i>	T1
84	84	<i>Alphitonia excelsa</i>	T1
93	93	<i>Acacia leiocalyx</i>	T1
94	94	<i>Alphitonia excelsa</i>	T1




## REFERENCE SITE FOR 8.1.1

SITE NUMBER	80												
LEVEL	3												
DETAIL SP. LIST	A												
REGIONAL ECOSYSTEM	8.1.1												
DATE	16/2/11												
RECORDER	David Francis & Dan Potter												
LOCALITY	Great Keppel Island												
SITE DESCRIPTION		Tidal mangrove community											
GENERAL NOTES													
COMMUNITY AREA (ha)		>50ha	COMMUNITY WIDTH (m)		Not linear								
MAPPED (Current RE)		8.1.1	REFERENCE SITE		Y								
LANDFORM													
Situation	V	Element	TDF	Eros pattern	LP	Pattern	TID						
SLOPE													
Type	LE	Slope (%)		<1%		Aspect (°)		0					
SOILS													
Source	S	Reliability	L	Code	E	Add data	-	ISB/MU	-	Colour	K	Texture	F
GEOLOGY													
Source	O	Reliability	L	Code		B		Map Unit		Qhe/m			
SPECHT STRUCTURE CODE								-					
GROUND (%)													
Litter	0	Rock	0	Bare ground		50		Cryptophyte		0	Vegetation		50
RAINFOREST													
Struct. Complexity	-	Leaf Size	-	Leaf fall		-		Floor Comp		-	In. Gr Forms		-
DISTURBANCE													
Storm damage (Proportion/Age)		0		Road Works (Proportion/Age)		0							
Fire (Proportion/Age/Height)		0		Salinity		Y							
Logging (#)		0		Ringbarking /Thinning (#)		0							
Grazing		N		Feral Digging		N							
Weeds (% Cover)		0		Remnant									
Erosion (Type/Severity)		0											

[illegible]



<b>SITE NUMBER</b>	81
<b>LEVEL</b>	2
<b>DETAIL SP. LIST</b>	A
<b>REGIONAL ECOSYSTEM</b>	
<b>DATE</b>	16/2/11
<b>RECORDER</b>	David Francis & Dan Potter
<b>LOCALITY</b>	Great Keppel Island



<b>SITE DESCRIPTION</b>	<i>Lophostemon suaveolens</i> , <i>Corymbia clarksoniana</i> , closed forest												
<b>GENERAL NOTES</b>	Hearsay evidence suggests that this area was frequently inundated prior to 1990's. No signs currently evident.												
<b>COMMUNITY AREA (ha)</b>							<b>COMMUNITY WIDTH (m)</b>	Not linear					
<b>MAPPED (Current RE)</b>	8.11.10/8.12.14 x 2c						<b>REFERENCE SITE</b>						
<b>LANDFORM</b>													
<b>Situation</b>	D		<b>Element</b>	VLF		<b>Eros pattern</b>	VL		<b>Pattern</b>	PLA			
<b>SLOPE</b>													
<b>Type</b>	GE		<b>Slope (%)</b>	1-3%		<b>Aspect (°)</b>	0						
<b>SOILS</b>													
<b>Source</b>	S	<b>Reliability</b>	L	<b>Code</b>	A	<b>Add data</b>	-	<b>ISB/MU</b>	-	<b>Colour</b>	I	<b>Texture</b>	F
<b>GEOLOGY</b>													
<b>Source</b>	O		<b>Reliability</b>	L		<b>Code</b>	F		<b>Map Unit</b>	Ccs			
<b>SPECHT STRUCTURE CODE</b>						Closed Forest							
<b>GROUND (%)</b>													
<b>Litter</b>			<b>Rock</b>			<b>Bare ground</b>			<b>Cryptophyte</b>			<b>Vegetation</b>	
<b>RAINFOREST</b>													
<b>Struct. Complexity</b>	-		<b>Leaf Size</b>	-		<b>Leaf fall</b>	-		<b>Floor Comp</b>	-		<b>In. Gr Forms</b>	-
<b>DISTURBANCE</b>													
<b>Storm damage (Proportion/Age)</b>	0					<b>Road Works (Proportion/Age)</b>	0						
<b>Fire (Proportion/Age/Height)</b>	0					<b>Salinity</b>	0						
<b>Logging (#)</b>	0					<b>Ringbarking /Thinning (#)</b>	0						
<b>Grazing</b>	N					<b>Feral Digging</b>	N						
<b>Weeds (% Cover)</b>						<b>Remnant</b>							
<b>Erosion (Type/Severity)</b>	0												

SITE NUMBER		81			continued	
STRUCTURAL SUMMARY						
Stratum	Height Range in Strata (m)	Median Height (m)	Cover (%) (100m transect)	Species		
Emergent	-	-	-	-		
Tree 1	8-13	12	88	Acacia dispartima (S) Corymbia clarksoniana (A) Lophostemon suaveolens (D)		
Tree 2	3-7	5	38.3	Glochidion lobocarpum Glochidion sumatranum		
Tree 3						
Shrub 1	1	1		Trema tomentosa		
Shrub 2						
Ground/ vines/ epiphytes/ mistletoes				Ageratum houstonianum* Bidens bipinnata* Enteropogon unispiceus Flemingia parviflora		




[illegible]

CANOPY COVER DATA (100m TRANSECT)			
Canopy Start (m)	Canopy finish (m)	Species	Strata
0	13.5	<i>Lophostemon suaveolens</i>	T1
3	9.5	<i>Acacia disparrima</i>	T1
17	32	<i>Planchonia careya</i>	T1
19.5	27.5	<i>Lophostemon suaveolens</i>	T1
28	45	<i>Lophostemon suaveolens</i>	T1
33	35	<i>Banksia integrifolia</i>	T2
41	45	<i>Planchonia careya</i>	T2
42.5	47.5	<i>Eucalyptus platyphylla</i>	T1
44	74	<i>Lophostemon suaveolens</i>	T1
43.5	49.5	<i>Glochidion sumatranum</i>	T2
53	56	<i>Acacia disparrima</i>	T2
56.5	59	<i>Glochidion lobocarpum</i>	T2
59	61.5	<i>Acacia leiocalyx</i>	T2
61	63.5	<i>Acacia disparrima</i>	T2
69	71.5	<i>Glochidion lobocarpum</i>	T2
73	76.5	<i>Acacia disparrima</i>	T2
76	93.5	<i>Lophostemon suaveolens</i>	T1
81.5	85.3	<i>Acacia disparrima</i>	T2
82.5	84	<i>Glochidion sumatranum</i>	T2
86.5	90	<i>Acacia disparrima</i>	T2
94	96.5	<i>Acacia disparrima</i>	T2
97	100	<i>Glochidion sumatranum</i>	T2
98.5	100	<i>Planchonia careya</i>	T2



<b>SITE NUMBER</b>	85
<b>LEVEL</b>	2
<b>DETAIL SP. LIST</b>	A
<b>REGIONAL ECOSYSTEM</b>	
<b>DATE</b>	16/2/11
<b>RECORDER</b>	David Francis & Dan Potter
<b>LOCALITY</b>	Great Keppel Island



<b>SITE DESCRIPTION</b>	Acacia mixed low closed forest												
<b>GENERAL NOTES</b>													
<b>COMMUNITY AREA (ha)</b>	>50			<b>COMMUNITY WIDTH (m)</b>	Not linear								
<b>MAPPED (Current RE)</b>	8.11.3a			<b>REFERENCE SITE</b>	N								
<b>LANDFORM</b>													
<b>Situation</b>	A		<b>Element</b>	FOO		<b>Eros pattern</b>	UL		<b>Pattern</b>	PLA			
<b>SLOPE</b>													
<b>Type</b>	GE		<b>Slope (%)</b>	1-3%			<b>Aspect (°)</b>	10					
<b>SOILS</b>													
<b>Source</b>	S	<b>Reliability</b>	L	<b>Code</b>	K	<b>Add data</b>	-	<b>ISB/MU</b>	-	<b>Colour</b>	B	<b>Texture</b>	A
<b>GEOLOGY</b>													
<b>Source</b>	O		<b>Reliability</b>	L		<b>Code</b>	O		<b>Map Unit</b>	Qa			
<b>SPECHT STRUCTURE CODE</b>						Low Closed Forest							
<b>GROUND (%)</b>													
<b>Litter</b>			<b>Rock</b>			<b>Bare ground</b>			<b>Cryptophyte</b>			<b>Vegetation</b>	
<b>RAINFOREST</b>													
<b>Struct. Complexity</b>	-		<b>Leaf Size</b>	-		<b>Leaf fall</b>	-		<b>Floor Comp</b>	-		<b>In. Gr Forms</b>	-
<b>DISTURBANCE</b>													
<b>Storm damage (Proportion/Age)</b>	0			<b>Road Works (Proportion/Age)</b>	0								
<b>Fire (Proportion/Age/Height)</b>	0			<b>Salinity</b>	0								
<b>Logging (#)</b>	0			<b>Ringbarking /Thinning (#)</b>	0								
<b>Grazing</b>	N			<b>Feral Digging</b>	N								
<b>Weeds (% Cover)</b>	<5			<b>Remnant</b>	N								
<b>Erosion (Type/Severity)</b>	0												

SITE NUMBER		85			continued
STRUCTURAL SUMMARY					
Stratum	Height Range in Strata (m)	Median Height (m)	Cover (%) (100m transect)	Species	
Emergent	-	-	-	-	
Tree 1	3-10	6	88.5	Acacia disparrima (S) Acacia leiocalyx (D) Alphitonia excelsa (S) Corymbia clarksoniana (S)	
Tree 2		2		Acacia disparrima Acacia leiocalyx Alphitonia excelsa Lophostemon suaveolens	
Tree 3					
Shrub 1			1.5	Alphitonia excelsa	



Shrub 2				
Ground/ vines/ epiphytes/ mistletoes				<i>Ageratum houstonianum*</i> <i>Bracteantha bracteata</i> <i>Brunoniella australis</i> <i>Cheilanthes sieberi</i> <i>Cymbopogon refractus</i> <i>Enteropogon unispiceus</i> <i>Epaltes australis</i> <i>Eriachne pallescens</i> <i>Gahnia aspera</i> <i>Glycine tomentella</i> <i>Leptochloa decipiens</i> var. <i>decipiens</i> <i>Melinis multiflora*</i> <i>Murdannia graminea</i> <i>Pandorea pandorana</i> <i>Panicum effusum</i> <i>Passiflora suberosa*</i> <i>Phyllanthus virgatus</i> <i>Sida cordifolia*</i> <i>Sida rhombifolia*</i> <i>Stephania japonica</i> <i>Triumfetta rhomboidea</i> <i>Vernonia cinerea</i>

#### BASAL AREA & STEM COUNTS


Species	Basal area for plot (50X10m)					Volume/ha		Stem count for plot (50X10m)					
	E	T1	T2	T3	S1	T1	T2	E	T1	T2	T3	S1	S2
<i>Acacia disparrima</i>		2							6				
<i>Acacia leiocalyx</i>		5							38	6		7	
<i>Alphitonia excelsa</i>									2				
<i>Corymbia clarksoniana</i>		1							5			1	
<i>Ficus opposita</i>												1	

#### CANOPY COVER DATA (100m TRANSECT)

Canopy Start (m)	Canopy finish (m)	Species	Strata
0	1	<i>Acacia disparrima</i>	T1
0	4.5	<i>Alphitonia excelsa</i>	T1
3	7	<i>Corymbia clarksoniana</i>	T1
4.5	12	<i>Acacia leiocalyx</i>	T1
13	24.5	<i>Acacia disparrima</i>	T1
25	39	<i>Acacia leiocalyx</i>	T1
36	40.5	<i>Corymbia clarksoniana</i>	T1
43	51.5	<i>Acacia disparrima</i>	T1
49	54	<i>Acacia leiocalyx</i>	T1
55	56.5	<i>Alphitonia excelsa</i>	S1
56	61	<i>Acacia disparrima</i>	T1
58.5	63	<i>Corymbia clarksoniana</i>	T1
63	72	<i>Acacia disparrima</i>	T1
69.5	77	<i>Corymbia clarksoniana</i>	T1
73	78.5	<i>Acacia leiocalyx</i>	T1
83.5	86	<i>Corymbia clarksoniana</i>	T1
86.5	100	<i>Acacia disparrima</i>	T1
91	96.5	<i>Corymbia clarksoniana</i>	T1



<b>SITE NUMBER</b>	114
<b>LEVEL</b>	2
<b>DETAIL SP. LIST</b>	A
<b>REGIONAL ECOSYSTEM</b>	
<b>DATE</b>	17/2/11
<b>RECORDER</b>	David Francis & Dan Potter
<b>LOCALITY</b>	Great Keppel Island



<b>SITE DESCRIPTION</b>	Melaleuca quinquenervia and Eucalyptus robusta closed forest.												
<b>GENERAL NOTES</b>													
<b>COMMUNITY AREA (ha)</b>				<b>COMMUNITY WIDTH (m)</b>	Not linear								
<b>MAPPED (Current RE)</b>	8.3.13c			<b>REFERENCE SITE</b>	Y								
<b>LANDFORM</b>													
<b>Situation</b>	E	<b>Element</b>	STB	<b>Eros pattern</b>	GP	<b>Pattern</b>	PLA						
<b>SLOPE</b>													
<b>Type</b>	GE	<b>Slope (%)</b>	1-3%	<b>Aspect (°)</b>	310								
<b>SOILS</b>													
<b>Source</b>	S	<b>Reliability</b>	L	<b>Code</b>	A	<b>Add data</b>	-	<b>ISB/MU</b>	-	<b>Colour</b>	I	<b>Texture</b>	F
<b>GEOLOGY</b>													
<b>Source</b>	O	<b>Reliability</b>	L	<b>Code</b>	F	<b>Map Unit</b>	Qa						
<b>SPECHT STRUCTURE CODE</b>	Closed Forest												
<b>GROUND (%)</b>													
<b>Litter</b>		<b>Rock</b>		<b>Bare ground</b>		<b>Cryptophyte</b>		<b>Vegetation</b>					
<b>RAINFOREST</b>													
<b>Struct. Complexity</b>	-	<b>Leaf Size</b>	-	<b>Leaf fall</b>	-	<b>Floor Comp</b>	-	<b>In. Gr Forms</b>	-				
<b>DISTURBANCE</b>													
<b>Storm damage (Proportion/Age)</b>	0			<b>Road Works (Proportion/Age)</b>	0								
<b>Fire (Proportion/Age/Height)</b>	0			<b>Salinity</b>	0								
<b>Logging (#)</b>	0			<b>Ringbarking /Thinning (#)</b>	0								
<b>Grazing</b>	N			<b>Feral Digging</b>	N								
<b>Weeds (% Cover)</b>	<5			<b>Remnant</b>									
<b>Erosion (Type/Severity)</b>	0												

SITE NUMBER		114			continued
STRUCTURAL SUMMARY					
Stratum	Height Range in Strata (m)	Median Height (m)	Cover (%) (100m transect)	Species	
Emergent	-	-	-	-	
Tree 1	10-15	12	90	<i>Eucalyptus robusta</i> <i>Melaleuca quinquenervia</i> <i>Melaleuca viridiflora</i>	
Tree 2	5-9	6	14	<i>Alphitonia excelsa</i> <i>Ficus hispida</i> <i>Macaranga tanarius</i> <i>Planchonia careya</i>	
Tree 3					
Shrub 1	3-4	3		<i>Ficus hispida</i> <i>Lantana camara</i> <i>Livistona decora</i> <i>Timonius timon</i>	



Shrub 2	1-2	1		
Ground/ vines/ epiphytes/ mistletoes	0.5-2	1.5		<i>Bonamia media</i> <i>Bidens bipinnata</i> * <i>Gahnia sieberiana</i> <i>Imperata cylindrica</i> <i>Megathyrsus maximus</i> * <i>Oplismenus hirtellus</i> <i>Ottochloa nodosa</i> <i>Passiflora suberosa</i> * <i>Pteridium esculentum</i> <i>Stephania japonica</i> <i>Triumfetta rhomboidea</i>

**BASAL AREA & STEM COUNTS**


Species	Basal area for plot (50X10m)					Volume/ha		Stem count for plot (50X10m)					
	E	T1	T2	T3	S1	T1	T2	E	T1	T2	T3	S1	S2
<i>Alphitonia excelsa</i>			1							1			1
<i>Eucalyptus robusta</i>		9							4				
<i>Ficus opposita</i>												1	1
<i>Glochidion sumatranum</i>										1			
<i>Lantana camara</i>												1	
<i>Livistona decora</i>												1	
<i>Melaleuca quinquenervia</i>		14							21				
<i>Planchonia careya</i>										1			

**CANOPY COVER DATA (100m TRANSECT)**

Canopy Start (m)	Canopy finish (m)	Species	Strata
0	8	<i>Eucalyptus robusta</i>	T1
5	8	<i>Planchonia careya</i>	T2
8.5	10.5	<i>Melaleuca quinquenervia</i>	T1
12.5	22.5	<i>Melaleuca quinquenervia</i>	T1
12.5	17	<i>Alphitonia excelsa</i>	T2
25	27	<i>Eucalyptus robusta</i>	T2
30	38	<i>Melaleuca quinquenervia</i>	T1
36.5	55.5	<i>Eucalyptus robusta</i>	T1
53	78.5	<i>Melaleuca quinquenervia</i>	T1
74	78.5	<i>Alphitonia excelsa</i>	T2
78.5	83	<i>Eucalyptus robusta</i>	T1
81	100	<i>Melaleuca quinquenervia</i>	T1



<b>SITE NUMBER</b>	118
<b>LEVEL</b>	2
<b>DETAIL SP. LIST</b>	A
<b>REGIONAL ECOSYSTEM</b>	
<b>DATE</b>	17/2/11
<b>RECORDER</b>	David Francis & Dan Potter
<b>LOCALITY</b>	Great Keppel Island



<b>SITE DESCRIPTION</b>	<i>Alphitonia excelsa</i> and <i>Acacia disparrima</i> low open forest												
<b>GENERAL NOTES</b>													
<b>COMMUNITY AREA (ha)</b>							<b>COMMUNITY WIDTH (m)</b>	Not linear					
<b>MAPPED (Current RE)</b>	8.11.10/8.12.14 x 2c						<b>REFERENCE SITE</b>						
<b>LANDFORM</b>													
<b>Situation</b>	A	<b>Element</b>	PLA	<b>Eros pattern</b>	GP	<b>Pattern</b>	SAN						
<b>SLOPE</b>													
<b>Type</b>				<b>Slope (%)</b>	%			<b>Aspect (°)</b>	310				
<b>SOILS</b>													
<b>Source</b>	S	<b>Reliability</b>	L	<b>Code</b>	A	<b>Add data</b>	-	<b>ISB/MU</b>	-	<b>Colour</b>	I	<b>Texture</b>	F
<b>GEOLOGY</b>													
<b>Source</b>	O	<b>Reliability</b>	L	<b>Code</b>	F			<b>Map Unit</b>	Ccs				
<b>SPECHT STRUCTURE CODE</b>						Low Open Forest							
<b>GROUND (%)</b>													
<b>Litter</b>			<b>Rock</b>			<b>Bare ground</b>			<b>Cryptophyte</b>			<b>Vegetation</b>	
<b>RAINFOREST</b>													
<b>Struct. Complexity</b>	-	<b>Leaf Size</b>	-	<b>Leaf fall</b>	-	<b>Floor Comp</b>	-	<b>In. Gr Forms</b>	-				
<b>DISTURBANCE</b>													
<b>Storm damage (Proportion/Age)</b>	0			<b>Road Works (Proportion/Age)</b>	0								
<b>Fire (Proportion/Age/Height)</b>	0			<b>Salinity</b>	0								
<b>Logging (#)</b>	0			<b>Ringbarking /Thinning (#)</b>	0								
<b>Grazing</b>	N			<b>Feral Digging</b>	N								
<b>Weeds (% Cover)</b>	-			<b>Remnant</b>									
<b>Erosion (Type/Severity)</b>	0			<b>Extensive Clearing</b>	Y								

SITE NUMBER		118			continued
STRUCTURAL SUMMARY					
Stratum	Height Range in Strata (m)	Median Height (m)	Cover (%) (100m transect)	Species	
Emergent	-	-	-	-	
Tree 1	4-10	6	73.5	Acacia disparrima (D) Alphitonia excelsa (A) Corymbia clarksoniana (S) Corymbia tessellaris (S)	
Tree 2	2-3	2		Alphitonia excelsa	
Tree 3					
Shrub 1	1-2	1		Lantana camara*	
Shrub 2	0.5-1	0.5		Lithomyrtus obtusa	



Ground/ vines/ epiphytes/ mistletoes					<i>Abrus precatorius</i> <i>Amyema conspicuus</i> <i>Bidens bipinnata</i> * <i>Cryptostegia grandiflora</i> * <i>Eriachne pallescens</i> <i>Hyptis suaveolens</i> * <i>Imperata cylindrica</i> <i>Megathyrsus maximus</i> * <i>Pandorea pandorana</i> <i>Passiflora suberosa</i> * <i>Sida cordifolia</i> * <i>Triumfetta rhomboidea</i> <i>Vernonia cinerea</i>
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#### BASAL AREA & STEM COUNTS


Species	Basal area for plot (50X10m)					Volume/ha		Stem count for plot (50X10m)					
	E	T1	T2	T3	S1	T1	T2	E	T1	T2	T3	S1	S2
<i>Corymbia clarksoniana</i>		3							6				
<i>Alphitonia excelsa</i>		6							21	7		2	
<i>Acacia disparrima</i>									1			1	
<i>Glochidion lobocarpum</i>									2			1	
<i>Allocasuarina littoralis</i>									10			2	
<i>Planchonia careya</i>		1											
<i>Acacia leiocalyx</i>		1							2	1			
<i>Lantana camara</i> *												6	
<i>Lithomyrtus obtusa</i>													1
<i>Corymbia tessellaris</i>									2			1	

#### CANOPY COVER DATA (100m TRANSECT)

Canopy Start (m)	Canopy finish (m)	Species	Strata
0	3	<i>Corymbia clarksoniana</i>	T1
1	11	<i>Alphitonia excelsa</i>	T1
14.5	16	<i>Corymbia clarksoniana</i>	T1
15.5	20	<i>Alphitonia excelsa</i>	T1
20	25	<i>Corymbia clarksoniana</i>	T1
24.5	28	<i>Alphitonia excelsa</i>	T1
28.5	30	<i>Alphitonia excelsa</i>	T1
30	30.5	<i>Corymbia tessellaris</i>	T1
33.5	36	<i>Allocasuarina littoralis</i>	T1
43.5	48.5	<i>Allocasuarina littoralis</i>	T1
48.5	50.5	<i>Alphitonia excelsa</i>	T1
51.5	54.5	<i>Allocasuarina littoralis</i>	T1
62.5	66	<i>Acacia disparrima</i>	T1
63	70	<i>Allocasuarina littoralis</i>	T1
70	76.5	<i>Corymbia clarksoniana</i>	T1
79.5	88	<i>Alphitonia excelsa</i>	T1
84.5	90.5	<i>Allocasuarina littoralis</i>	T1
90.5	96	<i>Alphitonia excelsa</i>	T1
92	96	<i>Planchonia careya</i>	T1
96	100	<i>Allocasuarina littoralis</i>	T1



<b>SITE NUMBER</b>	124
<b>LEVEL</b>	2
<b>DETAIL SP. LIST</b>	A
<b>REGIONAL ECOSYSTEM</b>	
<b>DATE</b>	17/2/11
<b>RECORDER</b>	David Francis & Dan Potter
<b>LOCALITY</b>	Great Keppel Island



<b>SITE DESCRIPTION</b>	<i>Allocasuarina littoralis</i> low closed forest												
<b>GENERAL NOTES</b>													
<b>COMMUNITY AREA (ha)</b>							<b>COMMUNITY WIDTH (m)</b>						
<b>MAPPED (Current RE)</b>	8.11.10/8.12.14 x 2c						<b>REFERENCE SITE</b>						
<b>LANDFORM</b>													
<b>Situation</b>	I	<b>Element</b>	FOO	<b>Eros pattern</b>	UL	<b>Pattern</b>	SAN						
<b>SLOPE</b>													
<b>Type</b>	GE		<b>Slope (%)</b>	3-10%		<b>Aspect (°)</b>	330						
<b>SOILS</b>													
<b>Source</b>	S	<b>Reliability</b>	L	<b>Code</b>	A	<b>Add data</b>	-	<b>ISB/MU</b>	-	<b>Colour</b>	I	<b>Texture</b>	F
<b>GEOLOGY</b>													
<b>Source</b>	O	<b>Reliability</b>	L	<b>Code</b>	F	<b>Map Unit</b>	Ccs						
<b>SPECHT STRUCTURE CODE</b>	Low Closed Forest												
<b>GROUND (%)</b>													
<b>Litter</b>		<b>Rock</b>		<b>Bare ground</b>		<b>Cryptophyte</b>		<b>Vegetation</b>					
<b>RAINFOREST</b>													
<b>Struct. Complexity</b>	-	<b>Leaf Size</b>	-	<b>Leaf fall</b>	-	<b>Floor Comp</b>	-	<b>In. Gr Forms</b>	-				
<b>DISTURBANCE</b>													
<b>Storm damage (Proportion/Age)</b>	0			<b>Road Works (Proportion/Age)</b>	0								
<b>Fire (Proportion/Age/Height)</b>	0			<b>Salinity</b>	0								
<b>Logging (#)</b>	0			<b>Ringbarking /Thinning (#)</b>	0								
<b>Grazing</b>	N			<b>Feral Digging</b>	N								
<b>Weeds (% Cover)</b>	5			<b>Remnant</b>									
<b>Erosion (Type/Severity)</b>	0												

SITE NUMBER		124		continued	
STRUCTURAL SUMMARY					
Stratum	Height Range in Strata (m)	Median Height (m)	Cover (%) (100m transect)	Species	
Emergent	-	15	-	-	
Tree 1	5-8	7	82	Acacia disparrima Acacia julifera Allocasuarina littoralis Corymbia clarksoniana	
Tree 2	2-4	3	1	Acacia disparrima Acacia julifera Alphitonia excelsa	
Tree 3					
Shrub 1	1-2	2		Alphitonia excelsa Corymbia clarksoniana	
Shrub 2	0.5-1	0.5		Corymbia clarksoniana Lithomyrtus obtusa	
Ground/ vines/ epiphytes/ mistletoes				Cyperus gracilis Digitaria ramularis	




															<i>Enteropogon unispiceus</i> <i>Eriachne pallescens</i> <i>Opuntia stricta</i> * <i>Ottochloa gracillima</i> <i>Passiflora suberosa</i> * <i>Triumfetta rhomboidea</i>
BASAL AREA & STEM COUNTS															
Species	Basal area for plot (50X10m)					Volume/ha		Stem count for plot (50X10m)							
	E	T1	T2	T3	S1	T1	T2	E	T1	T2	T3	S1	S2		
<i>Acacia disparrima</i>									1						
<i>Acacia julifera</i>		3							3	2					
<i>Allocasuarina littoralis</i>		11							19	1					
<i>Alphitonia excelsa</i>												1			
<i>Corymbia clarksoniana</i>		1							1	1		1	1		
<i>Corymbia tessellaris</i>		1							1						
<i>Lithomyrtus obtusa</i>														2	

CANOPY COVER DATA (100m TRANSECT)			
Canopy Start (m)	Canopy finish (m)	Species	Strata
0	1	<i>Corymbia clarksoniana</i>	T2
5.5	34	<i>Allocasuarina littoralis</i>	T1
25	29	<i>Corymbia clarksoniana</i>	T1
32	35.5	<i>Corymbia tessellaris</i>	T1
35.5	50	<i>Corymbia clarksoniana</i>	T1
50.5	54	<i>Acacia disparrima</i>	T1
56	59.5	<i>Acacia disparrima</i>	T1
59.5	82	<i>Allocasuarina littoralis</i>	T1
70.5	73.5	<i>Acacia julifera</i>	T1
70.5	73.5	<i>Acacia disparrima</i>	T1
81.5	82.5	<i>Corymbia tessellaris</i>	T1
84	86	<i>Acacia julifera</i>	T1
92.5	95	<i>Corymbia tessellaris</i>	T1
97	100	<i>Alphitonia excelsa</i>	T1



# TERTIARY

<b>SITE NUMBER</b>	132
<b>LEVEL</b>	3
<b>DETAIL SP. LIST</b>	A
<b>REGIONAL ECOSYSTEM</b>	
<b>DATE</b>	17/2/11
<b>RECORDER</b>	David Francis & Dan Potter
<b>LOCALITY</b>	Great Keppel Island



<b>SITE DESCRIPTION</b>	Eucalyptus exserta and Lophostemon confertus low forest												
<b>GENERAL NOTES</b>													
<b>COMMUNITY AREA (ha)</b>								<b>COMMUNITY WIDTH (m)</b>					
<b>MAPPED (Current RE)</b>				8.11.10/8.12.14 x 2c				<b>REFERENCE SITE</b>				N	
<b>LANDFORM</b>													
<b>Situation</b>	F	<b>Element</b>	HSL	<b>Eros pattern</b>	UH	<b>Pattern</b>		<b>HIL</b>					
<b>SLOPE</b>													
<b>Type</b>	VG	<b>Slope (%)</b>	1-3%	<b>Aspect (°)</b>	30								
<b>SOILS</b>													
<b>Source</b>	S	<b>Reliability</b>	L	<b>Code</b>	Q	<b>Add data</b>	-	<b>ISB/MU</b>	-	<b>Colour</b>	K	<b>Texture</b>	G
<b>GEOLOGY</b>													
<b>Source</b>	O	<b>Reliability</b>	L	<b>Code</b>	O	<b>Map Unit</b>	Ccs						
<b>SPECHT STRUCTURE CODE</b>													
-													
<b>GROUND (%)</b>													
<b>Litter</b>		<b>Rock</b>		<b>Bare ground</b>		<b>Cryptophyte</b>		<b>Vegetation</b>					
<b>RAINFOREST</b>													
<b>Struct. Complexity</b>	-	<b>Leaf Size</b>	-	<b>Leaf fall</b>	-	<b>Floor Comp</b>	-	<b>In. Gr Forms</b>	-				
<b>DISTURBANCE</b>													
<b>Storm damage (Proportion/Age)</b>	0			<b>Road Works (Proportion/Age)</b>	0								
<b>Fire (Proportion/Age/Height)</b>	0			<b>Salinity</b>	0								
<b>Logging (#)</b>	N			<b>Ringbarking /Thinning (#)</b>	N								
<b>Grazing</b>	N			<b>Feral Digging</b>	N								
<b>Weeds (% Cover)</b>	0			<b>Remnant</b>									
<b>Erosion (Type/Severity)</b>	0												


SITE NUMBER		132	continued	
STRUCTURAL SUMMARY				
Stratum	Height Range in Strata (m)	Median Height (m)	Cover (%) (100m transect)	Species
Emergent	-	-	-	-
Tree 1	1-3	2		<i>Eucalyptus exserta</i> <i>Lophostemon confertus</i>
Tree 2				<i>Acacia leiocalyx</i> <i>Allocasuarina littoralis</i>
Tree 3				
Shrub 1				
Shrub 2				
Ground/ vines/ epiphytes/ mistletoes				<i>Aristida queenslandica</i> var. <i>queenslandica</i> <i>Abildgaardia ovata</i> <i>Fimbristylis cinnamometorum</i>



[illegible]



<b>SITE NUMBER</b>	140
<b>LEVEL</b>	2
<b>DETAIL SP. LIST</b>	A
<b>REGIONAL ECOSYSTEM</b>	
<b>DATE</b>	17/2/11
<b>RECORDER</b>	David Francis & Dan Potter
<b>LOCALITY</b>	Great Keppel Island



<b>SITE DESCRIPTION</b>	<i>Acacia disparrima</i> and <i>Acacia julifera</i> open forest												
<b>GENERAL NOTES</b>													
<b>COMMUNITY AREA (ha)</b>				<b>COMMUNITY WIDTH (m)</b>	Not linear								
<b>MAPPED (Current RE)</b>	8.11.10/8.12.14 x 2c			<b>REFERENCE SITE</b>									
<b>LANDFORM</b>													
<b>Situation</b>	T	<b>Element</b>	HSL	<b>Eros pattern</b>	UH	<b>Pattern</b>	HIL						
<b>SLOPE</b>													
<b>Type</b>	VG	<b>Slope (%)</b>	<1%	<b>Aspect (°)</b>	250								
<b>SOILS</b>													
<b>Source</b>	S	<b>Reliability</b>	L	<b>Code</b>	A	<b>Add data</b>	-	<b>ISB/MU</b>	-	<b>Colour</b>	B	<b>Texture</b>	F
<b>GEOLOGY</b>													
<b>Source</b>	O	<b>Reliability</b>	L	<b>Code</b>	F	<b>Map Unit</b>	Ccs						
<b>SPECHT STRUCTURE CODE</b>	Low Open Forest												
<b>GROUND (%)</b>													
<b>Litter</b>		<b>Rock</b>		<b>Bare ground</b>		<b>Cryptophyte</b>		<b>Vegetation</b>					
<b>RAINFOREST</b>													
<b>Struct. Complexity</b>	-	<b>Leaf Size</b>	-	<b>Leaf fall</b>	-	<b>Floor Comp</b>	-	<b>In. Gr Forms</b>	-				
<b>DISTURBANCE</b>													
<b>Storm damage (Proportion/Age)</b>	0			<b>Road Works (Proportion/Age)</b>	0								
<b>Fire (Proportion/Age/Height)</b>	0			<b>Salinity</b>	0								
<b>Logging (#)</b>	0			<b>Ringbarking /Thinning (#)</b>	0								
<b>Grazing</b>	0			<b>Feral Digging</b>	0								
<b>Weeds (% Cover)</b>	0			<b>Remnant</b>									
<b>Erosion (Type/Severity)</b>	0												

SITE NUMBER		140			continued	
STRUCTURAL SUMMARY						
Stratum	Height Range in Strata (m)	Median Height (m)	Cover (%) (100m transect)	Species		
Emergent	-	-	-	-		
Tree 1	5-9	6	70.5	Acacia disparrima (D) Acacia julifera (C) Allocasuarina littoralis (C) Banksia integrifolia (S) Corymbia clarksoniana (S) Corymbia tessellaris (S)		
Tree 2	2-4	3	1.5	Alphitonia excelsa		
Tree 3						
Shrub 1	1-2	2		Alphitonia excelsa		
Shrub 2	0.5-1	0.5		Lithomyrtus obtusa		
Ground/ vines/ epiphytes/ mistletoes				Eriachne pallescens Lomandra leucocephala		




[illegible]

CANOPY COVER DATA (100m TRANSECT)			
Canopy Start (m)	Canopy finish (m)	Species	Strata
0	5	<i>Acacia disparrima</i>	T1
10.5	19	<i>Acacia disparrima</i>	T1
17.5	22	<i>Banksia integrifolia</i>	T1
20.5	25	<i>Alphitonia excelsa</i>	T1
31	51	<i>Acacia disparrima</i>	T1
49	50.5	<i>Corymbia clarksoniana</i>	T2
51	56	<i>Allocasuarina littoralis</i>	T1
64	66	<i>Acacia disparrima</i>	T1
66	70	<i>Acacia julifera</i>	T1
71	72	<i>Alphitonia excelsa</i>	T1
78	88	<i>Allocasuarina littoralis</i>	T1
84.5	85.5	<i>Alphitonia excelsa</i>	T2
90	92	<i>Acacia julifera</i>	T1
93	100	<i>Allocasuarina littoralis</i>	T1



# REFERENCE SITE FOR 8.12.14

<b>SITE NUMBER</b>	142
<b>LEVEL</b>	2
<b>DETAIL SP. LIST</b>	A
<b>REGIONAL ECOSYSTEM</b>	8.12.14
<b>DATE</b>	17/2/11
<b>RECORDER</b>	David Francis & Dan Potter
<b>LOCALITY</b>	Great Keppel Island



<b>SITE DESCRIPTION</b>	Eucalyptus crebra open forest												
<b>GENERAL NOTES</b>													
<b>COMMUNITY AREA (ha)</b>					<b>COMMUNITY WIDTH (m)</b>	Not linear							
<b>MAPPED (Current RE)</b>	8.11.10/8.12.14 x 2c				<b>REFERENCE SITE</b>	Y							
<b>LANDFORM</b>													
<b>Situation</b>	F	<b>Element</b>	HSL	<b>Eros pattern</b>	UH	<b>Pattern</b>	HIL						
<b>SLOPE</b>													
<b>Type</b>	MO	<b>Slope (%)</b>	10-32%		<b>Aspect (°)</b>	240							
<b>SOILS</b>													
<b>Source</b>	S	<b>Reliability</b>	L	<b>Code</b>	Q	<b>Add data</b>	-	<b>ISB/MU</b>	-	<b>Colour</b>	I	<b>Texture</b>	E
<b>GEOLOGY</b>													
<b>Source</b>	O	<b>Reliability</b>	L	<b>Code</b>	O	<b>Map Unit</b>	Ccs						
<b>SPECHT STRUCTURE CODE</b>	Low Open Forest												
<b>GROUND (%)</b>													
<b>Litter</b>		<b>Rock</b>		<b>Bare ground</b>		<b>Cryptophyte</b>		<b>Vegetation</b>					
<b>RAINFOREST</b>													
<b>Struct. Complexity</b>	-	<b>Leaf Size</b>	-	<b>Leaf fall</b>	-	<b>Floor Comp</b>	-	<b>In. Gr Forms</b>	-				
<b>DISTURBANCE</b>													
<b>Storm damage (Proportion/Age)</b>	0		<b>Road Works (Proportion/Age)</b>		0								
<b>Fire (Proportion/Age/Height)</b>	0		<b>Salinity</b>		0								
<b>Logging (#)</b>	0		<b>Ringbarking /Thinning (#)</b>		0								
<b>Grazing</b>	N		<b>Feral Digging</b>		N								
<b>Weeds (% Cover)</b>	-		<b>Remnant</b>										
<b>Erosion (Type/Severity)</b>	0												

SITE NUMBER		142			continued	
STRUCTURAL SUMMARY						
Stratum	Height Range in Strata (m)	Median Height (m)	Cover (%) (100m transect)	Species		
Emergent	-	-	-	-		
Tree 1	6-10	7	78.5	<i>Eucalyptus crebra</i>		
Tree 2	2-5	3	10.5	<i>Acacia disparrima</i> <i>Alphitonia excelsa</i> <i>Acacia leiocalyx</i>		
Tree 3						
Shrub 1	0.5-1	0.5		<i>Acacia leiocalyx</i> <i>Alphitonia excelsa</i>		
Shrub 2						
Ground/ vines/ epiphytes/ mistletoes				<i>Ageratum houstonianum*</i> <i>Digitaria ramularis</i>		



				<i>Enteropogon unispiceus</i> <i>Glossocardia pilosa</i> <i>Opuntia stricta</i> * <i>Pandorea pandorana</i> <i>Passiflora suberosa</i> * <i>Pteridium esculentum</i> <i>Scleria mackaviensis</i> <i>Sida cordifolia</i> * <i>Sida hackettiana</i> <i>Tetrastigma nitens</i> <i>Triumfetta rhomboidea</i>
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#### BASAL AREA & STEM COUNTS


Species	Basal area for plot (50X10m)					Volume/ha		Stem count for plot (50X10m)					
	E	T1	T2	T3	S1	T1	T2	E	T1	T2	T3	S1	S2
<i>Acacia disparrima</i>										1			
<i>Acacia leiocalyx</i>										4		4	1
<i>Alphitonia excelsa</i>										6		23	2
<i>Eucalyptus crebra</i>		8							9	5		4	1

#### CANOPY COVER DATA (100m TRANSECT)

Canopy Start (m)	Canopy finish (m)	Species	Strata
0	24	<i>Eucalyptus crebra</i>	T1
14	18	<i>Acacia disparrima</i>	T2
28	31	<i>Alphitonia excelsa</i>	T2
33	43	<i>Eucalyptus crebra</i>	T1
40.5	42.5	<i>Acacia disparrima</i>	T2
45	75.5	<i>Eucalyptus crebra</i>	T1
80	84	<i>Eucalyptus crebra</i>	T1
85	86.5	<i>Alphitonia excelsa</i>	T2
88	95	<i>Eucalyptus crebra</i>	T1
97	100	<i>Eucalyptus crebra</i>	T1



TERTIARY  
REFERENCE SITE FOR 8.11.9a

<b>SITE NUMBER</b>	165						
<b>LEVEL</b>	3						
<b>DETAIL SP. LIST</b>	A						
<b>REGIONAL ECOSYSTEM</b>	8.11.9a						
<b>DATE</b>	18/2/11						
<b>RECORDER</b>	David Francis & Dan Potter						
<b>LOCALITY</b>	Great Keppel Island						
							
				<b>SITE DESCRIPTION</b>	Grassland		
				<b>GENERAL NOTES</b>			
				<b>COMMUNITY AREA (ha)</b>	C	<b>COMMUNITY WIDTH (m)</b>	D
				<b>MAPPED (Current RE)</b>	8.11.9a	<b>REFERENCE SITE</b>	Y
				<b>LANDFORM</b>			
				<b>Situation</b>	N	<b>Element</b>	PLA
				<b>Eros pattern</b>	UH	<b>Pattern</b>	HIL
				<b>SLOPE</b>			
				<b>Type</b>	GE	<b>Slope (%)</b>	3-10%
<b>Aspect (°)</b>	140						
<b>SOILS</b>							
<b>Source</b>	S	<b>Reliability</b>	L				
<b>Code</b>	Q	<b>Add data</b>	-				
<b>ISB/MU</b>	-	<b>Colour</b>	K				
<b>Texture</b>	G						
<b>GEOLOGY</b>							
<b>Source</b>	O	<b>Reliability</b>	L				
<b>Code</b>	O	<b>Map Unit</b>	Ccs				
<b>SPECHT STRUCTURE CODE</b>			-				
<b>GROUND (%)</b>							
<b>Litter</b>		<b>Rock</b>					
<b>Bare ground</b>		<b>Cryptophyte</b>					
<b>Vegetation</b>							
<b>RAINFOREST</b>							
<b>Struct. Complexity</b>	-	<b>Leaf Size</b>	-				
<b>Leaf fall</b>	-	<b>Floor Comp</b>	-				
<b>In. Gr Forms</b>	-						
<b>DISTURBANCE</b>							
<b>Storm damage (Proportion/Age)</b>	-	<b>Road Works (Proportion/Age)</b>	-				
<b>Fire (Proportion/Age/Height)</b>	-	<b>Salinity</b>	-				
<b>Logging (#)</b>	-	<b>Ringbarking /Thinning (#)</b>	-				
<b>Grazing</b>	-	<b>Feral Digging</b>	-				
<b>Weeds (% Cover)</b>	-	<b>Remnant</b>	-				
<b>Erosion (Type/Severity)</b>	-						


SITE NUMBER		165			continued
STRUCTURAL SUMMARY					
Stratum	Height Range in Strata (m)	Median Height (m)	Cover (%) (100m transect)	Species	
Emergent	-	-	-	-	
Tree 1	-	-	-	-	
Tree 2	-	-	-	-	
Tree 3	-	-	-	-	
Shrub 1	-	-	-	-	
Shrub 2	-	-	-	-	
Ground/ vines/ epiphytes/ mistletoes	0-1	0.5		Acacia leiocalyx Ageratum houstonianum* Aristida warburgii	



			<i>Bothriochloa pertusa*</i> <i>Cassytha filiformis</i> <i>Centella asiatica</i> <i>Crotalaria montana</i> <i>Emilia sonchifolia*</i> <i>Epaltes australis</i> <i>Evolvulus alsinoides</i> <i>Glossocardia bidens</i> <i>Heliotropium pauciflorum</i> <i>Hibbertia vestita</i> <i>Hybanthus enneaspermus</i> <i>Leucopogon leptospermoides</i> <i>Lomandra confertifolia subsp. pallida</i> <i>Pseuderanthemum variable</i> <i>Pteridium esculentum</i> <i>Richardia brasiliensis</i> <i>Solanum ellipticum</i> <i>Sida cordifolia*</i> <i>Stachytarpheta jamaicensis *</i> <i>Zornia dyctiocarpa</i>
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<b>SITE NUMBER</b>	167
<b>LEVEL</b>	2
<b>DETAIL SP. LIST</b>	A
<b>REGIONAL ECOSYSTEM</b>	
<b>DATE</b>	18/2/11
<b>RECORDER</b>	David Francis & Dan Potter
<b>LOCALITY</b>	Great Keppel Island



<b>SITE DESCRIPTION</b>	Acacia leiocalyx and Eucalyptus moluccana forest												
<b>GENERAL NOTES</b>	Transect terminates at a fence that runs east to west												
<b>COMMUNITY AREA (ha)</b>					<b>COMMUNITY WIDTH (m)</b>								
<b>MAPPED (Current RE)</b>	8.11.3a				<b>REFERENCE SITE</b>	N							
<b>LANDFORM</b>													
<b>Situation</b>	A	<b>Element</b>	PLA	<b>Eros pattern</b>	GP	<b>Pattern</b>	PLA						
<b>SLOPE</b>													
<b>Type</b>	VG	<b>Slope (%)</b>	1-3%			<b>Aspect (°)</b>	30						
<b>SOILS</b>													
<b>Source</b>	S	<b>Reliability</b>	L	<b>Code</b>	A	<b>Add data</b>	-	<b>ISB/MU</b>	-	<b>Colour</b>	I	<b>Texture</b>	F
<b>GEOLOGY</b>													
<b>Source</b>	O	<b>Reliability</b>	L	<b>Code</b>	F			<b>Map Unit</b>	Ccs				
<b>SPECHT STRUCTURE CODE</b>				Low Open Forest									
<b>GROUND (%)</b>													
<b>Litter</b>		<b>Rock</b>		<b>Bare ground</b>		<b>Cryptophyte</b>		<b>Vegetation</b>					
<b>RAINFOREST</b>													
<b>Struct. Complexity</b>	-	<b>Leaf Size</b>	-	<b>Leaf fall</b>	-	<b>Floor Comp</b>	-	<b>In. Gr Forms</b>	-				
<b>DISTURBANCE</b>													
<b>Storm damage (Proportion/Age)</b>	0			<b>Road Works (Proportion/Age)</b>	0								
<b>Fire (Proportion/Age/Height)</b>	0			<b>Salinity</b>	0								
<b>Logging (#)</b>	0			<b>Ringbarking /Thinning (#)</b>	0								
<b>Grazing</b>	N			<b>Feral Digging</b>	N								
<b>Weeds (% Cover)</b>	<5			<b>Remnant</b>									
<b>Erosion (Type/Severity)</b>													

SITE NUMBER		167			continued
STRUCTURAL SUMMARY					
Stratum	Height Range in Strata (m)	Median Height (m)	Cover (%) (100m transect)	Species	
Emergent	-	-	-	-	
Tree 1	5-10	6	69.5	<i>Acacia leiocalyx</i> <i>Alphitonia excelsa</i> <i>Eucalyptus moluccana</i> <i>Lophostemon suaveolens</i>	
Tree 2	2-4	3	4	<i>Acacia leiocalyx</i> <i>Melaleuca nervosa</i>	
Tree 3					
Shrub 1					
Shrub 2					



Ground/ vines/ epiphytes/ mistletoes				<i>Alloteropsis semialata</i> <i>Enteropogon unispiceus</i> <i>Epaltes australis</i> <i>Eriachne pallescens</i> <i>Fimbristylis acicularis</i> <i>Fimbristylis dichotoma</i> <i>Imperata cylindrica</i> <i>Lomandra confertifolia</i> subsp. <i>pallida</i> <i>Mitrasacme pygmaea</i> <i>Polygala</i> sp (aff. <i>linearifolia</i> 'd') <i>Sida cordifolia</i> * <i>Sida atherophora</i>
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#### BASAL AREA & STEM COUNTS

Species	Basal area for plot (50X10m)					Volume/ha		Stem count for plot (50X10m)					
	E	T1	T2	T3	S1	T1	T2	E	T1	T2	T3	S1	S2
<i>Acacia leiocalyx</i>			1						1	12		12	5
<i>Alphitonia excelsa</i>									1			1	1
<i>Corymbia clarksoniana</i>									1	6		3	2
<i>Eucalyptus moluccana</i>		2							11				
<i>Lophostemon suaveolens</i>									1				
<i>Melaleuca nervosa</i>										3		3	

#### CANOPY COVER DATA (100m TRANSECT)

Canopy Start (m)	Canopy finish (m)	Species	Strata
0	18.5	<i>Eucalyptus moluccana</i>	T1
16.5	20	<i>Lophostemon suaveolens</i>	T1
20	26	<i>Eucalyptus moluccana</i>	T1
26.5	29.5	<i>Acacia leiocalyx</i>	T1
31	32	<i>Acacia leiocalyx</i>	T1
35	43	<i>Acacia leiocalyx</i>	T1
43.5	44.5	<i>Melaleuca nervosa</i>	T2
44	45	<i>Acacia leiocalyx</i>	T2
45	46	<i>Eucalyptus moluccana</i>	T2
47.5	48.5	<i>Eucalyptus moluccana</i>	T2
50	50.5	<i>Alphitonia excelsa</i>	T2
53.5	55.5	<i>Eucalyptus moluccana</i>	T1
55	71	<i>Alphitonia excelsa</i>	T1
56.5	60	<i>Acacia leiocalyx</i>	T1
79	81.5	<i>Eucalyptus moluccana</i>	T1
81.5	92	<i>Alphitonia excelsa</i>	T1
99	100	<i>Acacia leiocalyx</i>	T1



## APPENDIX C – Quaternary Sites



Number	Tree1i	Tree1ii	Tree1iii	Tree1iv	Tree1v	Tree1vi	Tree2i	Tree2ii	Tree2iii	Tree2iv	Tree2v	Tree2vi	Shrub1i	Shrub1ii	Shrub2i	Shrub2ii	Ground	T1 Ht	Geology	Notes
3	<i>Lophostemon confertus</i>	<i>Melaleuca quinquenervia</i>	<i>Eucalyptus tereticornis</i>				<i>Planchonia careya</i>	<i>Alphitonia excelsa</i>	<i>Allocasuarina littoralis</i>											
4	<i>Corymbia clarksoniana</i>	<i>Eucalyptus crebra</i>	<i>Lophostemon confertus</i>				<i>Petalostigma pubescens</i>													
5	<i>Allocasuarina littoralis</i>	<i>Alphitonia excelsa</i>	<i>Banksia integrifolia</i>	<i>Acacia julifera</i>																Possibly historically cleared
6	<i>Corymbia clarksoniana</i>						<i>Leptospermum neglectum</i>	<i>Banksia integrifolia</i>	<i>Grevillea banksii</i>				<i>Breynia oblongifolia</i>		<i>Lithomyrtus obtusa</i>		<i>Triumfetta rhomboidea</i>			
7	<i>Alphitonia excelsa</i>	<i>Allocasuarina littoralis</i>	<i>Acacia disparrima</i>	<i>Trema tomentosa</i>																
8	<i>Corymbia clarksoniana</i>						<i>Alphitonia excelsa</i>	<i>Banksia integrifolia</i>	<i>Drypetes deplanchei</i>								<i>Xanthorrhoea latifolia</i> , <i>Jasminum didymum</i>			
10	<i>Corymbia clarksoniana</i>						<i>Trema tomentosa</i>	<i>Acronychia laevis</i>									<i>Vernonia cinerea</i>	20		
11	<i>Corymbia citriodora</i>	<i>Eucalyptus portuensis</i>															<i>Heteropogon contortus</i> , <i>Dianella rara</i> , <i>Arundinella nepalensis</i> , <i>Brunoniella australis</i> , <i>Glycine tomentella</i>			
12	<i>Corymbia citriodora</i>	<i>Melaleuca nervosa</i>																		
13	<i>Allocasuarina littoralis</i>	<i>Eucalyptus platyphylla</i>																		Disturbed
14	<i>Melaleuca quinquenervia</i>	<i>Corymbia tessellaris</i>	<i>Banksia integrifolia</i>	<i>Melaleuca dealbata</i>	<i>Planchonia careya</i>								<i>Lantana camara</i>				<i>Pteridium esculentum</i> , <i>Cryptostegia grandiflora</i> ,		Sand	Rubber vine abundant
15	<i>Corymbia clarksoniana</i>	<i>Corymbia tessellaris</i>					<i>Acacia disparrima</i>	<i>Arytera divaricata</i>									<i>Cryptostegia grandiflora</i>			
16	<i>Corymbia clarksoniana</i>						<i>Glochidion lobocarpum</i>													
17	<i>Lophostemon suaveolens</i>																			
18	<i>Corymbia tessellaris</i>	<i>Corymbia clarksoniana</i>					<i>Allocasuarina littoralis</i>	<i>Pouteria sericea</i>												
19	<i>Allocasuarina littoralis</i>	<i>Acacia disparrima</i>											<i>Clerodendrum floribundum</i>						Sand	
20	<i>Allocasuarina littoralis</i>	<i>Alphitonia excelsa</i>	<i>Acacia julifera</i>	<i>Banksia integrifolia</i>									<i>Acacia leiocalyx</i> subsp. <i>leiocalyx</i>				<i>Wahlenbergia gracilis</i> , <i>Sida cordifolia</i> , <i>Ageratum houstonianum</i> , <i>Emilia sonchifolia</i> *, <i>Perotis rara</i> , <i>Amyema conspicuosa</i> , <i>Chenopodium carinatum</i> , <i>Poranthera microphylla</i> , <i>Vittadinia dissecta</i> var. <i>hirta</i> , <i>Chenopodium carinatum</i>			
21	<i>Eucalyptus portuensis</i>	<i>Drypetes deplanchei</i>	<i>Ficus obliqua</i>	<i>Pouteria sericea</i>	<i>Euroschin us falcatus</i>	<i>Drynaria sparsisora</i>											<i>Desmodium gunnii</i> , <i>Opismenus aemulus</i> , <i>Eustrephus latifolius</i> , <i>Adiantum hispidulum</i> , <i>Gahnia aspera</i> , <i>Drynaria sparsisora</i> , <i>Cheilanthes sieberi</i> , <i>Brunoniella australis</i>			
22	<i>Corymbia clarksoniana</i>	<i>Corymbia tessellaris</i>	<i>Allocasuarina littoralis</i>														<i>Cryptostegia grandiflora</i>			
23	<i>Corymbia clarksoniana</i>						<i>Alphitonia excelsa</i>	<i>Planchonia careya</i>					<i>Alyxia ruscifolia</i>							
24																	<i>Ipomoea pes-caprae</i> , <i>Hibbertia scandens</i> , <i>Opuntia stricta</i> *, <i>Cynodon dactylon</i> , <i>Imperata cylindrica</i> , <i>Stephania japonica</i> , <i>Hyptis suaveolens</i> *, <i>Billardiera scandens</i> , <i>Cryptostegia grandiflora</i> *, <i>Lantana camara</i> *, <i>Sida cordifolia</i> *, <i>Boerhavia pubescens</i> , <i>Triumfetta rhomboidea</i> , <i>Mukia maderaspatana</i> *, <i>Ageratum houstonianum</i> *, <i>Heteropogon contortus</i> , <i>Vittadinia dissecta</i> var. <i>hirta</i> , <i>Evolvulus alsinoides</i>			No trees; photo with goats
26	<i>Allocasuarina littoralis</i>	<i>Acacia leiocalyx</i>	<i>Melaleuca nervosa</i>														<i>Lomandra confertifolia</i> subsp. <i>pallida</i> , <i>Hibbertia stricta</i> , <i>Themeda triandra</i> , <i>Hibbertia scandens</i> , <i>Ageratum houstonianum</i> , <i>Ipomoea pes-caprae</i> , <i>Vernonia cinerea</i> , <i>Gahnia aspera</i> , <i>Stylosanthes humilis</i> *, <i>Pterocaulon esculentum</i> , <i>Crotalaria montana</i> , <i>Velleia paradoxa</i>		Metasediment	Wind sheared vegetation
28	<i>Allocasuarina littoralis</i>	<i>Lophostemon suaveolens</i>	<i>Banksia integrifolia</i>	<i>Acacia leiocalyx</i>	<i>Acronychia laevis</i>								<i>Lithomyrtus obtusa</i>				<i>Pandorea pandorana</i> , <i>Cryptostegia grandiflora</i>		Sand	Abundant Rubber Vine
30	<i>Corymbia clarksoniana</i>	<i>Allocasuarina littoralis</i>	<i>Acacia disparrima</i>	<i>Alphitonia excelsa</i>									<i>Lithomyrtus obtusa</i>					5	Sand	Max 6m, Median 5m, Min 3m; felled logs everywhere
32a	<i>Corymbia clarksoniana</i>	<i>Allocasuarina littoralis</i>	<i>Banksia integrifolia</i>	<i>Acacia leiocalyx</i>	<i>Glochidion lobocarpum</i>								<i>Jacksonia scoparia</i>				<i>Lomandra confertifolia</i> , <i>Gahnia aspera</i> , <i>Enteropogon unispiceus</i> , <i>Emilia sonchifolia</i> , <i>Evolvulus pilosus</i> , <i>Crotalaria montana</i>			Wind sheared top of headland
32b	<i>Eucalyptus portuensis</i>	<i>Eucalyptus crebra</i>	<i>Lophostemon confertus</i>															6 to 7	Metasediment	Wind sheared; gully



Number	Tree1i	Tree1ii	Tree1iii	Tree1iv	Tree1v	Tree1vi	Tree2i	Tree2ii	Tree2iii	Tree2iv	Tree2v	Tree2vi	Shrub1i	Shrub1ii	Shrub2i	Shrub2ii	Ground	T1 Ht	Geology	Notes
33	<i>Eucalyptus portuensis</i>	<i>Allocasuarina littoralis</i>											<i>Xanthorrhoea latifolia</i>						Metasediment	Wind sheared
34	<i>Lophostemon confertus</i>	<i>Eucalyptus portuensis</i>					<i>Pouteria sericea</i>	<i>Jagera pseudorhus</i>	<i>Drypetes deplanchei</i>				<i>Scolopia braunii</i>				<i>Drynaria rigidula, Entolasia stricta,</i>			
36	<i>Corymbia clarksoniana</i>	<i>Mallotus discolor</i>	<i>Lophostemon confertus</i>	<i>Lophostemon suaveolens</i>	<i>Glochidion lobocarpum</i>												<i>Adiantum hispidulum</i>			
37	<i>Corymbia clarksoniana</i>	<i>Eucalyptus portuensis</i>					<i>Planchonia careya</i>	<i>Pittosporum ferrugineum</i>	<i>Drypetes deplanchei</i>	<i>Diospyros geminata</i>	<i>Acronychia laevis</i>		<i>Wikstroemia indica</i>				<i>Triumfetta rhomboidea</i>			
38	<i>Corymbia clarksoniana</i>	<i>Corymbia tessellaris</i>	<i>Eucalyptus portuensis</i>	<i>Eucalyptus platyphylla</i>													<i>Stachytarpheta jamaicensis</i>			
39	<i>Lophostemon suaveolens</i>	<i>Melaleuca dealbata</i>	<i>Corymbia tessellaris</i>	<i>Eucalyptus portuensis</i>	<i>Alphitonia excelsa</i>												<i>Achyranthes aspera, Evolvulus alsinoides, Macroptilium atropurpureum*</i>			
40	<i>Melaleuca quinquenervia</i>	<i>Melaleuca dealbata</i>					<i>Livistona decora</i>	<i>Acacia leiocalyx</i>	<i>Acacia disparrima</i>								<i>Triumfetta rhomboidea, Cryptostegia grandiflora*, Bidens pilosa*, Ageratum houstonianum*, Sida rhombifolia, Sonchus oleraceus*</i>		Sand	Disturbed
41	<i>Corymbia citriodora</i>																	18		
43	<i>Lophostemon confertus</i>	<i>Ficus virens</i>																		Gully
44	<i>Eucalyptus camaldulensis</i>	<i>Lophostemon suaveolens</i>					<i>Drypetes deplanchei</i>	<i>Glochidion sumatranum</i>	<i>Ficus obliqua</i>											Creek
45	<i>Lophostemon suaveolens</i>	<i>Corymbia clarksoniana</i>	<i>Corymbia tessellaris</i>																Sand	Looks remnant
47	<i>Melaleuca quinquenervia</i>	<i>Melaleuca dealbata</i>	<i>Banksia integrifolia</i>				<i>Drypetes deplanchei</i>	<i>Acacia disparrima</i>	<i>Alphitonia excelsa</i>											
49	<i>Melaleuca quinquenervia</i>						<i>Acacia disparrima</i>	<i>Alphitonia excelsa</i>	<i>Planchonia careya</i>	<i>Breynia oblongifolia</i>							<i>Cryptostegia grandiflora</i>	7	Sand	
51	<i>Eucalyptus crebra</i>						<i>Acacia leiocalyx</i>	<i>Alphitonia excelsa</i>									<i>Passiflora foetida, Cassytha filiformis</i>		Metasediment	
52	<i>Eucalyptus crebra</i>						<i>Acacia leiocalyx</i>												Metasediment	Remnant
54	<i>Eucalyptus crebra</i>	<i>Alphitonia excelsa</i>																8	Metasediment	Large rock outcrops
55	<i>Melaleuca viridiflora</i>	<i>Acacia leiocalyx</i>																5		
57	<i>Corymbia tessellaris</i>	<i>Melaleuca dealbata</i>					<i>Acacia leiocalyx</i>	<i>Aphananthe philippinensis</i>												T1 sparse; abundant Acacia
58	<i>Corymbia clarksoniana</i>	<i>Eucalyptus camaldulensis</i>	<i>Alphitonia excelsa</i>														<i>Parsonsia plaesiophylla</i>			
62	<i>Lophostemon confertus</i>	<i>Eucalyptus crebra</i>	<i>Eucalyptus portuensis</i>	<i>Corymbia citriodora</i>														8	Metasediment	
63	<i>Eucalyptus crebra</i>	<i>Lophostemon confertus</i>	<i>Eucalyptus portuensis</i>	<i>Corymbia clarksoniana</i>									<i>Jacksonia scoparia</i>		<i>Xanthorrhoea latifolia</i>			7		
64	<i>Corymbia citriodora</i>	<i>Eucalyptus crebra</i>																16		
65	<i>Eucalyptus moluccana</i>																			
66	<i>Eucalyptus exserta</i>	<i>Eucalyptus crebra</i>	<i>Lophostemon confertus</i>	<i>Corymbia citriodora</i>			<i>Acacia julifera</i>											7		
67	<i>Lophostemon confertus</i>	<i>Eucalyptus crebra</i>	<i>Corymbia clarksoniana</i>	<i>Corymbia citriodora</i>			<i>Grevillea banksii</i>						<i>Jacksonia scoparia</i>							
68	<i>Corymbia citriodora</i>																			
69	<i>Corymbia citriodora</i>	<i>Alphitonia excelsa</i>											<i>Jacksonia scoparia</i>							Appears disturbed
70	<i>Eucalyptus moluccana</i>	<i>Melaleuca quinquenervia</i>																		Remnant
71	<i>Casuarina equisetifolia</i>	<i>Vitex trifolia</i>																		
72	<i>Casuarina equisetifolia</i>						<i>Drypetes deplanchei</i>													
73	<i>Casuarina equisetifolia</i>																<i>Spinifex sericea, Canavalia rosea</i>			
74	<i>Eucalyptus crebra</i>	<i>Acronychia laevis</i>	<i>Diospyros geminata</i>	<i>Ficus platypoda</i>	<i>Pouteria sericea</i>												<i>Heteropogon contortus</i>			
75	<i>Pouteria sericea</i>	<i>Diospyros</i>	<i>Ficus rubiginosa</i>	<i>Acronychia laevis</i>													<i>Drynaria rigidula, Trophis scandens</i>			
76	<i>Melaleuca quinquenervia</i>	<i>Corymbia tessellaris</i>	<i>Timonius timon</i>	<i>Melaleuca dealbata</i>			<i>Planchonia careya</i>	<i>Glochidion lobocarpum</i>									<i>Sporobolus africanus</i>			
77	<i>Corymbia tessellaris</i>	<i>Corymbia clarksoniana</i>	<i>Banksia integrifolia</i>														<i>Hyparrhenia rufa, Melinis minutiflora</i>			
78	<i>Corymbia tessellaris</i>	<i>Corymbia clarksoniana</i>															<i>Crotalaria medicaginea var. neglecta</i>			
79	<i>Corymbia clarksoniana</i>	<i>Allocasuarina littoralis</i>	<i>Banksia integrifolia</i>				<i>Leptospermum neglectum</i>	<i>Alphitonia excelsa</i>	<i>Acacia julifera</i>									8		



Number	Tree1i	Tree1ii	Tree1iii	Tree1iv	Tree1v	Tree1vi	Tree2i	Tree2ii	Tree2iii	Tree2iv	Tree2v	Tree2vi	Shrub1i	Shrub1ii	Shrub2i	Shrub2ii	Ground	T1 Ht	Geology	Notes
80	<i>Corymbia tessellaris</i>	<i>Corymbia clarksoniana</i>															<i>Dianella caerulea</i>	10		
81	<i>Corymbia tessellaris</i>	<i>Banksia integrifolia</i>	<i>Allocasuarina littoralis</i>	<i>Acacia julifera</i>																
82	<i>Corymbia clarksoniana</i>						<i>Leptospermum neglectum</i>	<i>Allocasuarina littoralis</i>									<i>Boronia occidentalis</i>			Previously cleared
83	<i>Corymbia clarksoniana</i>						<i>Planchonia careya</i>	<i>Grevillea banksii</i>	<i>Pelatostigma pubescens</i>				<i>Xanthorrhoea latifolia</i>				<i>Lomandra leucocephala</i>			Remnant
84	<i>Corymbia tessellaris</i>	<i>Mallotus discolor</i>															<i>Oplismenus aemulus</i> , <i>Jasminum simplicifolium</i>			
85	<i>Corymbia clarksoniana</i>																	11	Sand	
86	<i>Corymbia clarksoniana</i>																	11	Sand	
87	<i>Allocasuarina littoralis</i>	<i>Alphitonia excelsa</i>	<i>Banksia integrifolia</i>															5	Sand	Previously cleared
90	<i>Corymbia intermedia</i>						<i>Acacia julifera</i>													
91	<i>Acacia salicina</i>												<i>Hibiscus tiliaceus</i>				<i>Catharanthus roseus</i> , <i>Thunbergia alata</i>			All planted in resort area
92	<i>Melaleuca quinquenervia</i>	<i>Melaleuca dealbata</i>															<i>Agave vivipara</i> , <i>Macroptilium atropurpureum</i> , <i>Duranta erecta</i> , <i>Chloris inflata</i> , <i>Megathyrsus maximus</i>			Cleared with scattered large Melaleucas
93	<i>Melaleuca dealbata</i>												<i>Senna occidentalis</i>							
94	<i>Lophostemon suaveolens</i>	<i>Corymbia clarksoniana</i>					<i>Dodonaea viscosa</i>	<i>Leptospermum neglectum</i>	<i>Acacia julifera</i>											
95	<i>Eucalyptus camaldulensis</i>	<i>Melaleuca quinquenervia</i>	<i>Lophostemon suaveolens</i>	<i>Lophostemon confertus</i>																
96	<i>Corymbia clarksoniana</i>	<i>Corymbia citriodora</i>					<i>Livistona decora</i>												Sand	
97	<i>Corymbia clarksoniana</i>						<i>Alphitonia excelsa</i>										<i>Pseuderanthemum variabile</i>			
100	<i>Corymbia clarksoniana</i>	<i>Corymbia tessellaris</i>																18		Surrounded by disturbance
101	<i>Corymbia clarksoniana</i>	<i>Banksia integrifolia</i>	<i>Allocasuarina littoralis</i>	<i>Acacia julifera</i>														7		
102	<i>Corymbia clarksoniana</i>	<i>Leptospermum neglectum</i>	<i>Allocasuarina littoralis</i>	<i>Acacia julifera</i>	<i>Grevillea banksii</i>	<i>Banksia integrifolia</i>												6		
104	<i>Araucaria cunninghamii</i>	<i>Cocos nucifera</i>	<i>Corymbia tessellaris</i>	<i>Melaleuca dealbata</i>			<i>Schefflera actinophylla</i>	<i>Delonix regia</i>												Norfolk Island Pine is planted
Resort	<i>Corymbia tessellaris</i> <i>Corymbia clarksoniana</i>	<i>Syagrus romanzoffiana</i> , <i>Cocos nucifera</i> *	<i>Melaleuca quinquenervia</i> <i>Melaleuca dealbata</i>	<i>Araucaria heterophylla</i> <i>Wodyetia bifurcata</i>	<i>Plumeria rubra</i> , <i>Alphitonia excelsa</i> , <i>Ficus benjamina</i> , <i>Schefflera digitata</i> *		<i>Glochidion sumatranum</i>	<i>Pongamia pinnata</i> (planted)	<i>Pinus sp.</i> *	<i>Cupaniopsis anacardioides</i>			<i>Bougainvillea sp.</i> *	<i>Tecoma stans</i> *	<i>Banksia integrifolia</i> <i>Hibiscus</i> (cultivar)	<i>Breynia oblongifolia</i>	<i>Cryptostegia grandiflora</i> *, <i>Thunbergia alata</i> *, <i>Chrysalidocarpus lutescens</i> , <i>Sphagneticola trilobata</i> *, <i>Thevetia peruviana</i> , <i>Duranta erecta</i> , <i>Sporobolus indicus</i> *, <i>Rhoea discolor</i> *			



[illegible]



ID	Tree1i	Tree1ii	Tree1iii	Tree1iv	Tree1v	Tree1vi	Tree2i	Tree2ii	Tree2iii	Tree2iv	Tree2v	Tree2vi	Shrub1i	Shrub1ii	Shrub1iii	Shrub1iv	Shrub1v	Shrub2i	Shrub2ii	shrub 2iii	Ground	T1 ht	Geology	Notes
18	<i>Corymbia clarksoniana</i> (possibly <i>intermedia</i> )						<i>Leptospermum neglectum</i>	<i>Banksia integrifolia</i>	<i>Allocasuarina littoralis</i>												<i>Imperata cylindrica</i> , <i>Megathyrsus maximus</i> *, <i>Dianella caerulea</i>	15		T2 10m
19	<i>Melaleuca quinquenervia</i>	<i>Melaleuca dealbata</i>																						low point in staff compound
20	<i>Corymbia tessellaris</i>	<i>Melaleuca dealbata</i>																				16		cleared but at edge of vegetation
21	<i>Corymbia tessellaris</i>	<i>Melaleuca dealbata</i>																				15		
22	<i>Corymbia tessellaris</i>	<i>Melaleuca dealbata</i>					<i>Planchonia careya</i>	<i>Banksia integrifolia</i>	<i>Dodonaea viscosa</i>													15		T2 8m
23	<i>Corymbia tessellaris</i>	<i>Melaleuca dealbata</i>					<i>Planchonia careya</i>	<i>Banksia integrifolia</i>	<i>Dodonaea viscosa</i>													16		T2 8m
24	<i>Corymbia tessellaris</i>	<i>Melaleuca dealbata</i>																				15		
25	<i>Melaleuca dealbata</i>	<i>Corymbia tessellaris</i>																				15		
26	<i>Eucalyptus crebra</i>						<i>Acronychia laevis</i>	<i>Lophostemon confertus</i>													<i>Fimbristylis ferruginea</i> , <i>Sporobolus virginicus</i>	8		Approx. 4m <sup>2</sup> marine plants on rocks, other vegetation above rocks. Insufficient width and canopy to be EPBC community
27	<i>Eucalyptus crebra</i>						<i>Drypetes deplanchei</i>														<i>Cymbopogon refractus</i> , <i>Cheilanthes sieberi</i> , <i>Vernonia cinerea</i> , <i>Brunoniella australis</i> , <i>Heteropogon contortus</i> , <i>Lantana montevidensis</i> *, <i>Sida hackettiana</i> *, <i>Phyllanthus virgatus</i> , <i>Ageratum houstonianum</i> , <i>Opuntia stricta</i> *, <i>Megathyrsus maximus</i> *	8		insufficient width and canopy to be EPBC community.
28	<i>Pouteria sericea</i>	<i>Ficus obliqua</i>	<i>Drypetes deplanchei</i>																		<i>Trophis scandens</i> , <i>Stephania japonica</i>	6		10m wide and all canopy scrub
29	<i>Acacia leiocalyx</i>	<i>Drypetes deplanchei</i>	<i>Pouteria sericea</i>	<i>Acronychia laevis</i>	<i>Opuntia stricta</i>																			1m wide - too narrow to be EPBC community
30	<i>Alphitonia excelsa</i>	<i>Pouteria sericea</i>	<i>Ficus obliqua</i>																					<i>Alphitonia excelsa</i> 3m at cliff top and other 1m on cliff - too narrow to map as EPBC community
31	<i>Acacia leiocalyx</i>	<i>Vitex trifolia</i>	<i>Pouteria sericea</i>	<i>Grevillea banksii</i>																				5m wide too narrow to map as EPBC community
32	<i>Acacia leiocalyx</i>	<i>Grevillea banksii</i>	<i>Drypetes deplanchei</i>										<i>Vitex trifoliata</i>								<i>Xanthorrhoea latifolia</i> , <i>Lomandra confertifolia</i> subsp. <i>pallida</i>			2m wide too narrow to map as EPBC community



ID	Tree1i	Tree1ii	Tree1iii	Tree1iv	Tree1v	Tree1vi	Tree2i	Tree2ii	Tree2iii	Tree2iv	Tree2v	Tree2vi	Shrub1i	Shrub1ii	Shrub1iii	Shrub1iv	Shrub1v	Shrub2i	Shrub2ii	shrub 2iii	Ground	T1 ht	Geology	Notes
33	<i>Ficus obliqua</i>	<i>Drypetes deplanchei</i>	<i>Pouteria sericea</i>				<i>Acronychia laevis</i>	<i>Acacia leiocalyx</i>	<i>Grevillea banksii</i>												<i>Themeda triandra</i> , <i>Heteropogon contortus</i> , <i>Xanthorrhoea latifolia</i>	5		maybe scrub
34	<i>Pandanus tectorius</i>	<i>Grevillea banksii</i>	<i>Acacia leiocalyx</i>										<i>Vitex trifolia</i>											T1 at 4m. not EPBC community
35	<i>Corymbia clarksoniana</i>	<i>Eucalyptus portuensis</i>	<i>Lophostemon confertus</i>																			12	sand	
36	<i>Eucalyptus crebra</i>	<i>Eucalyptus exserta</i>	<i>Eucalyptus portuensis</i>	<i>Lophostemon confertus</i>																		4	rock	
37	<i>Acacia leiocalyx</i>	<i>Lophostemon confertus</i>	<i>Allocasuarina littoralis</i>	<i>Eucalyptus crebra</i>																		3	rock	
38	<i>Eucalyptus crebra</i>																					6		
39	<i>Corymbia clarksoniana</i>	<i>Lophostemon suaveolens</i>					<i>Allocasuarina luehmannii</i>														<i>Eriachne stipacea</i>			
40	<i>Allocasuarina littoralis</i>	<i>Corymbia intermedia</i>	<i>Acacia julifera</i>	<i>Corymbia clarksoniana</i>																		6		
41																								
42	<i>Eucalyptus exserta</i>	<i>Allocasuarina littoralis</i>	<i>Acacia leiocalyx</i>										<i>Jacksonia scoparia</i>					<i>Leucopogon leptospermoides</i>			<i>Xanthorrhoea latifolia</i>	1		
43	<i>Lophostemon confertus</i>	<i>Eucalyptus portuensis</i>	<i>Allocasuarina littoralis</i>	<i>Grevillea banksii</i>																	<i>Xanthorrhoea latifolia</i> , <i>Gahnia aspera</i> , <i>Lepidosperma laterale</i>	0.5-1		Collected <i>Acacia juncifolia</i> . Edge of low vegetation
44	<i>Lophostemon confertus</i>	<i>Eucalyptus crebra</i>	<i>Corymbia clarksoniana</i>																			5		collected <i>Tephrosia juncea</i> and <i>Clerodendron floribunda</i> nearby
45	<i>Lophostemon confertus</i>	<i>Eucalyptus portuensis</i>																				4		
46	<i>Lophostemon confertus</i>	<i>Eucalyptus portuensis</i>																				6		Collected herb and <i>Marsdenia</i> .
47	<i>Acacia leiocalyx</i>	<i>Banksia integrifolia</i>																				3	sand	regrowth
48	<i>Acacia leiocalyx</i>																					2	metasediment	
49	<i>Acacia leiocalyx</i>																				<i>Gahnia aspera</i> , <i>Adiantum hispidulum</i> , <i>Sida cordifolia</i> *, <i>Oplismenus aemulus</i> , <i>Centella asiatica</i>			grassland with occasional T1
50	<i>Lophostemon confertus</i>																							Gully splits 1-2 Lophostemon from grassland.
51	<i>Lophostemon confertus</i>																					3		edge of grassland
53	<i>Eucalyptus crebra</i>																					6		Occasional scrub not sufficient to map.



ID	Tree1i	Tree1ii	Tree1iii	Tree1iv	Tree1v	Tree1vi	Tree2i	Tree2ii	Tree2iii	Tree2iv	Tree2v	Tree2vi	Shrub1i	Shrub1ii	Shrub1iii	Shrub1iv	Shrub1v	Shrub2i	Shrub2ii	shrub 2iii	Ground	T1 ht	Geology	Notes
54	<i>Eucalyptus crebra</i>																					10		slope
56	<i>Corymbia tessellaris</i>	<i>Corymbia clarksoniana</i>					<i>Banksia integrifolia</i>	<i>Allocasuarina littoralis</i>														12		
57	<i>Corymbia tessellaris</i>						<i>Banksia integrifolia</i>	<i>Allocasuarina littoralis</i>														12		
58	<i>Allocasuarina littoralis</i>	<i>Alphitonia excelsa</i>	<i>Banksia integrifolia</i>																			7		
59	<i>Corymbia clarksoniana</i>																					15		patch
60	<i>Corymbia clarksoniana</i>	<i>Corymbia tessellaris</i>	<i>Corymbia clarksoniana</i>																			15m west, 10m east		T1i to west 15m, T1ii and iii to east, 10m
61																					<i>Jasminum didymum</i> , <i>Abrus precatorius</i> , <i>Triumfetta rhomboidea</i> , <i>Imperata cylindrica</i> , <i>Eriachne pallescens</i> , <i>Xanthorrhoea latifolia</i> , <i>Stephania japonica</i> , <i>Passiflora suberosa</i> *			
62	<i>Lophostemon confertus</i>	<i>Corymbia clarksoniana</i>																			<i>Chamaecrista nomame</i>	15	sand	
63	<i>Corymbia citriodora</i>	<i>Eucalyptus crebra</i>																					metasediment	
64	<i>Corymbia citriodora</i>	<i>Eucalyptus crebra</i>																			<i>Murdannia graminea</i>			
65	<i>Melaleuca dealbata</i>																				<i>Cynodon dactylon</i>			Duck pond in resort. planted cotton trees
66	<i>Allocasuarina littoralis</i>	<i>Corymbia clarksoniana</i>	<i>Planchonia careya</i>	<i>Pittosporum ferrugineum</i>																		8		has been cleared (cut stumps present) but appears to achieve remnant status.
67	<i>Casuarina equisetifolia</i>																				<i>Cryptostegia grandiflora</i> *, <i>Jasminum didymum</i>			
68	<i>Drypetes deplanchei</i>	<i>Thespesia populnea</i>	<i>Ficus virens</i>	<i>Diospyros geminata</i>																				edge of scrub
69	<i>Casuarina equisetifolia</i>																				<i>Hibbertia scandens</i> , <i>Dactyloctenium radulans</i> , <i>Epaltes australis</i> , <i>Axonopus compressus</i>			
70	<i>Corymbia tessellaris</i>	<i>Cocos nucifera</i> *																			<i>Sporobolus pyramidalis</i> *			cleared
72	<i>Corymbia intermedia/clarksoniana</i>	<i>Eucalyptus portuensis</i>																				15	metasediment colluvium	
73	<i>Corymbia intermedia/clarksoniana</i>																					15	colluvium	break in slope towards ck
74	<i>Melaleuca quinquenervia</i>																							centreline ck
76	<i>Melaleuca quinquenervia</i>	<i>Livistona decora</i>																				10		1 Livistona
78	<i>Acacia leiocalyx</i>	<i>Melaleuca dealbata</i>	<i>Corymbia tessellaris</i>																			5		
79	<i>Melaleuca nervosa</i>	<i>Melaleuca viridiflora</i>																				6		remnant
80	<i>Avicenna marina</i> var. <i>eucalyptifolia</i>	<i>Rhizophora stylosa</i>																				3		3m2 basal sweep 1 of each T1. 2-5m tall



ID	Tree1i	Tree1ii	Tree1iii	Tree1iv	Tree1v	Tree1vi	Tree2i	Tree2ii	Tree2iii	Tree2iv	Tree2v	Tree2vi	Shrub1i	Shrub1ii	Shrub1iii	Shrub1iv	Shrub1v	Shrub2i	Shrub2ii	shrub 2iii	Ground	T1 ht	Geology	Notes
82	<i>Corymbia tessellaris</i>	<i>Corymbia clarksoniana</i>	<i>Alphitonia excelsa</i>																			10		Corymbia - 10m Alphitonia - 5m. Disturbed.
83	<i>Corymbia clarksoniana</i>	<i>Acacia disparrima</i>	<i>Acacia leiocalyx</i>																		<i>Wikstroemia indica</i>	6		
84	<i>Corymbia citriodora</i>																				<i>Pseuderanthemum variable</i>			Remnant in gully. In Gully along leeks dam.
86	<i>Acacia leiocalyx</i>																					5		
87	<i>Acacia leiocalyx</i>	<i>Corymbia citriodora</i>																				5		<i>Corymbia citriodora</i> taller nearby
88	<i>Acacia leiocalyx</i>	<i>Corymbia citriodora</i>	<i>Corymbia clarksoniana</i>																					Joins with <i>Corymbia clarksoniana</i> . Wattle 300°
89	<i>Acacia leiocalyx</i>	<i>Corymbia citriodora</i>	<i>Corymbia clarksoniana</i>																		<i>Geodorum densiflorum</i>			
90	<i>Corymbia citriodora</i>																							Canopy tall on creek
91	<i>Eucalyptus crebra</i>	<i>Eucalyptus portuensis</i>																				15		at edge with wattles
92	<i>Acacia leiocalyx</i>	<i>Corymbia citriodora</i>																				5		<i>Corymbia citriodora</i> - 17m at edge
93	<i>Melaleuca nervosa</i>																					5		2 x 10m patches, young
94	<i>Acacia leiocalyx</i>																					5		
95	<i>Acacia leiocalyx</i>																					5		
96	<i>Eucalyptus moluccana</i>																					17		on creek
97	<i>Eucalyptus moluccana</i>	<i>Acacia leiocalyx</i>																				5		Clearing.
98	<i>Acacia leiocalyx</i>																					5		small area of clearing
99	<i>Eucalyptus drepanophylla</i>	<i>Corymbia clarksoniana</i>					<i>Melaleuca nodosa</i>															12		T2 8m
100	<i>Eucalyptus moluccana</i>																							remnant on creek
101	<i>Acacia leiocalyx</i>	<i>Eucalyptus moluccana</i>																				10		
102	<i>Alphitonia excelsa</i>	<i>Acacia leiocalyx</i>	<i>Allocasuarina littoralis</i>																			5		1 <i>Eucalyptus moluccana</i> emergent
103	<i>Eucalyptus moluccana</i>																					14		
104	<i>Acacia leiocalyx</i>																					4		
105	<i>Eucalyptus moluccana</i>																							
106																								20m to west appears cleared
107	<i>Planchonia careya</i>	<i>Ficus obliqua</i>	<i>Pouteria sericea</i>	<i>Drypetes deplanchei</i>																			metasediment	too narrow for scrub community
108	<i>Casuarina equisetifolia</i>																							
109	<i>Casuarina equisetifolia</i>																							
110	<i>Drypetes deplanchei</i>	<i>Mallotus discolour</i>	<i>Exocarpos latifolius</i>	<i>Ficus opposita</i>	<i>Excoecaria agallocha</i>	<i>Alphitonia excelsa</i>																		small patch of scrub community
111	<i>Casuarina equisetifolia</i>																						beach	
112	<i>Excoecaria agallocha</i>	<i>Lumnitzera racemosa</i>																			<i>Sporobolus virginicus</i> , <i>Fimbristylis ferruginea</i>			Edge of weeds. T1 occasional.



ID	Tree1i	Tree1ii	Tree1iii	Tree1iv	Tree1v	Tree1vi	Tree2i	Tree2ii	Tree2iii	Tree2iv	Tree2v	Tree2vi	Shrub1i	Shrub1ii	Shrub1iii	Shrub1iv	Shrub1v	Shrub2i	Shrub2ii	shrub 2iii	Ground	T1 ht	Geology	Notes	
113	<i>Eucalyptus robusta</i>	<i>Melaleuca quinquenervia</i>											<i>Lantana camara</i> *									<i>Gahnia sieberiana</i>			<i>Melaleuca quinquenervia</i> is dead. From hole, deduce that it is a dying wetland.
115	<i>Melaleuca quinquenervia</i>	<i>Eucalyptus robusta</i>																				as per 114 transect		integral	
116	<i>Melaleuca dealbata</i>						<i>Alphitonia excelsa</i>	<i>Acacia disparrima</i>					<i>Lantana camara</i> *									10		T2 6m. Lantana is dense.	
117	<i>Melaleuca dealbata</i>						<i>Alphitonia excelsa</i>	<i>Acacia disparrima</i>					<i>Lantana camara</i> *									11		T2 6m. Lantana is dense.	
119	<i>Acacia leiocalyx</i>																					4			
120	<i>Melaleuca dealbata</i>	<i>Corymbia clarksoniana</i>	<i>Corymbia tessellaris</i>				<i>Acacia leiocalyx</i>						<i>Lantana camara</i> *									15			
121	<i>Acacia disparrima</i>	<i>Lantana camara</i> *	<i>Banksia integrifolia</i>	<i>Alphitonia excelsa</i>																		5			
122	<i>Melaleuca quinquenervia</i>																					<i>Cryptostegia grandiflora</i> *			
123	<i>Lophostemon suaveolens</i>	<i>Melaleuca dealbata</i>	<i>Corymbia tessellaris</i>																			15		Good condition	
125	<i>Corymbia tessellaris</i>	<i>Corymbia clarksoniana</i>	<i>Allocasuarina littoralis</i>	<i>Acacia julifera</i>																		6		Abundant Acacia.	
126	<i>Eucalyptus crebra</i>	<i>Eucalyptus exserta</i>					<i>Acacia leiocalyx</i>																rocky outcrop	Remnant	
127	<i>Eucalyptus crebra</i>																					7			
128	<i>Eucalyptus crebra</i>																					7			
129	<i>Corymbia citriodora</i>	<i>Eucalyptus crebra</i>																				15			
130	<i>Lophostemon confertus</i>	<i>Corymbia citriodora</i>					<i>Cupaniopsis anacardioides</i>																	<i>Corymbia citriodora</i> to the east. Low <i>Lophostemon</i> to the west. Gully. Collected tubers in gully to east.	
131	<i>Lophostemon confertus</i>	<i>Eucalyptus exserta</i>	<i>Eucalyptus portuensis</i>																			<i>Xanthorrhoea latifolia</i> , <i>Hardenbergia violacea</i>	5		<i>Lophostemon</i> is dominant.
133	<i>Lophostemon confertus</i>	<i>Eucalyptus portuensis</i>	<i>Eucalyptus fibrosa</i>																			<i>Desmodium brachypoda</i>	10		
134	<i>Diospyros geminata</i>	<i>Dendrobium discolor</i>																						gully	
135	<i>Corymbia citriodora</i>																							entry to canopy	
136	<i>Corymbia citriodora</i>	<i>Eucalyptus platyphylla</i>																							
137																							metasediment in creek		
138	<i>Lophostemon confertus</i>	<i>Eucalyptus platyphylla</i>																					sand		
139	<i>Corymbia clarksoniana</i>	<i>Eucalyptus portuensis</i>		<i>Callicarpa pedunculata</i>																					
141	<i>Acacia disparrima</i>	<i>Allocasuarina littoralis</i>																						regrowth	
150	<i>Corymbia clarksoniana</i>																							Remnant. Old fence post here.	
151	<i>Corymbia citriodora</i>	<i>Eucalyptus crebra</i>																						remnant	
152	<i>Corymbia clarksoniana</i>	<i>Eucalyptus platyphylla</i>																					metasediment rise		
153	<i>Corymbia citriodora</i>	<i>Eucalyptus portuensis</i>																					metasediment.	Gully	
154	<i>Acacia leiocalyx</i>	<i>Eucalyptus exserta</i>	<i>Allocasuarina littoralis</i>	<i>Melaleuca nervosa</i>	<i>Corymbia tessellaris</i>	<i>Grevillea banksii</i>																4	metasediment		
155	<i>Eucalyptus crebra</i>																					6			
156	<i>Acacia leiocalyx</i>																					2			



[illegible]



Dry Season Quaternaries				Dry Season Quaternaries			
Point Number	Point Type	Latitude	Longitude	Point Number	Point Type	Latitude	Longitude
3	Quaternaries	-23.180043	150.943894	86	Quaternaries	-23.184789	150.947199
4	Quaternaries	-23.181399	150.943987	87	Quaternaries	-23.185085	150.945977
5	Quaternaries	-23.182021	150.943855	90	Quaternaries	-23.184977	150.944316
6	Quaternaries	-23.183423	150.944902	91	Quaternaries	-23.181015	150.939974
7	Quaternaries	-23.183301	150.945427	92	Quaternaries	-23.180983	150.94067
8	Quaternaries	-23.183535	150.946242	93	Quaternaries	-23.181006	150.941247
10	Quaternaries	-23.182616	150.946496	94	Quaternaries	-23.180567	150.941484
11	Quaternaries	-23.181894	150.946216	95	Quaternaries	-23.1802	150.942496
12	Quaternaries	-23.181483	150.945961	96	Quaternaries	-23.181184	150.943425
13	Quaternaries	-23.180495	150.945512	97	Quaternaries	-23.181843	150.943545
14	Quaternaries	-23.179313	150.967919	100	Quaternaries	-23.182461	150.944302
15	Quaternaries	-23.179493	150.969518	101	Quaternaries	-23.183976	150.942861
16	Quaternaries	-23.178701	150.971771	102	Quaternaries	-23.184481	150.943361
17	Quaternaries	-23.178817	150.972659	104	Quaternaries	-23.182144	150.937245
18	Quaternaries	-23.179465	150.973461	resort	Quaternaries	-23.1792	150.9354
19	Quaternaries	-23.180247	150.973892	Dry Season Tertiaries			
20	Quaternaries	-23.180633	150.974239	24	Tertiaries	-23.183072	150.976603
21	Quaternaries	-23.179174	150.973899	25	Tertiaries	-23.182609	150.976389
22	Quaternaries	-23.179056	150.96374	46b	Tertiaries	-23.180088	150.963047
23	Quaternaries	-23.178586	150.961864	50	Tertiaries	-23.177096	150.958557
24	Quaternaries	-23.183072	150.976603	53	Tertiaries	-23.179182	150.958233
25	Quaternaries	-23.182609	150.976389	59	Tertiaries	-23.177976	150.950553
26	Quaternaries	-23.183261	150.974898	89	Tertiaries	-23.18454	150.945105
28	Quaternaries	-23.182444	150.97321	99	Tertiaries	-23.181804	150.944578
30	Quaternaries	-23.182524	150.967346	103	Tertiaries	-23.185441	150.944253
32a	Quaternaries	-23.184752	150.964627	Dry Season Secondaries			
32b	Quaternaries	-23.184172	150.964309	T1E	Secondaries	-23.175549	150.93678
33	Quaternaries	-23.183548	150.9639	T1M	Secondaries	-23.175327	150.937057
34	Quaternaries	-23.182764	150.96378	T1S	Secondaries	-23.175	150.937315
36	Quaternaries	-23.182011	150.964302	T2E	Secondaries	-23.176785	150.937645
37	Quaternaries	-23.180862	150.964818	T2M	Secondaries	-23.177034	150.937781
37	Quaternaries	-23.179877	150.96521	T2S	Secondaries	-23.177362	150.937929
38	Quaternaries	-23.179866	150.965215	T9S	Secondaries	-23.18384	150.946969
39	Quaternaries	-23.179526	150.965759	T9E	Secondaries	-23.184353	150.947742
40	Quaternaries	-23.178807	150.967758	T9M	Secondaries	-23.184155	150.947442
41	Quaternaries	-23.176318	150.967457	T27S	Secondaries	-23.182578	150.974206
43	Quaternaries	-23.175199	150.967375	T27M	Secondaries	-23.182845	150.973982
44	Quaternaries	-23.176604	150.966113	T27E	Secondaries	-23.183111	150.973641
45	Quaternaries	-23.176421	150.964932	T29S	Secondaries	-23.181947	150.971376
47	Quaternaries	-23.175234	150.957878	T29M	Secondaries	-23.1819	150.9711
49	Quaternaries	-23.177435	150.959219	T29E	Secondaries	-23.181574	150.970601
51	Quaternaries	-23.178236	150.957966	T31S	Secondaries	-23.182559	150.965098
52	Quaternaries	-23.178617	150.958241	T31M	Secondaries	-23.182956	150.965238
54	Quaternaries	-23.179416	150.958931	T31E	Secondaries	-23.183307	150.965372
55	Quaternaries	-23.17883	150.959428	T35S	Secondaries	-23.182488	150.964061
57	Quaternaries	-23.177751	150.960942	T35M	Secondaries	-23.182729	150.964351
58	Quaternaries	-23.17719	150.952614	T35E	Secondaries	-23.183193	150.964652
62	Quaternaries	-23.180635	150.94855	T42S	Secondaries	-23.176038	150.96688
63	Quaternaries	-23.179242	150.948672	T42M	Secondaries	-23.175836	150.967081
64	Quaternaries	-23.176199	150.952837	T42E	Secondaries	-23.175541	150.967405
65	Quaternaries	-23.176095	150.94786	T46aS	Secondaries	-23.176804	150.964303
66	Quaternaries	-23.178735	150.946792	T46aM	Secondaries	-23.176641	150.964535
67	Quaternaries	-23.177951	150.945135	T46aE	Secondaries	-23.176419	150.964849
68	Quaternaries	-23.177336	150.944049	T48M	Secondaries	-23.177043	150.959893
69	Quaternaries	-23.177775	150.94177	T48S	Secondaries	-23.176718	150.959595
70	Quaternaries	-23.178042	150.941089	T48E	Secondaries	-23.177164	150.960129
71	Quaternaries	-23.174728	150.937155	T56S	Secondaries	-23.178362	150.95994
72	Quaternaries	-23.174126	150.937851	T56M	Secondaries	-23.178526	150.9603
74	Quaternaries	-23.172236	150.937232	T56E	Secondaries	-23.178707	150.960707
75	Quaternaries	-23.171353	150.936343	T60S	Secondaries	-23.178487	150.951137
76	Quaternaries	-23.181121	150.937875	T60M	Secondaries	-23.178709	150.951439
77	Quaternaries	-23.187362	150.945909	T60E	Secondaries	-23.178974	150.951716
78	Quaternaries	-23.188108	150.946903	T61S	Secondaries	-23.178647	150.948312
79	Quaternaries	-23.187499	150.947312	T61M	Secondaries	-23.178992	150.948207
80	Quaternaries	-23.187858	150.947752	T61E	Secondaries	-23.17938	150.948224
81	Quaternaries	-23.187463	150.94802	T88E	Secondaries	-23.185099	150.945484
82	Quaternaries	-23.187162	150.948519	T88S	Secondaries	-23.185433	150.945433
83	Quaternaries	-23.187041	150.948654	T88M	Secondaries	-23.185136	150.945328
84	Quaternaries	-23.187065	150.949365	T98E	Secondaries	-23.181028	150.943753
85	Quaternaries	-23.185883	150.949196	T98M	Secondaries	-23.180834	150.943623
				T98S	Secondaries	-23.180492	150.943502

Note: S = transect start, M = middle and E = End









Wet Season Quaternaries				Wet Season Quaternaries				Wet Season Secondaries			
Point	Point Type	Latitude	Longitude	Point	Point Type	Latitude	Longitude	Point	Point Type	Latitude	Longitude
1	Quaternary	-23.176841	150.937756	90	Quaternary	-23.179743	150.953879	T55S	Secondary	-23.182151	150.94148
2	Quaternary	-23.176187	150.939685	91	Quaternary	-23.180236	150.953673	T61E	Secondary	-23.183711	150.946801
3	Quaternary	-23.17649	150.939643	92	Quaternary	-23.180505	150.953234	T61M	Secondary	-23.183438	150.946609
4	Quaternary	-23.177273	150.940174	93	Quaternary	-23.18009	150.952135	T61S	Secondary	-23.183132	150.946272
5	Quaternary	-23.178184	150.940849	94	Quaternary	-23.180043	150.951573	T71E	Secondary	-23.174252	150.957641
6	Quaternary	-23.1792	150.941466	95	Quaternary	-23.179956	150.951145	T71M	Secondary	-23.174608	150.957616
7	Quaternary	-23.180502	150.937824	96	Quaternary	-23.179869	150.95095	T71S	Secondary	-23.174998	150.957456
8	Quaternary	-23.180256	150.938159	97	Quaternary	-23.179467	150.950785	T75E	Secondary	-23.175094	150.959269
9	Quaternary	-23.179349	150.938361	98	Quaternary	-23.179253	150.950068	T75M	Secondary	-23.17483	150.959154
10	Quaternary	-23.17949	150.939408	99	Quaternary	-23.179086	150.94902	T75S	Secondary	-23.174468	150.95902
11	Quaternary	-23.179553	150.940122	100	Quaternary	-23.178959	150.949333	T77E	Secondary	-23.175627	150.956078
12	Quaternary	-23.179168	150.940619	101	Quaternary	-23.179511	150.949396	T77M	Secondary	-23.175925	150.956262
13	Quaternary	-23.179938	150.940535	102	Quaternary	-23.177296	150.94909	T77S	Secondary	-23.176337	150.956453
14	Quaternary	-23.178788	150.939094	103	Quaternary	-23.177182	150.948376	T81E	Secondary	-23.178056	150.972694
15	Quaternary	-23.178365	150.939109	104	Quaternary	-23.176908	150.948342	T81M	Secondary	-23.178348	150.972842
17	Quaternary	-23.177962	150.939009	105	Quaternary	-23.174833	150.947402	T81S	Secondary	-23.178781	150.973003
18	Quaternary	-23.179665	150.938902	106	Quaternary	-23.17331	150.947695	T85S	Secondary	-23.179348	150.953548
19	Quaternary	-23.180774	150.938705	107	Quaternary	-23.171006	150.941245	T85M	Secondary	-23.179627	150.953211
20	Quaternary	-23.180383	150.937066	108	Quaternary	-23.171692	150.950057	T85E	Secondary	-23.179876	150.95286
21	Quaternary	-23.179593	150.936972	109	Quaternary	-23.167539	150.954994	T114E	Secondary	-23.175249	150.961433
22	Quaternary	-23.178708	150.936837	110	Quaternary	-23.170409	150.953562	T114M	Secondary	-23.17536	150.96176
23	Quaternary	-23.178046	150.936695	111	Quaternary	-23.170154	150.953392	T114S	Secondary	-23.175676	150.962212
24	Quaternary	-23.178339	150.937133	112	Quaternary	-23.176834	150.940279	T118E	Secondary	-23.178084	150.962984
25	Quaternary	-23.178328	150.937625	115	Quaternary	-23.175404	150.962753	T118M	Secondary	-23.17817	150.963306
26	Quaternary	-23.172224	150.937219	113	Quaternary	-23.176676	150.962892	T118S	Secondary	-23.178282	150.963791
27	Quaternary	-23.171895	150.936752	116	Quaternary	-23.177082	150.962992	T124	Secondary	-23.179834	150.971998
28	Quaternary	-23.171385	150.93641	117	Quaternary	-23.177498	150.963545	T124M	Secondary	-23.179563	150.971894
29	Quaternary	-23.171094	150.935969	119	Quaternary	-23.178388	150.952154	T124S	Secondary	-23.179288	150.971371
30	Quaternary	-23.170581	150.935835	120	Quaternary	-23.179052	150.966382	T140S	Secondary	-23.1815	150.965363
31	Quaternary	-23.170143	150.935855	121	Quaternary	-23.179306	150.967137	T140M	Secondary	-23.181558	150.965848
32	Quaternary	-23.169634	150.935392	122	Quaternary	-23.179326	150.967898	T140E	Secondary	-23.181565	150.966328
33	Quaternary	-23.169428	150.93514	123	Quaternary	-23.179462	150.969931	T142S	Secondary	-23.1816	150.961951
34	Quaternary	-23.169082	150.93485	125	Quaternary	-23.180229	150.963172	T42M	Secondary	-23.182017	150.961767
35	Quaternary	-23.181677	150.962915	126	Quaternary	-23.180995	150.962135	T142E	Secondary	-23.18241	150.96163
36	Quaternary	-23.181719	150.962678	127	Quaternary	-23.181127	150.961861	T167E	Secondary	-23.179893	150.949091
37	Quaternary	-23.181772	150.962449	128	Quaternary	-23.181391	150.961776	T167M	Secondary	-23.1797	150.949243
38	Quaternary	-23.181824	150.961916	129	Quaternary	-23.181881	150.961479	T167S	Secondary	-23.179296	150.949419
39	Quaternary	-23.181233	150.963195	130	Quaternary	-23.182107	150.960866				
40	Quaternary	-23.180438	150.963324	131	Quaternary	-23.182372	150.960498				
41	Quaternary	-23.182567	150.962141	133	Quaternary	-23.181703	150.959348				
42	Quaternary	-23.183364	150.962602	134	Quaternary	-23.181768	150.958855				
43	Quaternary	-23.183378	150.962597	135	Quaternary	-23.180682	150.959903				
44	Quaternary	-23.183543	150.962908	136	Quaternary	-23.17963	150.960799				
45	Quaternary	-23.182934	150.964	137	Quaternary	-23.178968	150.960931				
46	Quaternary	-23.183325	150.964226	138	Quaternary	-23.178735	150.9607				
47	Quaternary	-23.184709	150.96539	139	Quaternary	-23.181157	150.964532				
48	Quaternary	-23.184938	150.965466	141	Quaternary	-23.18129	150.964226				
49	Quaternary	-23.185167	150.965227	150	Quaternary	-23.178655	150.971813				
50	Quaternary	-23.18646	150.964082	151	Quaternary	-23.171461	150.957664				
51	Quaternary	-23.186483	150.963207	152	Quaternary	-23.168918	150.958289				
53	Quaternary	-23.186276	150.934324	153	Quaternary	-23.168283	150.958388				
54	Quaternary	-23.185612	150.936367	154	Quaternary	-23.158865	150.962919				
56	Quaternary	-23.187919	150.947892	155	Quaternary	-23.160743	150.963508				
57	Quaternary	-23.187074	150.947231	156	Quaternary	-23.163357	150.963874				
58	Quaternary	-23.186442	150.946274	157	Quaternary	-23.16567	150.963572				
59	Quaternary	-23.185209	150.945812	158	Quaternary	-23.170797	150.964701				
60	Quaternary	-23.1843	150.945817	159	Quaternary	-23.174047	150.970502				
62	Quaternary	-23.181455	150.944116	160	Quaternary	-23.175828	150.974022				
63	Quaternary	-23.181631	150.944377	161	Quaternary	-23.177447	150.975685				
64	Quaternary	-23.181957	150.945502	162	Quaternary	-23.178028	150.976594				
65	Quaternary	-23.181288	150.937662	163	Quaternary	-23.180762	150.980517				
66	Quaternary	-23.187625	150.945206	164	Quaternary	-23.18046	150.98331				
67	Quaternary	-23.190196	150.949763	166	Quaternary	-23.176993	150.956011				
68	Quaternary	-23.188744	150.955823	168	Quaternary	-23.169372	150.93633				
69	Quaternary	-23.189821	150.95576	169	Quaternary	-23.16872	150.93466				
70	Quaternary	-23.177877	150.9348	170	Quaternary	-23.171844	150.946478				
72	Quaternary	-23.172847	150.958666								
73	Quaternary	-23.173255	150.959233	Wet Season Tertiaries							
74	Quaternary	-23.173731	150.959327	80	Tertiary	-23.173433	150.954772				
76	Quaternary	-23.174661	150.958511	132	Tertiary	-23.182496	150.960043				
78	Quaternary	-23.175557	150.955843	165	Tertiary	-23.17945	150.992312				
79	Quaternary	-23.175186	150.955777	Wet Season Secondaries							
82	Quaternary	-23.178564	150.964916	T16S	Secondary	-23.177925	150.939393				
83	Quaternary	-23.177826	150.961437	T16M	Secondary	-23.177772	150.939036				
84	Quaternary	-23.178995	150.953486	T16E	Secondary	-23.177699	150.938617				
86	Quaternary	-23.179735	150.954134	T52S	Secondary	-23.186139	150.962604				
87	Quaternary	-23.179638	150.95434	T52M	Secondary	-23.186273	150.962778				
88	Quaternary	-23.179344	150.954228	T52E	Secondary	-23.186548	150.963014				
89	Quaternary	-23.179864	150.95445	T55E	Secondary	-23.181602	150.941973				
				T55M	Secondary	-23.181831	150.94177				



## APPENDIX D – Wetland Assessment Pro formas



	HYDROLOGY ASSESSMENT						VEGETATION ASSESSMENT			SOILS ASSESSMENT																						
SITE NUMBER	Landscape Feature <sup>1</sup>	Wetland soils <sup>2</sup>	Wetland landform Pattern <sup>3</sup>	Wetland landform element <sup>4</sup>	Depth to watertable (cm)	Anecdotal Evidence	Type (2°,3° or 4°)	Species / Layer / Height	Image	WETLAND SOILS Organic material <sup>5</sup>	P Horizon (Y/N)	Thickness of P Horizon (cm)	WETLAND SOIL INDICATORS Organic material (within 0.3m of soils surface (Y/N)	Thickness of organic material (cm)	Texture qualifier (Fabric, Sapric, Hemic)	ACID SULFATE MATERIALS Hydrogen sulphide gas (Y/N)	Monosulphide black ooze (Y/N)	Sulphuroius segregations (Y/N)	Grey colours (Y/N)	Thickness of gley layer (cm)	Depth of gley layer (cm)	Soil water interface (Y/N)	Depth of soil water interface	Mottles (<0.3m of surface) (Y/N)	Segregations (<0.3m of surface) (Y/N)	Ferruginous root channel and pore linings (<0.3m of surface) (Y/N)	SOIL MATRIX CHROMA Are chroma values ≤2 in wettest lowest lying area ? (Y/N)	Do chroma values decrease moving into the wetland from sites considered outside? (Y/N)	Image			
1	x	N	BEA	BRI		Dry deep white – grey sandy profile	4	Melaleuca dealbata T1 14-18m		N	N	-	N	-	-	N	N	N	N	-	-	N	-	N	N	N	N	N	N			
2	x	N	BEA	BRI		Site elevated above tidal influence (see photo)	4	Acacia disparrima T1 3-5m																					x			
3	x	N	BEA	BRI			4	Corymbia intermedia T1 4-8m	x																				x			
4	x	N	BEA	STF			4	Melaleuca dealbata Excoecaria agallocha T1 5-8m		K	-	-	N	-	-	Y (mild)	N	N	-	-	-	N	-	N	N	N	Y	Y				
5	x	Y	BEA	BRI			4	Melaleuca quinquenervia T1 8-13m	x	R	Y	Z	Y	Z	Hemic	N	N	N	Y	30	5			Y	N	N	-	-				



[illegible]



[illegible]







## APPENDIX E – Consolidated Flora Species List



Family Name	Status	Botanical Name	Common Name	Herbrecs	Sep-10		Feb-11	
					Quaternaries Dry	Secondaries Dry	Quaternaries Wet	Secondaries Wet
Cyperaceae		<i>Abidgaardia ovata</i>	A Sedge			x		x
Fabaceae		<i>Abrus precatorius</i>	Crab's Eye			x	x	x
Malvaceae		<i>Abutilon albescens</i> var. <i>australiense</i>	Coastal Lantern Flower	x		x		
Mimosaceae		<i>Acacia disparima</i> subsp. <i>disparima</i>	Hickory Wattle		x		x	x
Mimosaceae		<i>Acacia julifera</i> subsp. <i>julifera</i>	Julie's Wattle	x	x	x	x	x
Mimosaceae	local	<i>Acacia leiocalyx</i> subsp. <i>leiocalyx</i>	Black Wattle	x	x	x	x	x
Mimosaceae	(p)	<i>Acacia salicina</i>	Sally Wattle		x			
Amaranthaceae		<i>Achyranthes aspera</i>	Chaff Flower	x	x			
Rutaceae		<i>Acronychia laevis</i>	Glossy Acronychia	x	x	x	x	
Pteridaceae		<i>Acrostichum speciosum</i>	Mangrove Fern	x				
Adiantaceae		<i>Adiantum hispidulum</i> var. <i>hispidulum</i>	Rough Maidenhair	x	x	x	x	
Myrsinaceae		<i>Aegiceras comiculatum</i>	River Mangrove	x				
Agavaceae	*	<i>Agave vivipara</i>	Agave		x	x		
Asteraceae	*	<i>Ageratum conyzoides</i> subsp. <i>conyzoides</i>	Billygoat Weed	x		x		
Asteraceae	*	<i>Ageratum houstonianum</i>	Blue Billygoat Weed		x	x	x	x
Casuarinaceae		<i>Allocasuarina littoralis</i>	Black Sheoak	x	x	x	x	x
Poaceae		<i>Allopteropis semialata</i>	Cockatoo Grass			x		x
Rhamnaceae		<i>Alphitonia excelsa</i>	Red Ash		x	x	x	x
Loranthaceae		<i>Amymenia conspicua</i> subsp. <i>conspicua</i>	Mistletoe	x	x	x		x
Ulmaceae		<i>Aphananthe philippinensis</i>	Native Elm		x			
Araucariaceae	(p)	<i>Araucaria cunninghamii</i>	Hoop Pine		x			
Araucariaceae	(p)	<i>Araucaria heterophylla</i>	Norfolk Island Pine		x			
Boraginaceae		<i>Argusia argentea</i>	Octopus Bush					
Poaceae		<i>Aristida gracilipes</i>	Wiregrass	x				
Poaceae		<i>Aristida holathera</i> var. <i>holathera</i>	Wiregrass	x				
Poaceae		<i>Aristida queenslandica</i> var. <i>queenslandica</i>	Wiregrass			x		x
Poaceae		<i>Aristida warburgii</i>	Wiregrass			x		
Poaceae		<i>Arundinella nepalensis</i>	Reedgrass		x	x		x
Sapindaceae		<i>Arytera divaricata</i>	Rose Tamarind		x			
Apocynaceae	*	<i>Asclepias curassavica</i>	Red Head Cotton Bush	x				
Asteraceae	*	<i>Aster subulatus</i>	Wild Aster	x				
Avicenniaceae		<i>Avicennia marina</i> subsp. <i>australasica</i>	Grey Mangrove	x				
Avicenniaceae		<i>Avicennia marina</i> subsp. <i>eucalyptifolia</i>	Grey Mangrove	x		x	x	
Poaceae	*	<i>Axonopus compressus</i>	Broadleaf Carpet Grass			x	x	
Proteaceae		<i>Banksia integrifolia</i> subsp. <i>compar</i>	Coastal Banksia	x	x	x	x	x
Cyperaceae		<i>Baumea juncea</i>	Bare Twigrush	x		x		
Asteraceae	*	<i>Bidens bipinnata</i>	Cobblers Peg			x		x
Asteraceae	*	<i>Bidens pilosa</i>	Cobblers Peg		x			
Blechnaceae		<i>Blechnum indicum</i>	Bungwall Fern	x		x		x
Asteraceae		<i>Blumea mollis</i>	Pink flowered Blumea	x				
Nyctaginaceae		<i>Boerhavia pubescens</i>	A Tar Vine	x	x			
Convolvulaceae		<i>Bonania media</i>				x		x
Rutaceae		<i>Boronia occidentalis</i>		x	x		x	
Poaceae	*	<i>Bothriochloa pertusa</i>	Indian Bluegrass				x	x
Nyctaginaceae	*	<i>Bougainvillea</i> sp.	Bougainvillea		x			
Asteraceae		<i>Bracteantha bracteata</i>	Paper Daisy			x		x
Phyllanthaceae		<i>Breynia oblongifolia</i>	Coffee Bush		x			x
Acanthaceae		<i>Brunoniella acaulis</i> subsp. <i>ciliata</i>		x		x		x
Acanthaceae		<i>Brunoniella australis</i>			x	x	x	
Cyperaceae		<i>Bulbostylis barbata</i>	Watergrass			x		
Lamiaceae		<i>Callicarpa pedunculata</i>	Velvet Leaf			x	x	
Dicksoniaceae		<i>Calochortus dubia</i>	soft bracken			x		
Asteraceae		<i>Calotis lappulacea</i>	Yellow Burr-daisy	x				x
Fabaceae		<i>Canavalia rosea</i>	Beach Bean		x	x		
Fabaceae	local	<i>Canavalia sericea</i>	Silky Jackbean	x				
Capparaceae		<i>Capparis arborea</i>	Bush Caper Berry					
Capparaceae		<i>Capparis canescens</i>	Wild Orange	x		x		
Aizoaceae		<i>Carpobrotus glaucescens</i>	Angular Pigface	x				
Apocynaceae	*	<i>Cascabela thevetia</i>	Yellow Oleander	x				
Caesalpinhiaceae	*	<i>Cassia coluteoides</i> *				x	x	
Lauraceae		<i>Cassytha filiformis</i>				x		x
Casuarinaceae		<i>Casuarina equisetifolia</i>			x		x	
Apocynaceae	*	<i>Catharanthus roseus</i>				x		
Viaceae		<i>Cayratia trifolia</i>		x				
Poaceae		<i>Cenchrus ciliaris</i>				x		
Poaceae	*	<i>Cenchrus echinatus</i>				x		x
Apiaceae		<i>Centella asiatica</i>		x		xx	x	x
Asteraceae		<i>Centipeda minima</i> subsp. <i>minima</i>		x				
Rhizophoraceae		<i>Cer tops tagal</i>		x				
Caesalpinhiaceae		<i>Chamaecrista concinna</i>				x		
Caesalpinhiaceae		<i>Chamaecrista nomame</i>				x	x	
Caesalpinhiaceae	*	<i>Chamaecrista rotundifolia</i>				x		
Adiantaceae		<i>Cheilanthes sieberi</i>			x		x	x
Chenopodiaceae		<i>Chenopodium carinatum</i>	Crumb Weed	x	x			
Poaceae	*	<i>Chloris divaricata</i> var. <i>divaricata</i>		x				
Poaceae		<i>Chloris gayana</i>	Rhodes Grass			x		
Poaceae	*	<i>Chloris inflata</i>		x	x			
Poaceae	*	<i>Chloris ventricosa</i>	Feathertop Rhodes Grass	x				
Thelypteridaceae		<i>Christella dentata</i>		x				
Arecaceae	*	<i>Chrysaldodocarpus lutescens</i>	Golden Cane Palm		x			
Poaceae		<i>Chrysopogon fallax</i>				x		x
Asteraceae	*	<i>Cirsium vulgare</i>		x				
Viaceae		<i>Cissus oblonga</i>		x		x		
Viaceae		<i>Clematicissus opaca</i>		x				
Lamiaceae		<i>Clerodendrum floribundum</i>			x			x
Lamiaceae		<i>Clerodendrum inermis</i>					x	
Arecaceae	*	<i>Cocos nucifera</i> *			x	x	x	
Commelinaceae		<i>Commelina ensifolia</i>		x				
Asteraceae	*	<i>Conyza bonariensis</i>						
Asteraceae	*	<i>Conyza canadensis</i> var. <i>pusilla</i>				x		
Boraginaceae		<i>Cordia dichotoma</i>		x				
Myrtaceae		<i>Corymbia citriodora</i> subsp. <i>citriodora</i>	Lemon-scented Gum	x	x	x	x	
Myrtaceae		<i>Corymbia clarkstoniana</i>	Clarkson's Bloodwood	x	x	x	x	x
Myrtaceae		<i>Corymbia intermedia</i>	Pink Bloodwood			x	x	
Myrtaceae		<i>Corymbia tessellaris</i>	Moreton Bay Ash	x	x	x	x	x
Amaryllidaceae		<i>Crinum flaccidum</i>						
Fabaceae		<i>Crotolaria medicaginea</i> var. <i>neglecta</i>	Trefoil Rattlepod		x			
Fabaceae		<i>Crotolaria montana</i>			x	x		x
Apocynaceae	* class 2	<i>Cryptostegia grandiflora</i>	Rubber Vine	x	x	x	x	x
Cucurbitaceae	*	<i>Cucumis maderaspatanus</i>		x				
Sapindaceae		<i>Cupaniopsis anacardioides</i>	Tuckeroo		x			
Asteraceae		<i>Cyanthillium cinereum</i>		x		x		
Rubiaceae		<i>Cyclophyllum coprosmoides</i>	Coast Canthium				x	
Thelypteridaceae		<i>Cyclosorus interruptus</i>		x				
Poaceae		<i>Cymbopogon bombycinus</i>				x		x
Poaceae		<i>Cymbopogon refractus</i>				x	x	x
Poaceae	*	<i>Cynodon dactylon</i>				x	x	
Cyperaceae		<i>Cyperus conicus</i> var. <i>conicus</i>				x		
Cyperaceae		<i>Cyperus difformis</i>				x	x	
Cyperaceae		<i>Cyperus eglobosus</i>		x				
Cyperaceae		<i>Cyperus enervis</i>		x				
Cyperaceae		<i>Cyperus javanicus</i>		x				
Cyperaceae		<i>Cyperus polystachyos</i>		x				
Cyperaceae		<i>Cyperus rotundus</i>				x		
Cyperaceae		<i>Cyperus scarious</i>		x				
Cyperaceae	local	<i>Cyperus stradbrokeensis</i>				x		x
Poaceae		<i>Dactyloctenium radicans</i>	Button Grass			x	x	
Fabaceae	*	<i>Delonix regia</i>	Poinciana		x			
Rubiaceae		<i>Dentella repens</i>		x				
Fabaceae		<i>Desmodium brachypoda</i>		x		x	x	
Fabaceae		<i>Desmodium gunnii</i>			x			
Fabaceae		<i>Desmodium rhytidophyllum</i>				x		
Hemerocallidaceae		<i>Dianella caerulea</i> var. <i>protensa</i>		x	x	x	x	x
Hemerocallidaceae		<i>Dianella rara</i>			x	x		
Poaceae		<i>Digitaria ammiophila</i>				x		x
Poaceae		<i>Digitaria hystichoides</i>		x				
Poaceae		<i>Digitaria ranularis</i>				x		x
Poaceae	*	<i>Digitaria violascens</i>		x				
Ebenaceae		<i>Diospyros geminata</i>		x	x	x		
Sapindaceae		<i>Dodonaea viscosa</i>			x	x	x	x



Polypodiaceae		<i>Drynaria rigidula</i>		x	x				
Polypodiaceae		<i>Drynaria sparsisora</i>		x	x				
Putranjivaceae		<i>Drypetes deplanchei</i>			x	x			
Verbenaceae	*	<i>Duranta erecta</i>	Duranta		x		x		x
Chenopodiaceae		<i>Eradia hastata</i>		x					
Celastraceae		<i>Elaeodendron melanocarpum</i>		x					
Cyperaceae		<i>Eleocharis equisetina</i>		x					
Cyperaceae		<i>Eleocharis geniculata</i>		x					
Asteraceae	*	<i>Emilia sonchifolia</i> var. <i>javanica</i>	Little Emily	x	x	x			x
Poaceae		<i>Enneapogon lindleyanus</i>		x					
Poaceae		<i>Enneapogon robustissimus</i>		x					
Poaceae		<i>Enteropogon unispiceus</i>		x		x	x		x
Poaceae		<i>Entolasia stricta</i>			x	x			
Asteraceae		<i>Epaltes australis</i>		x		x	x		x
Poaceae		<i>Eragrostis brownii</i>		x					
Poaceae		<i>Eragrostis curvula</i>				x			
Poaceae		<i>Eragrostis interrupta</i>				x			
Poaceae		<i>Eragrostis sororia</i>				x			x
Poaceae		<i>Eragrostis spartinoidea</i>		x					
Poaceae		<i>Eremochloa bimaculata</i>				x			
Poaceae		<i>Eriachne pallescens</i> var. <i>pallescens</i>				x	x		x
Poaceae		<i>Eriachne rana</i>		x					
Poaceae	Local	<i>Eriachne stipacea</i>							
Poaceae		<i>Eriochloa procera</i>		x					
Myrtaceae		<i>Eucalyptus camaldulensis</i>	River Red Gum	x	x	x	x		
Myrtaceae		<i>Eucalyptus crebra</i>	Narrow-leaved Ironbark	x	x	x	x		x
Myrtaceae		<i>Eucalyptus drepanophylla</i>	Grey Ironbark						
Myrtaceae		<i>Eucalyptus exserta</i>	Queensland Peppermint	x	x	x	x		x
Myrtaceae		<i>Eucalyptus fibrosa</i> subsp. <i>fibrosa</i>	Broad-leaved Ironbark			x			
Myrtaceae		<i>Eucalyptus moluccana</i>	Grey Box	x	x		x		x
Myrtaceae		<i>Eucalyptus platyphylla</i>	Poplar Gum		x	x	x		x
Myrtaceae		<i>Eucalyptus portuensis</i>	White Mahogany	x	x	x	x		
Myrtaceae	local	<i>Eucalyptus robusta</i>	Swamp Mahogany	x		x			x
Myrtaceae		<i>Eucalyptus tereticornis</i>	Red Gum		x	x			
Euphorbiaceae	*	<i>Euphorbia cyathophora</i>				x	x		
Anacardiaceae		<i>Euroschinus falcatus</i>			x				
Lamniaceae		<i>Eustrephus latifolius</i>	Wombat Berry		x	x			
Convolvulaceae		<i>Evolvulus albinoides</i>				x			x
Convolvulaceae		<i>Evolvulus pilosus</i>	Blue eyes		x				
Euphorbiaceae		<i>Excoecaria agallocha</i>	Blind your eye mangrove			x	x		
Santalaceae		<i>Exocarpos latifolius</i>	Native Cherry			x	x		
Moraceae		<i>Ficus benjamina</i>			x				
Moraceae		<i>Ficus congesta</i> var. <i>congesta</i>		x					
Moraceae		<i>Ficus hispida</i>							
Moraceae		<i>Ficus obliqua</i>			x	x	x		x
Moraceae		<i>Ficus opposita</i>		x		x			x
Moraceae		<i>Ficus rubiginosa</i> var. <i>glabrescens</i>		x					
Moraceae		<i>Ficus rubiginosa</i> var. <i>rubiginosa</i>		x					
Moraceae		<i>Ficus virens</i> var. <i>subanceolata</i>		x					
Moraceae		<i>Ficus virens</i> var. <i>virens</i>		x	x	x	x		
Cyperaceae		<i>Fimbristylis acicularis</i>				x			x
Cyperaceae		<i>Fimbristylis cinnamometorum</i>							x
Cyperaceae		<i>Fimbristylis dichotoma</i>		x		x			x
Cyperaceae		<i>Fimbristylis ferruginea</i>		x		x	x		
Cyperaceae		<i>Fimbristylis microcarpa</i>		x		x			
Cyperaceae		<i>Fimbristylis nutans</i>		x					
Cyperaceae		<i>Fimbristylis polytrichoides</i>		x					
Fabaceae		<i>Flemingia parviflora</i>				x			x
Cyperaceae		<i>Gahnia aspera</i>			x		x		x
Cyperaceae		<i>Gahnia sieberiana</i>		x		xx	x		x
Hereroacaliaceae		<i>Gettonopogon cymosum</i>							
Orchidaceae		<i>Geodorum densiflorum</i>				x	x		
Phyllanthaceae		<i>Glochidion lobocarpum</i>		x	x	x			x
Phyllanthaceae		<i>Glochidion sumatranum</i>		x	x				x
Asteraceae		<i>Glossocardia bidens</i>		x		x			x
Fabaceae		<i>Glycine tabacina</i>			x	x			
Fabaceae		<i>Glycine tomentella</i>			x	x			x
Proteaceae		<i>Grevillea banksii</i>				x	x		x
Fabaceae		<i>Hardenbergia violacea</i>					x		
Asteraceae	*	<i>Helianthus argophyllus</i>		x					
Boraginaceae		<i>Heliotropium pauciflorum</i>				x			x
Poaceae		<i>Heteropogon contortus</i>	Barbed-wire Grass	x	x	x	x		
Dileniaceae	local	<i>Hibbertia linearis</i> var. <i>floribunda</i>		x					
Dileniaceae		<i>Hibbertia scandens</i>		x	x	x	x		
Dileniaceae		<i>Hibbertia stricta</i>			x				
Dileniaceae		<i>Hibbertia vestita</i>		x		x			x
Malvaceae	*	<i>Hibiscus cultivar</i>	Hibiscus		x				
Malvaceae		<i>Hibiscus ilicicus</i>		x	x				
Apocynaceae		<i>Hoya australis</i> subsp. <i>australis</i>		x					
Violaceae		<i>Hybanthus enneaspermus</i>	Spade Flower			x			x
Violaceae		<i>Hybanthus stellarioides</i>	Spade Flower			x			x
Poaceae	*	<i>Hypantheria rufa</i>	Thatch Grass		x				
Lamiaceae	*	<i>Hyptis suaveolens</i>		x	x	x			x
Poaceae		<i>Imperata cylindrica</i>	Blady Grass	x	x	x	x		x
Fabaceae		<i>Indigofera pratensis</i>				x			x
Convolvulaceae		<i>Iponomea pes-caprae</i> subsp. <i>brasiliensis</i>	Goats foot convolvulus		x				
Bignoniaceae	*	<i>Jacaranda mimosifolia</i>	Jacaranda						
Fabaceae		<i>Jacksonia scoparia</i>			x	x	x		
Sapindaceae		<i>Jagera pseudorhus</i> var. <i>pseudorhus</i>		x	x	x			
Oleaceae		<i>Jasminum didymum</i> subsp. <i>didymum</i>		x	x	xx	x		x
Oleaceae		<i>Jasminum simplicifolium</i> subsp. <i>australiense</i>		x	x				
Juncaceae		<i>Juncus continuus</i>		x					
Juncaceae		<i>Juncus kraussii</i>		x		x			
Juncaceae		<i>Juncus polyanthemus</i>		x					
Verbenaceae	* Class 3	<i>Lantana camara</i>	Lantana			x	x		x
Verbenaceae	* Class 3	<i>Lantana montevidensis</i>	Creeping Lantana			x	x		
Poaceae		<i>Leersia hexandra</i>	Swamp Ricegrass			x	x		
Cyperaceae		<i>Lepidosperma laterale</i> var. <i>laterale</i>		x		x	x		x
Poaceae		<i>Leptochloa decipiens</i> var. <i>decipiens</i>				x			x
Myrtaceae		<i>Leptospermum neglectum</i>		x	x		x		x
Poaceae		<i>Lepturus repens</i>							
Fabaceae	*	<i>Leucaena leucoccephala</i>							
Ericaceae		<i>Leucopogon leptospermoides</i>		x		x			x
Plumbaginaceae		<i>Limonium solanderi</i>		x					
Lindsaeaceae		<i>Lindsaea ensifolia</i> subsp. <i>ensifolia</i>		x					
Myrtaceae		<i>Lithomyrtus obtusa</i>		x	x		x		x
Areaceae		<i>Livistona decora</i>			x	xx	x		x
Campanulaceae		<i>Lobelia membranacea</i>		x					
Laxmaniaceae		<i>Lomandra confertifolia</i> subsp. <i>pallida</i>		x		x			x
Laxmaniaceae		<i>Lomandra filiformis</i>				x			
Laxmaniaceae		<i>Lomandra leucocephala</i> subsp. <i>leucocephala</i>		x	x	x			x
Laxmaniaceae		<i>Lomandra longifolia</i>				x			
Laxmaniaceae		<i>Lomandra multiflora</i>				x			
Myrtaceae		<i>Lophostemon confertus</i>	Brush Box	x	x	x	x		x
Myrtaceae		<i>Lophostemon suaveolens</i>	Swamp Box	x	x	x	x		x
Onacraceae		<i>Ludwigia octovalvis</i>	Willow Primrose						
Combretaceae		<i>Lumnitzera racemosa</i>		x		x	x		
Schizaeaceae		<i>Lygodium microphyllum</i>		x					
Loranthaceae		<i>Lysiana maritima</i>	A Mistletoe			x			
Euphorbiaceae		<i>Macaranga lanarius</i>	Macaranga	x		x			x
Aizoaceae		<i>Macarthuria neocambica</i>			x				
Fabaceae	*	<i>Macroptilium atropurpureum</i>	Siratro		x				
Euphorbiaceae		<i>Mallotus discolor</i>		x	x	x			
Malvaceae	*	<i>Malvastrum coromandelianum</i> subsp. <i>coromandelianum</i>		x		x			
Lamiaceae	*	<i>Marrubium vulgare</i>	Horehound			x			
Asclepiadaceae		<i>Marsdenia brevis</i>			x	xx	x		x
Poaceae	*	<i>Mesophyllum maximum</i>	Guinea Grass		x	x	x		
Myrtaceae		<i>Melaleuca dealbata</i>	Silver-leaf Paperbark	x	x				
Myrtaceae		<i>Melaleuca nervosa</i>	Paperbark	x		x	x		x
Myrtaceae		<i>Melaleuca nervosa</i> subsp. <i>nervosa</i>		x					
Myrtaceae		<i>Melaleuca quinquenervia</i>	Broad-leaved Tea Tree	x	x		x		x
Myrtaceae		<i>Melaleuca viridiflora</i> var. <i>viridiflora</i>	Swamp Tea Tree	x		xx	x		x



Poaceae	*	<i>Melinis minutiflora</i>	Molasses Grass	x	x	x			x
Poaceae	*	<i>Melinis repens</i>				x			
Polypodiaceae		<i>Microsorium grossum</i>		x	x				
Polypodiaceae		<i>Microsorium punctatum</i>				x			
Loganiaceae		<i>Mitrasacme cymaea</i>	Pygmy Bishop's Hat			x			x
Fabaceae		<i>Mucuna gigantea</i>		x					
Cucurbitaceae		<i>Mukia maderaspatana</i>			x				
Commelinaceae		<i>Murdannia graminea</i>		x		x		x	x
Myoporaceae		<i>Myoporum acuminatum</i>	Beach Myopororum						
Mimosaceae		<i>Neptunia gracilis</i>				x			
Poaceae		<i>Oplismenus aemulus</i>			x		x		
Poaceae		<i>Oplismenus hirtellus</i>				x			x
Cactaceae	* class 2	<i>Opuntia stricta</i>	Common Prickly Pear		x	x		x	x
Myrtaceae		<i>Osbornia octodonta</i>		x					
Poaceae		<i>Ottochloa gracillima</i>				x			x
Poaceae		<i>Ottochloa nodosa</i>		x		x			x
Oxalidaceae		<i>Oxalis radiciosa</i>		x					
Asteraceae		<i>Ozothamnus cassinioides</i>		x					
Pandanaceae		<i>Pandanus tectorius</i>				x		x	
Blignoniaceae		<i>Pandorea pandorana</i>		x	x				x
Poaceae		<i>Panicum effusum</i>							x
Apocynaceae		<i>Parsonsia plaesiophylla</i>	Parsonsia		x				
Poaceae		<i>Paspalidium distans</i>		x		x			x
Poaceae		<i>Paspalidium gausum</i>				x			
Poaceae		<i>Paspalidium gracile</i>				x			
Poaceae		<i>Paspalum argenteum</i>				x		x	
Poaceae	*	<i>Paspalum plicatulum</i>							
Poaceae		<i>Paspalum scrobiculatum</i>		x		x			x
Poaceae		<i>Paspalum vaginatum</i>							
Passifloraceae	*	<i>Passiflora foetida</i>	stinking Passionfruit	x	x				
Passifloraceae	*	<i>Passiflora suberosa</i>	Corky Passionfruit			x		x	x
Poaceae	*	<i>Pennisetum ciliare</i>		x					
Asteraceae		<i>Peripleura diffusa</i>		x		x			x
Poaceae	*	<i>Perotis rara</i>	Comet Grass		x				
Picrodendraceae		<i>Petalostigma pubescens</i>	Quinine Berry	x	x	x			x
Poaceae		<i>Phragmites australis</i>		x					
Phyllanthaceae		<i>Phyllanthus fuemirohii</i>		x					
Phyllanthaceae		<i>Phyllanthus virgatus</i>		x		x			x
Coniferae	*	<i>Pinus sp.</i>	Exotic Pine		x				
Urticaceae		<i>Pipturus argenteus</i>		x		x			
Pittosporaceae		<i>Pittosporum ferrugineum subsp. linifolium</i>		x				x	x
Lecythidaceae		<i>Planchonia careya</i>	Cocky Apple	x	x	x		x	x
Apocynaceae	*	<i>Plumeria rubra</i>	Frangipani		x				
Polygalaceae		<i>Polygala sp (aff. linearifolia 'tr')</i>				x			x
Fabaceae		<i>Pongamia pinnata</i>				x			
Phyllanthaceae		<i>Poranthura microphylla</i>	Native Wisteria						
Sapotaceae	local	<i>Pouteria sericea</i>				x		x	
Acanthaceae		<i>Pseuderanthemum variabile</i>	Love Flower		x	x		x	x
Asteraceae		<i>Pseudognaphalium luteoalbum</i>		x					
Dennistaedtiaceae		<i>Pteridium esculentum</i>		x	x	x			x
Asteraceae		<i>Pterocaulon redolens</i>		x		x			
Ramalinaceae		<i>Ramalina litorea</i>		x					
Rhizophoraceae		<i>Rhizophora stylosa</i>		x		x		x	
Commelinaceae	*	<i>Rhoeo discolor</i>	Rhoea		x				
Rubiaceae	*	<i>Richardia brasiliensis</i>		x		x			x
Chenopodiaceae		<i>Sarcocornia quinqueflora</i>				x			
Goodeniaceae		<i>Scaevola calendulacea</i>		x					
Araliaceae		<i>Schefflera actinophylla</i>	Umbrella Tree	x	x				
Araliaceae	*	<i>Schefflera digitata</i>	New Zealand umbrella tree			x			
Guttariaceae		<i>Schenkia australis</i>	Spiked Century						
Poaceae		<i>Schizachyrium fragile</i>	Firegrass						
Poaceae		<i>Scleria brownei</i>				x			
Poaceae		<i>Scleria ciliaris</i>		x					
Poaceae		<i>Scleria mackayensis</i>				x			x
Flacourtiaceae		<i>Scolopia braunii</i>		x		x			x
Caesalpinaceae		<i>Senna gaudichaudii</i>		x					
Caesalpinaceae	*	<i>Senna occidentalis</i>			x				
Caesalpinaceae	*	<i>Senna pendula</i>				x			
Alzooaceae		<i>Sesuvium portulacastrum</i>	Sea Purslane						
Malvaceae		<i>Sida aethiopiflora</i>		x		x			x
Malvaceae	*	<i>Sida cordifolia</i>	Flannel Weed	x	x	x		x	x
Malvaceae		<i>Sida hackettiana</i>	Spiked Sida	x		x		x	x
Malvaceae	*	<i>Sida rhombifolia</i>	Arrowleaf Sida		x	x			x
Malvaceae	*	<i>Sida spinosa</i>	Spiny Sida	x					
Asteraceae	*	<i>Siegesbeckia orientalis</i>	Indian Weed	x					
Solanaceae		<i>Solanum ellipticum</i>	Potato Bush			x			x
Solanaceae	*	<i>Solanum nigrum</i>	Black Nightshade			x			
Solanaceae	*	<i>Solanum nodiflorum (syn nodiflorum)</i>	American Nightshade	x					
Solanaceae	*	<i>Solanum torum</i>	Turkey Berry	x					
Asteraceae	*	<i>Sonchus oleraceus</i>	sow thistle		x				
Rubiaceae	*	<i>Spermocoe remota</i>	False Buttonweed			x			
Asteraceae	* class 3	<i>Sphagneticola trilobata</i>	Singapore Daisy	x					
Poaceae		<i>Spinifex sericeus</i>	Beach Spinifex			x			
Poaceae	* Class 2	<i>Sporobolus africanus</i>	Parramatta Grass			x			
Poaceae	*	<i>Sporobolus laxus</i>		x					
Poaceae	* Class 2	<i>Sporobolus pyramidalis</i>	Giant Rats Tail Grass			x		x	
Poaceae	*	<i>Sporobolus sessilis</i>		x					
Poaceae	*	<i>Sporobolus virginicus</i>	Marine Couch			x		x	
Verbenaceae	*	<i>Stachytarpheta cayennensis</i>	Snakeweed						
Verbenaceae	*	<i>Stachytarpheta jamaicensis</i>	Snakeweed			x			x
Menispermaceae		<i>Stephania japonica var. discolor</i>	Snake Vine	x				x	x
Fabaceae	*	<i>Stylosanthes humilis</i>	Townsville Stylo			x			x
Chenopodiaceae		<i>Suaeda australis</i>		x					
Aracaceae	*	<i>Syagrus romanzoffiana</i>	Queen Palm			x			
Bignoniaceae	* Class 3	<i>Tecoma stans</i>	Yellow Bells			z			
Chenopodiaceae		<i>Tecticornia indica</i>		x					
Fabaceae		<i>Tephrosia filipes</i>					x		x
Vitaceae		<i>Tetragstigma nitens</i>		x		x			x
Poaceae		<i>Themeda triandra</i>	Kangaroo Grass		x	xx		x	x
Malvaceae		<i>Thespesia populnea</i>						x	
Apocynaceae	*	<i>Thevetia peruviana</i>	Captain Cook Plant		x				
Acanthaceae	*	<i>Thunbergia alata</i>	Black-eyed Susan	x	x				
Rubiaceae		<i>Timonius timon var. timon</i>				x			x
Asteraceae	*	<i>Tithonia diversifolia</i>	Japanese Sunflower						
Cyperaceae		<i>Trachystylis stradbokensis</i>		x					
Ulmaceae		<i>Trema tomentosa</i>		x	x	x			x
Asteraceae	*	<i>Tridax procumbens</i>	Tridax		x	x			
Sparmanniaceae		<i>Triumfetta rhomboides</i>	Chinese Burr		x	x		x	x
Moraceae		<i>Trophis scandens</i>	Burnie Vine		x	x		x	
Typhaceae		<i>Typha domingensis</i>		x					
Goodeniaceae		<i>Vellaea paradoxa</i>			x				
Asteraceae		<i>Vernonia cinerea</i>				x		x	x
Lamiaceae		<i>Vitex rotundifolia</i>		x					
Lamiaceae	*	<i>Vitex trifolia var. subtriseata</i>		x					
Lamiaceae		<i>Vitex trifolia var. trifolia</i>		x	x	x		x	
Asteraceae		<i>Vittadinia dissecta</i>			x				
Asteraceae		<i>Vittadinia dissecta var. hirta</i>		x	x				
Campanulaceae		<i>Wahlenbergia gracilis</i>			x				
Byttneriaceae		<i>Waltheria indica</i>		x					
Thymelaeaceae		<i>Wikstroemia indica</i>	Tie Bush		x	x		x	
Arceaceae		<i>Wodyetia bifurcata</i>	Footall Palm		x				
Asteraceae	*	<i>Xanthium occidentale</i>	Noogora Burr	x					
Xanthorrhoeaceae		<i>Xanthorrhoea latifolia</i>	A Grass Tree	x	x	x		x	x
Fabaceae		<i>Zornia dyctiocarpa</i>	Zornia			x			x



## APPENDIX F – Habitat Assessment Forms



## **HABITAT ASSESSMENT – Terrestrial woody ecosystem (20m radius from observer)**

GPS Waypoint/Site #:

Photo #:

Date:

Location:

Vegetation type (e.g Eucalypt open forest):

Feature	Count	% Projective Cover	Presence/Absence	Comments
<b>Condition</b> (circle relevant) <ul style="list-style-type: none"> <li>Integral (little disturbance)</li> <li>Remnant (or regrowth but &gt;70% height, &gt;50% cover of RE)</li> <li>Regrowth (&lt;70% height, &lt;50% cover)</li> </ul>				
Exotics/weeds		%		
Human Disturbance				
<b>Vegetation Density</b>  Canopy  Understorey		Circle relevant category * D M S V Absent D M S V Absent		
<b>Ground Cover</b> Fallen woody debris (timber >10cmdiameter, 0.5m length)		(Total must be 100%) %		
Bark/Leaf Litter		%		
Rocks		%		
Grass		%		
Bare ground		%		
<b>Hollow Bearing Trees</b>				
<b>Mature Koala Food Trees</b> (Angophora, Corymbia, Eucalyptus, Lophostemon, Melaleuca) >4m height, 10cmDBH				
<b>Rocky Outcrops</b> Cliffs, caves, large boulder stacks				
<b>Aquatic Resources</b> ponding/wetland/low lying areas/creek			(Circle relevant and give type/description)  Ephemeral Perennial None present	Description (if present):

\* D(Dense) = crowns touching/overlap; M (Mid-dense) = touching – slight separation; S (Sparse) = clearly separated; V(Very Sparse) = well separated

### **Opportunistic Observations (tick and describe)**

	Scratches	Type:
	Diggings	Type: (e.g. bandicoot, echidna)
	Nests	Type: (e.g. raptor, other)
	Hollow use	Species:
	Scats	Type:

**Other Notes (including direct fauna sightings) –**



## **WATERWAY HABITAT ASSESSMENT**

GPS Waypoint/Site #:

Photo #:

Date:

Location:

Rain in last week?:

Vegetation Community surrounding (e.g Eucalypt open forest):

### **DESKTOP**

***Vegetation integrity*** (based on site mapping)

Remnant (>70% height, >50%)	Regrowth (<70% height, <50% cover)	Not wooded
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***Stream Order***



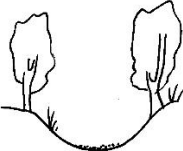
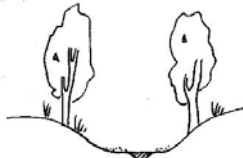

1	2	3	4	5
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### **FIELD ASSESSMENT**

***Water Permanency*** (circle applicable)

Ephemeral	Permanent	Tidal influence	OTHER?
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***Watercourse form*** (circle most appropriate)

				
Ephemeral	Ephemeral	Ephemeral	Ephemeral	Permanent
Little change in topography	incised	Some rounding of watercourse, no ponding	Minor alluvial deposits, some ponding	Water present

***Aquatic vegetation***

Terrestrial vegetation same as surrounding environment
Ground and canopy species associated with wetter environs (e.g ferns, Brush box)
Riparian vegetation (e.g Melaleuca, Waterhousia)
Aquatic obligates
n/a

***Exotic species***

% of all vegetation	Species present:
------------------------	------------------



### *Habitat Features*

#### **Ephemeral - complete habitat pro-forma**

#### **Permanent water – habitat features** (tick applicable)

Banks suitable for burrowing species (e.g platypus, crabs)	
Coarse woody debris in stream	
Riffles	
Runs	
Pools	
Overhanging vegetation	
Stagnant water	
Appears flushed	

#### *Disturbance* (circle most accurate description)

<b>Disturbance level</b>	<b>Riparian vegetation / vegetation adjacent to watercourse</b>
<b>Extreme</b>	Absent or severely reduced. Vegetation if present is dominated by exotic species. Native species are rare or absent. Agriculture and/ or cleared both side
<b>Very high</b>	Some native vegetation present, but is severely modified both sides by grazing or intrusion of introduced species. Native species severely reduced in numbers (species richness} and cover. Agriculture and/ or cleared both sides
<b>High</b>	Moderately disturbed by stock or through the intrusion of introduced species, though native species remain in reasonable numbers. Agriculture and/ or cleared one side; native vegetation on the other is clearly disturbed.
<b>Moderate</b>	Native vegetation present on both sides of the river. The intrusion of introduced species is minor and of moderate impact.
<b>Low</b>	Native vegetation present on both sides of the river in generally good condition with few introduced species present. Any disturbance is minor.
<b>Very low</b>	Native vegetation on both sides of the river in an undisturbed state. Introduced species are rare or insignificant. Representative of pristine conditions.


#### **Other Notes** (including aquatic/semi-aquatic fauna sightings)



## APPENDIX G – Habitat & Waterway Assessments



<b>SITE NUMBER</b>	H 19
<b>Location</b>	Area 3 - Airstrip
<b>Type</b>	Terrestrial woody ecosystem
<b>DATE</b>	22/09/2010
<b>RECORDER</b>	Amy Prowd
<b>LOCALITY</b>	Great Keppel Island




<b>SITE DESCRIPTION</b>		Hill slope dominated by She-oak and occasional emergent eucalypts.							
<b>GENERAL NOTES</b>		Close to the airstrip and houses.							
Exotics/Weeds		0%		Hollow Bearing Trees		0			
Human Disturbance		Y – airstrip and housing		Rocky Outcrops		N			
Mature Koala Feed Trees		4 (all emergents)							
<b>Vegetation Condition</b>									
Integral	-	Remnant	Y (RE v 6.0 = 8.2.8a)			Regrowth	-		
<b>Vegetation Density</b>									
Canopy	M-S			Understorey			S-V		
<b>Ground Cover</b>									
Fallen Woody Debris	30%	Bark/Leaf Litter	25%	Rocks	0%	Grass/Vegetation	40%	Bare Ground	5%
<b>Aquatic Resources</b>									
Ephemeral	-	Perennial	-	Marine	-	None	Y		
<b>Opportunistic Observations</b>									
Scratches (Type)		-							
Diggings (Type)		-							
Nests (Type)		-							
Hollow Use (Species)		-							
Scats (Type)		-							
Fauna at site		-							

**Habitat Value Ranking:** High – Very High



<b>SITE NUMBER</b>	H 20
<b>Location</b>	Area 3 - Airstrip
<b>Type</b>	Terrestrial woody ecosystem
<b>DATE</b>	22/09/2010
<b>RECORDER</b>	Amy Prowd
<b>LOCALITY</b>	Great Keppel Island



<b>SITE DESCRIPTION</b>	She-oak dominated woodland.													
<b>GENERAL NOTES</b>	Top of slope. Lots of flowering Grevillea. Lots of She-oak cones.													
Exotics/Weeds	0%			Hollow Bearing Trees			0							
Human Disturbance	Y (airstrip)			Rocky Outcrops			N							
Mature Koala Feed Trees	0													
<b>Feature</b>														
Integral	-		Remnant	Y (RE v 6.0 = 8.2.8a)			Regrowth	-						
<b>Vegetation Density</b>														
Canopy	M			Understorey			S-V							
<b>Ground Cover</b>														
Fallen Woody Debris	0%		Bark/Leaf Litter	60%		Rocks	0%		Grass/Vegetation	40%		Bare Ground	0%	
<b>Aquatic Resources</b>														
Ephemeral	-		Perennial	-		Marine	-		None	Y				
<b>Opportunistic Observations</b>														
Scratches (Type)												-		
Diggings (Type)												Possible Echidna diggings		
Nests (Type)												-		
Hollow Use (Species)												-		
Scats (Type)												Possum		
Fauna at site												<i>Lygisorum foliorum</i>		

**Habitat Value Ranking:** High – Very High




<b>SITE NUMBER</b>	H 21								
<b>Location</b>	Area 3 - Airstrip								
<b>Type</b>	Terrestrial woody ecosystem								
<b>DATE</b>	22/09/2010								
<b>RECORDER</b>	Amy Prowd								
<b>LOCALITY</b>	Great Keppel Island								
<b>SITE DESCRIPTION</b>		<i>Eucalyptus tessellaris</i> emergent with she-oak and acacia dominating the understorey.							
<b>GENERAL NOTES</b>		Near an ephemeral pond area.							
Exotics/Weeds		10% (some Lantana)		Hollow Bearing Trees		0			
Human Disturbance		Y (Track)		Rocky Outcrops		N			
Mature Koala Feed Trees		3							
<b>Feature</b>									
<b>Integral</b>	-	<b>Remnant</b>	Y (RE v 6.0 = 8.2.8a)			<b>Regrowth</b>	-		
<b>Vegetation Density</b>									
<b>Canopy</b>		M		<b>Understorey</b>		M-S			
<b>Ground Cover</b>									
<b>Fallen Woody Debris</b>	5%	<b>Bark/Leaf Litter</b>	30%	<b>Rocks</b>	3%	<b>Grass/Vegetation</b>	60%	<b>Bare Ground</b>	2%
<b>Aquatic Resources</b>									
<b>Ephemeral</b>	-	<b>Perennial</b>	-	<b>Marine</b>	-	<b>None</b>	Y		
<b>Opportunistic Observations</b>									
<b>Scratches (Type)</b>		-							
<b>Diggings (Type)</b>		-							
<b>Nests (Type)</b>		-							
<b>Hollow Use (Species)</b>		-							
<b>Scats (Type)</b>		-							
<b>Fauna at site</b>		-							

**Habitat Value Ranking:** Moderate - High




<b>SITE NUMBER</b>	H 22
<b>Location</b>	Area 1
<b>Type</b>	Terrestrial woody ecosystem
<b>DATE</b>	22/09/2010
<b>RECORDER</b>	Amy Prowd
<b>LOCALITY</b>	Great Keppel Island



<b>SITE DESCRIPTION</b>		Low eucalypt open forest							
<b>GENERAL NOTES</b>		Hill slope facing Leekes Beach.							
Exotics/Weeds		0%		Hollow Bearing Trees		1			
Human Disturbance		Minor (track nearby)		Rocky Outcrops		N			
Mature Koala Feed Trees		16							
<b>Feature</b>									
<b>Integral</b>	-	<b>Remnant</b>	Y (RE v 6.0 = 8.11.3a)			<b>Regrowth</b>	-		
<b>Vegetation Density</b>									
<b>Canopy</b>		M		<b>Understorey</b>		S			
<b>Ground Cover</b>									
<b>Fallen Woody Debris</b>	5%	<b>Bark/Leaf Litter</b>	30%	<b>Rocks</b>	10%	<b>Grass/Vegetation</b>	50%	<b>Bare Ground</b>	5%
<b>Aquatic Resources</b>									
<b>Ephemeral</b>	-	<b>Perennial</b>	-	<b>Marine</b>	-	<b>None</b>	Y		
<b>Opportunistic Observations</b>									
<b>Scratches (Type)</b>			-						
<b>Diggings (Type)</b>			-						
<b>Nests (Type)</b>			-						
<b>Hollow Use (Species)</b>			-						
<b>Scats (Type)</b>			Possum						
<b>Fauna at site</b>			-						

**Habitat Value Ranking:** High – Very High




<b>SITE NUMBER</b>	H 23								
<b>Location</b>	Area 4								
<b>Type</b>	Terrestrial woody ecosystem								
<b>DATE</b>	22/09/2010								
<b>RECORDER</b>	Amy Prowd								
<b>LOCALITY</b>	Great Keppel Island								
<b>SITE DESCRIPTION</b>		Eucalyptus woodland							
<b>GENERAL NOTES</b>									
Exotics/Weeds		0%		Hollow Bearing Trees		0			
Human Disturbance		Y (near track)		Rocky Outcrops		N			
Mature Koala Feed Trees		17							
<b>Feature</b>									
<b>Integral</b>	-	<b>Remnant</b>	Y (RE v 6.0 = 8.11.3a)			<b>Regrowth</b>	-		
<b>Vegetation Density</b>									
<b>Canopy</b>		M			<b>Understorey</b>		V		
<b>Ground Cover</b>									
<b>Fallen Woody Debris</b>	0%	<b>Bark/Leaf Litter</b>	60%	<b>Rocks</b>	0%	<b>Grass/Vegetation</b>	40%	<b>Bare Ground</b>	0%
<b>Aquatic Resources</b>									
<b>Ephemeral</b>	Y	<b>Perennial</b>	-	<b>Marine</b>	-	<b>None</b>	-		
<b>Description</b>	Within 100m of a ponded area to the NW and within 150m of a tidal inlet to the East.								
<b>Opportunistic Observations</b>									
<b>Scratches (Type)</b>		-							
<b>Diggings (Type)</b>		-							
<b>Nests (Type)</b>		-							
<b>Hollow Use (Species)</b>		-							
<b>Scats (Type)</b>		-							
<b>Fauna at site</b>		-							

**Habitat Value Ranking:** High – Very High




<b>SITE NUMBER</b>	H 25
<b>Location</b>	Area 4
<b>Type</b>	Terrestrial woody ecosystem
<b>DATE</b>	22/09/2010
<b>RECORDER</b>	Amy Prowd
<b>LOCALITY</b>	Great Keppel Island



<b>SITE DESCRIPTION</b>		She-oak woodland							
<b>GENERAL NOTES</b>		Many fallen trees.							
Exotics/Weeds		0%		Hollow Bearing Trees		0			
Human Disturbance		Y (track)		Rocky Outcrops		N			
Mature Koala Feed Trees		1							
<b>Feature</b>									
<b>Integral</b>	-	<b>Remnant</b>	Y (RE v 6.0 = 8.1.2)			<b>Regrowth</b>	-		
<b>Vegetation Density</b>									
<b>Canopy</b>		M			<b>Understorey</b>		S		
<b>Ground Cover</b>									
<b>Fallen Woody Debris</b>	60%	<b>Bark/Leaf Litter</b>	30%	<b>Rocks</b>	0%	<b>Grass/Vegetation</b>	10%	<b>Bare Ground</b>	0%
<b>Aquatic Resources</b>									
<b>Ephemeral</b>	Y	<b>Perennial</b>	-	<b>Marine</b>	-	<b>None</b>	-		
<b>Description</b>	Within 100m of tidal inlet to the east.								
<b>Opportunistic Observations</b>									
<b>Scratches (Type)</b>				-					
<b>Diggings (Type)</b>				-					
<b>Nests (Type)</b>				-					
<b>Hollow Use (Species)</b>				-					
<b>Scats (Type)</b>				-					
<b>Fauna at site</b>				Brushtail Possum					


**Habitat Value Ranking:** High – Very High



<b>SITE NUMBER</b>	H 26								
<b>Location</b>	Tidal Inlet								
<b>Type</b>	Marine Inlet								
<b>DATE</b>	22/09/2010								
<b>RECORDER</b>	Amy Prowd								
<b>LOCALITY</b>	Great Keppel Island								
									
		<b>SITE DESCRIPTION</b>		Marine tidal inlet with marine couch and sandfire.					
		<b>GENERAL NOTES</b>		Earth bridge across inlet.					
		Exotics/Weeds	0%	Hollow Bearing Trees	0				
		Human Disturbance	Y (earth bridge at point)	Rocky Outcrops	N				
Mature Koala Feed Trees	0								
<b>Feature</b>									
<b>Integral</b>	-	<b>Remnant</b>	Y (RE v 6.0 = 8.1.2)	<b>Regrowth</b>	-				
<b>Vegetation Density</b>									
<b>Canopy</b>	Absent		<b>Understorey</b>	Absent					
<b>Ground Cover</b>									
<b>Fallen Woody Debris</b>	0%	<b>Bark/Leaf Litter</b>	0%	<b>Rocks</b>	5%	<b>Grass/Vegetation</b>	25%	<b>Bare Ground</b>	70%
<b>Aquatic Resources</b>									
<b>Ephemeral</b>	-	<b>Perennial</b>	-	<b>Marine</b>	Y	<b>None</b>	-		
<b>Description</b>	Marine tidal system. Part of Leekes Creek.								
<b>Opportunistic Observations</b>									
<b>Scratches (Type)</b>		-							
<b>Diggings (Type)</b>		Crabs							
<b>Nests (Type)</b>		-							
<b>Hollow Use (Species)</b>		-							
<b>Scats (Type)</b>		-							
<b>Fauna at site</b>		Beach Stone Curlew							


**Habitat Value Ranking:** High -Very High



<b>SITE NUMBER</b>	H 33								
<b>Location</b>									
<b>Type</b>	Terrestrial woody ecosystem								
<b>DATE</b>	23/09/2010								
<b>RECORDER</b>	Amy Prowd								
<b>LOCALITY</b>	Great Keppel Island								
<b>SITE DESCRIPTION</b>		Low Acacia							
<b>GENERAL NOTES</b>		Weeds included Snake weed and Green Panic.							
Exotics/Weeds		50% of ground layer		Hollow Bearing Trees		0			
Human Disturbance		Y (track)		Rocky Outcrops		N			
Mature Koala Feed Trees		0							
<b>Feature</b>									
<b>Integral</b>	-	<b>Remnant</b>	Y (RE v 6.0 = 8.3.13c)			<b>Regrowth</b>	-		
<b>Vegetation Density</b>									
<b>Canopy</b>		M			<b>Understorey</b>		D		
<b>Ground Cover</b>									
<b>Fallen Woody Debris</b>	5%	<b>Bark/Leaf Litter</b>	0%	<b>Rocks</b>	0%	<b>Grass/Vegetation</b>	90%	<b>Bare Ground</b>	5%
<b>Aquatic Resources</b>									
<b>Ephemeral</b>	Y	<b>Perennial</b>	-	<b>Marine</b>	-	<b>None</b>	-		
<b>Description</b>	Water ponded in low lying areas following rain.								
<b>Opportunistic Observations</b>									
<b>Scratches (Type)</b>		-							
<b>Diggings (Type)</b>		-							
<b>Nests (Type)</b>		-							
<b>Hollow Use (Species)</b>		-							
<b>Scats (Type)</b>		-							
<b>Fauna at site</b>		Crow Pheasant coucal Olive-backed Sunbird Striped Marsh Frog							


**Habitat Value Ranking:** Moderate - High



<b>SITE NUMBER</b>	H 34								
<b>Location</b>	Along the track								
<b>Type</b>	Terrestrial woody ecosystem								
<b>DATE</b>	23/09/2010								
<b>RECORDER</b>	Amy Prowd								
<b>LOCALITY</b>	Great Keppel Island								
<b>SITE DESCRIPTION</b>		Ironbark and Angophora open forest.							
<b>GENERAL NOTES</b>		Weeds in the ground layer only are exotic grasses.							
Exotics/Weeds		30%		Hollow Bearing Trees		0			
Human Disturbance		Y (track)		Rocky Outcrops		N			
Mature Koala Feed Trees		100% of canopy							
<b>Feature</b>									
<b>Integral</b>	-	<b>Remnant</b>	Y (RE v 6.0 = 8.11.3a)			<b>Regrowth</b>	-		
<b>Vegetation Density</b>									
<b>Canopy</b>		M		<b>Understorey</b>		S-V			
<b>Ground Cover</b>									
<b>Fallen Woody Debris</b>	0%	<b>Bark/Leaf Litter</b>	20%	<b>Rocks</b>	0%	<b>Grass/Vegetation</b>	80%	<b>Bare Ground</b>	0%
<b>Aquatic Resources</b>									
<b>Ephemeral</b>	-	<b>Perennial</b>	-	<b>Marine</b>	-	<b>None</b>	Y		
<b>Opportunistic Observations</b>									
<b>Scratches (Type)</b>		-							
<b>Diggings (Type)</b>		-							
<b>Nests (Type)</b>		-							
<b>Hollow Use (Species)</b>		-							
<b>Scats (Type)</b>		-							
<b>Fauna at site</b>		Noisy Friarbird							


**Habitat Value Ranking:** Moderate - High



<b>SITE NUMBER</b>	H 36								
<b>Location</b>	Track								
<b>Type</b>	Terrestrial woody ecosystem								
<b>DATE</b>	23/09/2010								
<b>RECORDER</b>	Amy Prowd								
<b>LOCALITY</b>	Great Keppel Island								
<b>SITE DESCRIPTION</b>		Eucalyptus open forest							
<b>GENERAL NOTES</b>		Weeds are exotic grasses only							
Exotics/Weeds		30%		Hollow Bearing Trees		0			
Human Disturbance		Y (track and fence)		Rocky Outcrops		N			
Mature Koala Feed Trees		100% of canopy							
<b>Feature</b>									
<b>Integral</b>	-	<b>Remnant</b>	Y (RE v 6.0 = 8.11.3a)			<b>Regrowth</b>	-		
<b>Vegetation Density</b>									
<b>Canopy</b>		V		<b>Understorey</b>		M-S			
<b>Ground Cover</b>									
<b>Fallen Woody Debris</b>	5%	<b>Bark/Leaf Litter</b>	0%	<b>Rocks</b>	0%	<b>Grass/Vegetation</b>	95%	<b>Bare Ground</b>	0%
<b>Aquatic Resources</b>									
<b>Ephemeral</b>	Y	<b>Perennial</b>	-	<b>Marine</b>	-	<b>None</b>	-		
<b>Description</b>	Area swampy after the rain – could be some overflow from the Leekes Dam to the SE.								
<b>Opportunistic Observations</b>									
<b>Scratches (Type)</b>		-							
<b>Diggings (Type)</b>		-							
<b>Nests (Type)</b>		-							
<b>Hollow Use (Species)</b>		-							
<b>Scats (Type)</b>		-							
<b>Fauna at site</b>		Pseudophryne major Striped Marsh Frog Eastern Sedgefrog Pheasant Coucal Crow Laughing Kookaburra Bar-shouldered Dove							


**Habitat Value Ranking:** Moderate - High



<b>SITE NUMBER</b>	H 37								
<b>Location</b>									
<b>Type</b>	Terrestrial woody ecosystem								
<b>DATE</b>	22/09/2010								
<b>RECORDER</b>	Amy Prowd								
<b>LOCALITY</b>	Great Keppel Island								
<b>SITE DESCRIPTION</b>	Eucalyptus open forest								
<b>GENERAL NOTES</b>									
Exotics/Weeds	5% (Prickly Pear)	Hollow Bearing Trees	1						
Human Disturbance	Y (track and rubbish dumped)	Rocky Outcrops	N						
Mature Koala Feed Trees	100% canopy								
<b>Feature</b>									
Integral	-	Remnant	Y (RE v 6.0 = 8.11.3a)	Regrowth	-				
<b>Vegetation Density</b>									
Canopy	M	Understorey	V						
<b>Ground Cover</b>									
Fallen Woody Debris	5%	Bark/Leaf Litter	50%	Rocks	0%	Grass/Vegetation	25%	Bare Ground	20%
<b>Aquatic Resources</b>									
Ephemeral	-	Perennial	-	Marine	Y	None	-		
Description	Within 100m of tidal inlet.								
<b>Opportunistic Observations</b>									
Scratches (Type)						-			
Diggings (Type)						-			
Nests (Type)						-			
Hollow Use (Species)						-			
Scats (Type)						Possum			
Fauna at site						Eastern Sedgefrog Noisy Friarbird			


**Habitat Value Ranking:** High – Very High



<b>SITE NUMBER</b>	H 38		
<b>Location</b>	Area 5		
<b>Type</b>	Terrestrial woody ecosystem		
<b>DATE</b>	24/09/2010		
<b>RECORDER</b>	Amy Prowd		
<b>LOCALITY</b>	Great Keppel Island		
			
<b>SITE DESCRIPTION</b>	Eucalypt forest		
<b>GENERAL NOTES</b>			
Exotics/Weeds	10%	Hollow Bearing Trees	1
Human Disturbance	Y (track)	Rocky Outcrops	N
Mature Koala Feed Trees	100% of canopy		
<b>Feature</b>			
Integral	-	Remnant	Y (RE v 6.0 = 8.3.13c)
		Regrowth	-
<b>Vegetation Density</b>			
Canopy	M	Understorey	M-S
<b>Ground Cover</b>			
Fallen Woody Debris	5%	Bark/Leaf Litter	5%
		Rocks	0%
		Grass/Vegetation	90%
		Bare Ground	0%
<b>Aquatic Resources</b>			
Ephemeral	Y	Perennial	-
		Marine	-
		None	-
Description	Within 100m of a creek		
<b>Opportunistic Observations</b>			
Scratches (Type)	Potentially Goanna		
Diggings (Type)	-		
Nests (Type)	-		
Hollow Use (Species)	-		
Scats (Type)	-		
Fauna at site			


**Habitat Value Ranking:** High – Very High



<b>SITE NUMBER</b>	H 40								
<b>Location</b>	Area 6								
<b>Type</b>	Terrestrial woody ecosystem								
<b>DATE</b>	24/09/2010								
<b>RECORDER</b>	Amy Prowd								
<b>LOCALITY</b>	Great Keppel Island								
<b>SITE DESCRIPTION</b>		Melaleuca and Banksia woodland							
<b>GENERAL NOTES</b>		Understorey of Bracken fern							
Exotics/Weeds		0%		Hollow Bearing Trees		1			
Human Disturbance		Y (Track)		Rocky Outcrops		N			
Mature Koala Feed Trees		20							
<b>Feature</b>									
<b>Integral</b>	-	<b>Remnant</b>	Y (RE v 6.0 = 8.11.10/8.12.14x2c)			<b>Regrowth</b>	-		
<b>Vegetation Density</b>									
<b>Canopy</b>		S		<b>Understorey</b>		S-V			
<b>Ground Cover</b>									
<b>Fallen Woody Debris</b>	10%	<b>Bark/Leaf Litter</b>	30%	<b>Rocks</b>	0%	<b>Grass/Vegetation</b>	50%	<b>Bare Ground</b>	10%
<b>Aquatic Resources</b>									
<b>Ephemeral</b>	-	<b>Perennial</b>	-	<b>Marine</b>	-	<b>None</b>	Y		
<b>Opportunistic Observations</b>									
<b>Scratches (Type)</b>		-							
<b>Diggings (Type)</b>		-							
<b>Nests (Type)</b>		-							
<b>Hollow Use (Species)</b>		-							
<b>Scats (Type)</b>		-							
<b>Fauna at site</b>		Osprey fly over Lygisaurus foliorum							


**Habitat Value Ranking:** Moderate - High



<b>SITE NUMBER</b>	H 43								
<b>Location</b>	Area 7								
<b>Type</b>	Terrestrial woody ecosystem								
<b>DATE</b>	25/09/2010								
<b>RECORDER</b>	Amy Prowd								
<b>LOCALITY</b>	Great Keppel Island								
<b>SITE DESCRIPTION</b>		She-oak dominated forest.							
<b>GENERAL NOTES</b>		Further to the coast vegetation becomes more stunted prior to steep decent to open grass and beach.							
Exotics/Weeds		0%		Hollow Bearing Trees		0			
Human Disturbance		Y (track, erosion)		Rocky Outcrops		N			
Mature Koala Feed Trees		0							
<b>Feature</b>									
<b>Integral</b>	-	<b>Remnant</b>	Y (RE v 6.0 = 8.11.10/8.12.14x2c)			<b>Regrowth</b>	-		
<b>Vegetation Density</b>									
<b>Canopy</b>		D			<b>Understorey</b>		V		
<b>Ground Cover</b>									
<b>Fallen Woody Debris</b>	5%	<b>Bark/Leaf Litter</b>	5%	<b>Rocks</b>	0%	<b>Grass/Vegetation</b>	50%	<b>Bare Ground</b>	40%
<b>Aquatic Resources</b>									
<b>Ephemeral</b>	-	<b>Perennial</b>	-	<b>Marine</b>	-	<b>None</b>	Y		
<b>Opportunistic Observations</b>									
<b>Scratches (Type)</b>		-							
<b>Diggings (Type)</b>		-							
<b>Nests (Type)</b>		-							
<b>Hollow Use (Species)</b>		-							
<b>Scats (Type)</b>		-							
<b>Fauna at site</b>		Osprey fly over Goats							

**Habitat Value Ranking:** Moderate - High



<b>SITE NUMBER</b>	H 44								
<b>Location</b>	Area 2								
<b>Type</b>	Terrestrial woody ecosystem								
<b>DATE</b>	25/09/2010								
<b>RECORDER</b>	Amy Prowd								
<b>LOCALITY</b>	Great Keppel Island								
<b>SITE DESCRIPTION</b>		Beach front she-oak							
<b>GENERAL NOTES</b>									
Exotics/Weeds		20% (grass)		Hollow Bearing Trees		0			
Human Disturbance		Y (camp)		Rocky Outcrops		N			
Mature Koala Feed Trees		0							
<b>Feature</b>									
<b>Integral</b>	-	<b>Remnant</b>	Y (RE v 6.0 = 8.2.1)			<b>Regrowth</b>	-		
<b>Vegetation Density</b>									
<b>Canopy</b>		M		<b>Understorey</b>		S-V			
<b>Ground Cover</b>									
<b>Fallen Woody Debris</b>	0%	<b>Bark/Leaf Litter</b>	5%	<b>Rocks</b>	0%	<b>Grass/Vegetation</b>	40%	<b>Bare Ground</b>	55%
<b>Aquatic Resources</b>									
<b>Ephemeral</b>	-	<b>Perennial</b>	-	<b>Marine</b>	-	<b>None</b>	Y		
<b>Opportunistic Observations</b>									
<b>Scratches (Type)</b>		-							
<b>Diggings (Type)</b>		-							
<b>Nests (Type)</b>		-							
<b>Hollow Use (Species)</b>		-							
<b>Scats (Type)</b>		Possum (Appear to be eating She-oaks on the beach front).							
<b>Fauna at site</b>									

**Habitat Value Ranking:** Moderate - High



<b>SITE NUMBER</b>	H 45								
<b>Location</b>	Area 8								
<b>Type</b>	Terrestrial woody ecosystem								
<b>DATE</b>	25/09/2010								
<b>RECORDER</b>	Amy Prowd								
<b>LOCALITY</b>	Great Keppel Island								
									
<b>SITE DESCRIPTION</b>		Pasture grassland with paddock dam							
<b>GENERAL NOTES</b>									
Exotics/Weeds		60% (pasture grass)		Hollow Bearing Trees		0			
Human Disturbance		Y (homestead pasture)		Rocky Outcrops		N			
Mature Koala Feed Trees		0							
<b>Feature</b>									
<b>Integral</b>	-	<b>Remnant</b>	-	<b>Regrowth</b>	Non-remnant				
<b>Vegetation Density</b>									
<b>Canopy</b>		Absent		<b>Understorey</b>		Absent			
<b>Ground Cover</b>									
<b>Fallen Woody Debris</b>	0%	<b>Bark/Leaf Litter</b>	0%	<b>Rocks</b>	0%	<b>Grass/Vegetation</b>	100%	<b>Bare Ground</b>	0%
<b>Aquatic Resources</b>									
<b>Ephemeral</b>	-	<b>Perennial</b>	-	<b>Marine</b>	-	<b>None</b>	Y		
<b>Opportunistic Observations</b>									
<b>Scratches (Type)</b>		-							
<b>Diggings (Type)</b>		-							
<b>Nests (Type)</b>		-							
<b>Hollow Use (Species)</b>		-							
<b>Scats (Type)</b>		Goat							
<b>Fauna at site</b>		Burton's Legless Lizard Carlia vivax							

**Habitat Value Ranking:** Very Low - Low




# HABITAT ASSESSMENT

*WET SEASON*


*FEBRUARY 2011*



<b>SITE NUMBER</b>	H 18		
<b>Location</b>	Area 9		
<b>Type</b>	Swamp box forest		
<b>DATE</b>	13/2/11		
<b>RECORDER</b>	Amy Prowd		
<b>LOCALITY</b>	Great Keppel Island		
<b>SITE DESCRIPTION</b> Sandy stream bed with <i>Eucalypt</i> emergent in <i>Lophostemon suaveolens</i> and <i>Melaleuca</i> forests.			
<b>GENERAL NOTES</b>			
Exotics/Weeds	10%	Hollow Bearing Trees	1
Human Disturbance	Y - track	Rocky Outcrops	N
Mature Koala Feed Trees	100% canopy		
<b>Vegetation Condition</b>			
<b>Integral</b>	-	<b>Remnant</b>	Y (RE v 6.0 = 8.2.8a)
		<b>Regrowth</b>	-
<b>Vegetation Density</b>			
<b>Canopy</b>	M	<b>Understorey</b>	D
<b>Ground Cover</b>			
Fallen Woody Debris	10%	Bark/Leaf Litter	60%
Rocks	0%	Grass/Vegetation	20%
Bare Ground	10%		
<b>Aquatic Resources</b>			
<b>Ephemeral</b>	Y	<b>Perennial</b>	-
<b>Marine</b>	-	<b>None</b>	-
<b>Opportunistic Observations</b>			
<b>Scratches (Type)</b>	-		
<b>Diggings (Type)</b>	-		
<b>Nests (Type)</b>	-		
<b>Hollow Use (Species)</b>	Ground hollow logs present. Potentially occupied.		
<b>Scats (Type)</b>	Brushtail possum.		
<b>Fauna at site</b>	Refer to Area 9 species list.		


**Habitat Value Ranking:** High – Very High



<b>SITE NUMBER</b>	H 19		
<b>Location</b>	Area 2		
<b>Type</b>	Rocky headland		
<b>DATE</b>	13/02/2011		
<b>RECORDER</b>	Amy Prowd		
<b>LOCALITY</b>	Great Keppel Island		
<b>SITE DESCRIPTION</b>		Rocky headland	
<b>GENERAL NOTES</b>		Putney Headland.	
Exotics/Weeds	0%	Hollow Bearing Trees	0
Human Disturbance	Y – fishing and walking	Rocky Outcrops	Y
Mature Koala Feed Trees	0		
<b>Vegetation Condition</b>			
Integral	Y	Remnant	-
		Regrowth	-
<b>Vegetation Density</b>			
Canopy	Absent	Understorey	Absent
<b>Ground Cover</b>			
Fallen Woody Debris	0%	Bark/Leaf Litter	0%
		Rocks	100%
		Grass/Vegetation	0%
		Bare Ground	0%
<b>Aquatic Resources</b>			
Ephemeral	-	Perennial	-
		Marine	Y – tidal influence
			None
			-
<b>Opportunistic Observations</b>			
Scratches (Type)	-		
Diggings (Type)	-		
Nests (Type)	-		
Hollow Use (Species)	-		
Scats (Type)	-		
Fauna at site	Small crabs Cryptobletharus littoralis Oysters on rocks		


**Habitat Value Ranking:** Moderate - High



<b>SITE NUMBER</b>	H 21								
<b>Location</b>	Area 3								
<b>Type</b>	She-oak forest								
<b>DATE</b>	14-2-11								
<b>RECORDER</b>	Amy Prowd								
<b>LOCALITY</b>	Great Keppel Island								
<b>SITE DESCRIPTION</b> Southern end of the existing airstrip.									
<b>GENERAL NOTES</b> Allocasuarina, Acacia and Grevillea forest.									
Exotics/Weeds	5%	Hollow Bearing Trees	0						
Human Disturbance	Y – driveable track and pump station	Rocky Outcrops	N						
Mature Koala Feed Trees	N								
<b>Vegetation Condition</b>									
<b>Integral</b>	-	<b>Remnant</b>	Y (Rev6 = 8.2.8a)	<b>Regrowth</b>	-				
<b>Vegetation Density</b>									
<b>Canopy</b>	D	<b>Understorey</b>	S						
<b>Ground Cover</b>									
Fallen Woody Debris	5%	Bark/Leaf Litter	70%	Rocks	0%	Grass/Vegetation	25%	Bare Ground	0%
<b>Aquatic Resources</b>									
Ephemeral	-	Perennial	-	Marine	-	None	Y		
<b>Opportunistic Observations</b>									
<b>Scratches (Type)</b>		-							
<b>Diggings (Type)</b>		Y (type unsure)							
<b>Nests (Type)</b>		-							
<b>Hollow Use (Species)</b>		-							
<b>Scats (Type)</b>		-							
<b>Fauna at site</b>		Casuarina present Sunbird Golden orb spider							


**Habitat Value Ranking:** Moderate - High



<b>SITE NUMBER</b>	H 23								
<b>Location</b>	Road footprint								
<b>Type</b>	Low Alphitonia forest								
<b>DATE</b>	14-2-11								
<b>RECORDER</b>	Amy Prowd								
<b>LOCALITY</b>	Great Keppel Island								
<b>SITE DESCRIPTION</b>		Alphitonia excelsa with occasional taller eucalypt							
<b>GENERAL NOTES</b>									
Exotics/Weeds		5%	Hollow Bearing Trees	0					
Human Disturbance		Y – Bitumen road	Rocky Outcrops	N					
Mature Koala Feed Trees		Y - 3							
<b>Vegetation Condition</b>									
Integral	-	Remnant	Y (Rev6 = 8.11.3a)	Regrowth	-				
<b>Vegetation Density</b>									
Canopy	M		Understorey	S					
<b>Ground Cover</b>									
Fallen Woody Debris	5%	Bark/Leaf Litter	10%	Rocks	5%	Grass/Vegetation	80%	Bare Ground	0%
<b>Aquatic Resources</b>									
Ephemeral	-	Perennial	-	Marine	-	None	Y		
<b>Opportunistic Observations</b>									
Scratches (Type)		-							
Diggings (Type)		-							
Nests (Type)		-							
Hollow Use (Species)		-							
Scats (Type)		Possum							
Fauna at site		Rainbow Lorikeet Toressian Crow							


**Habitat Value Ranking:** High – Very High



<b>SITE NUMBER</b>	H 24								
<b>Location</b>	Road footprint								
<b>Type</b>	Eucalypt forest								
<b>DATE</b>	14-2-11								
<b>RECORDER</b>	Amy Prowd								
<b>LOCALITY</b>									
<b>SITE DESCRIPTION</b> Eucalyptus moluccana forest on hillside									
<b>GENERAL NOTES</b>									
Exotics/Weeds	0%	Hollow Bearing Trees	3 (small hollows)						
Human Disturbance	Y – walking track	Rocky Outcrops	N						
Mature Koala Feed Trees	Y – 100% canopy								
<b>Vegetation Condition</b>									
Integral	-	Remnant	Y (RE v 6.0 = 8.11.3a)	Regrowth	-				
<b>Vegetation Density</b>									
Canopy	M	Understorey	S						
<b>Ground Cover</b>									
Fallen Woody Debris	10%	Bark/Leaf Litter	10%	Rocks	10%	Grass/Vegetation	60%	Bare Ground	10%
<b>Aquatic Resources</b>									
Ephemeral	-	Perennial	-	Marine	-	None	Y		
<b>Opportunistic Observations</b>									
Scratches (Type)				-					
Diggings (Type)				-					
Nests (Type)				-					
Hollow Use (Species)				-					
Scats (Type)				-					
Fauna at site				Cryptobletharus pulcher Lygisorus foliorum Pheasant Coucal Noisy Friarbird Brown Honeyeater Toressian Crow					


**Habitat Value Ranking:** High – Very High



<b>SITE NUMBER</b>	H 41								
<b>Location</b>									
<b>Type</b>	Low eucalypt forest								
<b>DATE</b>	14/2/11								
<b>RECORDER</b>	Dan Potter								
<b>LOCALITY</b>	Great Keppel Island								
<b>SITE DESCRIPTION</b>		Mixed very low eucalypt and wattle community							
<b>GENERAL NOTES</b>		Exposed rocky slope very low vegetation including eucalyptus, acacia, Casuarina, xanthorrhoea.							
Exotics/Weeds		<5%		Hollow Bearing Trees		0			
Human Disturbance		N		Rocky Outcrops		N			
Mature Koala Feed Trees		N							
<b>Vegetation Condition</b>									
Integral	Y	Remnant		Rev6 = 8.11.10/8.12.14x2c		Regrowth		-	
<b>Vegetation Density</b>									
Canopy		S		Understorey		S			
<b>Ground Cover</b>									
Fallen Woody Debris	15%	Bark/Leaf Litter	10%	Rocks	20%	Grass/Vegetation	30%	Bare Ground	25%
<b>Aquatic Resources</b>									
Ephemeral	-	Perennial	-	Marine	-	None	Y		
<b>Opportunistic Observations</b>									
Scratches (Type)		-							
Diggings (Type)		-							
Nests (Type)		-							
Hollow Use (Species)		-							
Scats (Type)		Possum							
Fauna at site		-							


**Habitat Value Ranking:** High – Very High



<b>SITE NUMBER</b>	H 44		
<b>Location</b>			
<b>Type</b>	Eucalypt forest		
<b>DATE</b>	14/2/11		
<b>RECORDER</b>	Dan Potter		
<b>LOCALITY</b>	Great Keppel Island		
<b>SITE DESCRIPTION</b>	Eucalyptus and Lophostemon woodland		
<b>GENERAL NOTES</b>	Adjacent to drainage gully on steep rocky slope. Eucalyptus crebra, Lophostemon confertus, Xanthorrhoea.		
Exotics/Weeds	0%	Hollow Bearing Trees	0
Human Disturbance	N	Rocky Outcrops	N
Mature Koala Feed Trees	N		
<b>Vegetation Condition</b>			
Integral	Y	Remnant	Rev6 = 8.11.10/8.12.14x2c
<b>Vegetation Density</b>			
Canopy	M	Understorey	V
<b>Ground Cover</b>			
Fallen Woody Debris	5%	Bark/Leaf Litter	30%
Rocks	25%	Grass/Vegetation	30%
Bare Ground	10%		
<b>Aquatic Resources</b>			
Ephemeral	-	Perennial	-
Marine	-	None	Y
<b>Opportunistic Observations</b>			
Scratches (Type)	-		
Diggings (Type)	-		
Nests (Type)	-		
Hollow Use (Species)	-		
Scats (Type)	-		
Fauna at site	-		


**Habitat Value Ranking:** High -Very High



<b>SITE NUMBER</b>	H 40		
<b>Location</b>			
<b>Type</b>	She-oak forest		
<b>DATE</b>	14/2/11		
<b>RECORDER</b>	Dan Potter		
<b>LOCALITY</b>	Great Keppel Island		
<b>SITE DESCRIPTION</b>		Casuarina open forest	
<b>GENERAL NOTES</b>		Casuarina, Corymbia, Acacia, Rock myrtle, Eucalyptus	
Exotics/Weeds	<5% - Prickly Pear	Hollow Bearing Trees	2
Human Disturbance	Y	Rocky Outcrops	N
Mature Koala Feed Trees	4		
<b>Vegetation Condition</b>			
Integral	-	Remnant	Y (Rev6 = 8.11.10/8.12.14x2c)
		Regrowth	-
<b>Vegetation Density</b>			
Canopy	M	Understorey	S
<b>Ground Cover</b>			
Fallen Woody Debris	20%	Bark/Leaf Litter	10%
Rocks	0%	Grass/Vegetation	50%
Bare Ground	20%		
<b>Aquatic Resources</b>			
Ephemeral	-	Perennial	-
Marine	-	None	Y
<b>Opportunistic Observations</b>			
Scratches (Type)	-		
Diggings (Type)	-		
Nests (Type)	-		
Hollow Use (Species)	-		
Scats (Type)	Possum		
Fauna at site	-		


**Habitat Value Ranking:** High – Very High



SITE NUMBER	H 61								
Location									
Type	Eucalypt forest								
DATE	15/2/11								
RECORDER	Dan Potter								
LOCALITY	Great Keppel Island								
SITE DESCRIPTION		Mixed Eucalyptus open woodland with Banksia, Cocky Apple and Grevillea species.							
GENERAL NOTES		Large E. clarksoniana and Corymbia tessellaris with numerous hollow.							
Exotics/Weeds	0%	Hollow Bearing Trees	3						
Human Disturbance	N	Rocky Outcrops	N						
Mature Koala Feed Trees	3								
Vegetation Condition									
Integral	-	Remnant	Y (Rev6 = 8.2.8a)	Regrowth	-				
Vegetation Density									
Canopy	M	Understorey	M						
Ground Cover									
Fallen Woody Debris	30%	Bark/Leaf Litter	30%	Rocks	0%	Grass/Vegetation	40%	Bare Ground	0%
Aquatic Resources									
Ephemeral	-	Perennial	-	Marine	-	None	Y		
Opportunistic Observations									
Scratches (Type)				-					
Diggings (Type)				-					
Nests (Type)				-					
Hollow Use (Species)				-					
Scats (Type)				-					
Fauna at site				-					


**Habitat Value Ranking:** High - Very High



<b>SITE NUMBER</b>	H 63								
<b>Location</b>									
<b>Type</b>	Eucalypt forest								
<b>DATE</b>	15/2/11								
<b>RECORDER</b>	Dan Potter								
<b>LOCALITY</b>	Great Keppel Island								
<b>SITE DESCRIPTION</b>		Lemon scented Gum and Ironbark Forest							
<b>GENERAL NOTES</b>									
Exotics/Weeds	5% - Prickly Pear	Hollow Bearing Trees	3						
Human Disturbance	N	Rocky Outcrops	N						
Mature Koala Feed Trees	18								
<b>Vegetation Condition</b>									
Integral	Y	Remnant	Rev6 = 8.2.8a	Regrowth	-				
<b>Vegetation Density</b>									
Canopy	M	Understorey	S						
<b>Ground Cover</b>									
Fallen Woody Debris	20%	Bark/Leaf Litter	40%	Rocks	10%	Grass/Vegetation	30%	Bare Ground	0%
<b>Aquatic Resources</b>									
Ephemeral	-	Perennial	-	Marine	-	None	Y		
<b>Opportunistic Observations</b>									
Scratches (Type)	-								
Diggings (Type)	-								
Nests (Type)	-								
Hollow Use (Species)	-								
Scats (Type)	-								
Fauna at site	-								


**Habitat Value Ranking:** High - Very High



<b>SITE NUMBER</b>	H 35								
<b>Location</b>	Area 7								
<b>Type</b>	Gully								
<b>DATE</b>	17/2/11								
<b>RECORDER</b>	Amy Prowd								
<b>LOCALITY</b>	Great Keppel Island								
									
			<b>SITE DESCRIPTION</b> Scrub gully with Lophostemon confertus forest up to gully edge.						
			<b>GENERAL NOTES</b>						
			Exotics/Weeds	0%	Hollow Bearing Trees	0			
			Human Disturbance	N	Rocky Outcrops	N			
Mature Koala Feed Trees	19								
<b>Vegetation Condition</b>									
Integral	Y	Remnant	Rev6 = 8.11.10/8.12.14x2c	Regrowth	-				
<b>Vegetation Density</b>									
Canopy	M	Understorey	S						
<b>Ground Cover</b>									
Fallen Woody Debris	20%	Bark/Leaf Litter	15%	Rocks	35%	Grass/Vegetation	30%	Bare Ground	0%
<b>Aquatic Resources</b>									
Ephemeral	Y (see below)	Perennial	-	Marine	-	None	-		
<b>Opportunistic Observations</b>									
Scratches (Type)		-							
Diggings (Type)		-							
Nests (Type)		-							
Hollow Use (Species)		-							
Scats (Type)		Goat							
Fauna at site		<i>Ctenotus robusta</i> <i>Cryptobletharus pulcher</i> <i>Pseudophryne ravenii</i> (Full list see Area 7)							
<b>Waterway Assessment</b>									
Stream Order	1	Water Permanency	Ephemeral	Rain in last week?	Y				
<b>Watercourse Form</b>									
Ephemeral	Ephemeral incised	Ephemeral some rounding	Ephemeral minor deposits some ponding	Permanent water present					
<b>Aquatic Vegetation</b>									
Terrestrial vegetation same as surrounding environment				Y					
Ground and canopy species associated with wetter environs (eg ferns, brush box)				Y					
Riparian vegetation (eg Melaleuca, Waterhousea)				N					
Aquatic obligates				N					
<b>Habitat Features (Permanent water only)</b>									
Banks suitable for burrowing species (eg platypus, crabs)				N					
Coarse woody debris in stream				Y					
Riffles/runs				N					
Pools				Y					
Overhanging vegetation				Y					
Stagnant water present				-					
Appears flushed				-					
<b>Aquatic/semi aquatic fauna observations</b>									


**Habitat Value Ranking:** High - Very High



<b>SITE NUMBER</b>	H 41 F								
<b>Location</b>	Near Area 6								
<b>Type</b>	Eucalypt forest								
<b>DATE</b>	17/2/11								
<b>RECORDER</b>	Amy Prowd								
<b>LOCALITY</b>	Great Keppel Island								
<b>SITE DESCRIPTION</b>		Corymbia tessellaris and Acacia woodland							
<b>GENERAL NOTES</b>									
Exotics/Weeds	30% weedy shrub layer	Hollow Bearing Trees	1 stag						
Human Disturbance	Y	Rocky Outcrops	N						
Mature Koala Feed Trees	5								
<b>Vegetation Condition</b>									
Integral	-	Remnant	Y (Rev6 = 8.11.10/8.12.14x2c)	Regrowth	-				
<b>Vegetation Density</b>									
Canopy	M	Understorey	M						
<b>Ground Cover</b>									
Fallen Woody Debris	30%	Bark/Leaf Litter	5%	Rocks	0%	Grass/Vegetation	60%	Bare Ground	5%
<b>Aquatic Resources</b>									
Ephemeral	-	Perennial	-	Marine	-	None	Y		
<b>Opportunistic Observations</b>									
Scratches (Type)		-							
Diggings (Type)		-							
Nests (Type)		-							
Hollow Use (Species)		-							
Scats (Type)		-							
Fauna at site		Goat Sunbird Varied Triller Noisy Friarbird							


**Habitat Value Ranking:** Moderate - High



<b>SITE NUMBER</b>	H 42 F		
<b>Location</b>	Disturbance footprint		
<b>Type</b>			
<b>DATE</b>	17/2/11		
<b>RECORDER</b>	Amy Prowd		
<b>LOCALITY</b>	Great Keppel Island		
<b>SITE DESCRIPTION</b>		Melaleuca dealbata, Corymbia tessellaris and Alphitonia excelsa	
<b>GENERAL NOTES</b>			
Exotics/Weeds	50% Lantana	Hollow Bearing Trees	0
Human Disturbance	Y	Rocky Outcrops	N
Mature Koala Feed Trees	7		
<b>Vegetation Condition</b>			
Integral	-	Remnant	Y (Rev6 = 8.11.10/8.12.14x2c)
		Regrowth	-
<b>Vegetation Density</b>			
Canopy	M	Understorey	D
<b>Ground Cover</b>			
Fallen Woody Debris	15%	Bark/Leaf Litter	5%
		Rocks	0%
		Grass/Vegetation	80%
		Bare Ground	0%
<b>Aquatic Resources</b>			
Ephemeral	-	Perennial	-
		Marine	-
		None	Y
<b>Opportunistic Observations</b>			
Scratches (Type)	-		
Diggings (Type)	-		
Nests (Type)	-		
Hollow Use (Species)	-		
Scats (Type)	-		
Fauna at site	Sunbird Bush thick knee		


**Habitat Value Ranking:** Moderate - High



<b>SITE NUMBER</b>	H 43 F		
<b>Location</b>	Disturbance Footprint		
<b>Type</b>	Melaleuca forest		
<b>DATE</b>	17/2/11		
<b>RECORDER</b>	Amy Prowd		
<b>LOCALITY</b>	Great Keppel Island		
<b>SITE DESCRIPTION</b>		Melaleuca dominated	
<b>GENERAL NOTES</b>			
Exotics/Weeds	60% Lantana	Hollow Bearing Trees	0
Human Disturbance	N	Rocky Outcrops	N
Mature Koala Feed Trees	4		
<b>Vegetation Condition</b>			
Integral	-	Remnant	Y (Rev6 = 8.3.13c)
<b>Vegetation Density</b>		Regrowth	-
Canopy	S	Understorey	D
<b>Ground Cover</b>			
Fallen Woody Debris	10%	Bark/Leaf Litter	5%
Rocks	0%	Grass/Vegetation	75%
Bare Ground	0%		
<b>Aquatic Resources</b>			
Ephemeral	-	Perennial	-
Marine	-	None	Y
<b>Opportunistic Observations</b>			
Scratches (Type)	-		
Diggings (Type)	-		
Nests (Type)	-		
Hollow Use (Species)	-		
Scats (Type)	-		
Fauna at site	-		


**Habitat Value Ranking:** High – Very High



<b>SITE NUMBER</b>	H 51 F								
<b>Location</b>	Area 10								
<b>Type</b>	Melaleuca forest								
<b>DATE</b>	17/2/11								
<b>RECORDER</b>	Amy Prowd								
<b>LOCALITY</b>	Great Keppel Island								
<b>SITE DESCRIPTION</b>	Melaleuca dealbata and Allocasuarina littoralis low lying area.								
<b>GENERAL NOTES</b>									
Exotics/Weeds	5% Lantana		Hollow Bearing Trees	1					
Human Disturbance	Y minor		Rocky Outcrops	N					
Mature Koala Feed Trees	2								
<b>Vegetation Condition</b>									
<b>Integral</b>	-	<b>Remnant</b>	Y (Rev6 = 8.2.7e)	<b>Regrowth</b>	-				
<b>Vegetation Density</b>									
<b>Canopy</b>	S		<b>Understorey</b>	S					
<b>Ground Cover</b>									
<b>Fallen Woody Debris</b>	5%	<b>Bark/Leaf Litter</b>	40%	<b>Rocks</b>	0%	<b>Grass/ Vegetation</b>	50%	<b>Bare Ground</b>	5%
<b>Aquatic Resources</b>									
<b>Ephemeral</b>	-	<b>Perennial</b>	-	<b>Marine</b>	-	<b>None</b>	Y		
<b>Opportunistic Observations</b>									
<b>Scratches (Type)</b>			-						
<b>Diggings (Type)</b>			-						
<b>Nests (Type)</b>			-						
<b>Hollow Use (Species)</b>			-						
<b>Scats (Type)</b>			Possum						
<b>Fauna at site</b>			Refer to list for Area 10						

**Habitat Value Ranking:** Moderate -High




<b>SITE NUMBER</b>	H 115		
<b>Location</b>			
<b>Type</b>	Melaleuca swamp		
<b>DATE</b>	17/2/11		
<b>RECORDER</b>	Dan Potter		
<b>LOCALITY</b>	Great Keppel Island		
<b>SITE DESCRIPTION</b>		Melaleuca swamp over bracken fern	
<b>GENERAL NOTES</b>			
Exotics/Weeds	<5%	Hollow Bearing Trees	2
Human Disturbance	N	Rocky Outcrops	N
Mature Koala Feed Trees	1		
<b>Vegetation Condition</b>			
Integral	Y	Remnant	Rev6 = 8.3.13c
		Regrowth	-
<b>Vegetation Density</b>			
Canopy	M	Understorey	M
<b>Ground Cover</b>			
Fallen Woody Debris	10%	Bark/Leaf Litter	85%
Rocks	0%	Grass/Vegetation	35
		Bare Ground	0%
<b>Aquatic Resources</b>			
Ephemeral	Y#	Perennial	-
Marine	-	None	-
<b>Opportunistic Observations</b>			
Scratches (Type)	-		
Diggings (Type)	-		
Nests (Type)	-		
Hollow Use (Species)	-		
Scats (Type)	-		
Fauna at site	-		

# Stream dry at present but subject to periodic inundation.


**Habitat Value Ranking:** High – Very High



SITE NUMBER	H 126								
Location									
Type	Eucalypt forest								
DATE	17/2/11								
RECORDER	Dan Potter								
LOCALITY	Great Keppel Island								
SITE DESCRIPTION		Eucalyptus crebra and E. exserta open forest over grassy understorey							
GENERAL NOTES		Rocky slope on side of low ridge							
Exotics/Weeds		<5%	Hollow Bearing Trees		2				
Human Disturbance		N	Rocky Outcrops		Y				
Mature Koala Feed Trees		4							
Vegetation Condition									
Integral		Y	Remnant		Rev6 = 8.11.10/8.12.14x2c	Regrowth		-	
Vegetation Density									
Canopy		S		Understorey		S			
Ground Cover									
Fallen Woody Debris	20%	Bark/Leaf Litter	20%	Rocks	50%	Grass/ Vegetation	10%	Bare Ground	0%
Aquatic Resources									
Ephemeral	-	Perennial	-	Marine		-	None	Y	
Opportunistic Observations									
Scratches (Type)			-						
Diggings (Type)			-						
Nests (Type)			-						
Hollow Use (Species)			-						
Scats (Type)			-						
Fauna at site			-						

**Habitat Value Ranking:** High -Very High




<b>SITE NUMBER</b>	H 139										
<b>Location</b>											
<b>Type</b>	Eucalypt forest										
<b>DATE</b>	17/2/11										
<b>RECORDER</b>	Dan Potter										
<b>LOCALITY</b>	Great Keppel Island										
<b>SITE DESCRIPTION</b>		Corymbia clarksoniana open forest with dense vine understorey									
<b>GENERAL NOTES</b>		Gentle slope down to creek.									
Exotics/Weeds		<5%				Hollow Bearing Trees		6			
Human Disturbance		N				Rocky Outcrops		N			
Mature Koala Feed Trees		5									
<b>Vegetation Condition</b>											
<b>Integral</b>		-		<b>Remnant</b>		Y (Rev6 = 8.11.10/8.12.14x2c)		<b>Regrowth</b>		-	
<b>Vegetation Density</b>											
<b>Canopy</b>		M				<b>Understorey</b>		M			
<b>Ground Cover</b>											
<b>Fallen Woody Debris</b>		5%		<b>Bark/Leaf Litter</b>		5%		<b>Rocks</b>		0%	
								<b>Grass/ Vegetation</b>		90%	
								<b>Bare Ground</b>		0%	
<b>Aquatic Resources</b>											
<b>Ephemeral</b>		Y#		<b>Perennial</b>		-		<b>Marine</b>		-	
								<b>None</b>		-	
<b>Opportunistic Observations</b>											
<b>Scratches (Type)</b>				-							
<b>Diggings (Type)</b>				-							
<b>Nests (Type)</b>				Medium sized twig nest in eucalyptus.							
<b>Hollow Use (Species)</b>				-							
<b>Scats (Type)</b>				-							
<b>Fauna at site</b>				-							

# small gully at the base of the slope with a minor tributary.

**Habitat Value Ranking:** High - Very High



<b>SITE NUMBER</b>	H 165								
<b>Location</b>	Lighthouse headland								
<b>Type</b>	Rocky coastal headland								
<b>DATE</b>	18/2/11								
<b>RECORDER</b>	Dan Potter								
<b>LOCALITY</b>	Great Keppel Island								
<b>SITE DESCRIPTION</b>		Grassland							
<b>GENERAL NOTES</b>		Exposed headland							
Exotics/Weeds		0%	Hollow Bearing Trees	0					
Human Disturbance		Y – Track and helipad	Rocky Outcrops	Y- Cliffs along edge of headland					
Mature Koala Feed Trees		N							
<b>Vegetation Condition</b>									
<b>Integral</b>	-	<b>Remnant</b>	Y (Rev6 = 8.11.9a)	<b>Regrowth</b>	-				
<b>Vegetation Density</b>									
<b>Canopy</b>		Absent		<b>Understorey</b>	Absent				
<b>Ground Cover</b>									
Fallen Woody Debris	0%	Bark/Leaf Litter	0%	Rocks	50%	Grass/Vegetation	50%	Bare Ground	0%
<b>Aquatic Resources</b>									
Ephemeral	-	Perennial	-	Marine	-	None	Y		
<b>Opportunistic Observations</b>									
Scratches (Type)		-							
Diggings (Type)		-							
Nests (Type)		-							
Hollow Use (Species)		-							
Scats (Type)		-							
Fauna at site		-							

**Habitat Value Ranking:** Moderate - High



## APPENDIX H – Consolidated Fauna List







Sep-10														
	Species Name	Common Name	Other significance	NCA	EPBC	Area 1	Area 2	Area 3	Area 4	Area 5	Area 6	Area 7	Area 8	Other
	<i>Egretta sacra</i>	Eastern Reef Egret (Dark Morph)					x							
	<i>Entomyzon cyanotis</i>	Blue-faced Honeyeater						x						
	<i>Eolophus roseicapillus</i>	Galah												x
	<i>Esacus neglectus</i>	Beach Stone Curlew	High Priority	V	Mar				x					
	<i>Eudynamys scolopacea</i>	Common Koel								x	x			
	<i>Eurostopodus mystacalis</i>	White Throated Nightjar				x				x				
	<i>Eurystomus orientalis</i>	Dollarbird												x
	<i>Geopelia humeralis</i>	Bar-shouldered Dove						x		x	x	x		
	<i>Grallina cyanoleuca</i>	Magpie Lark						x						
	<i>Haematopus fuliginosus</i>	Sooty Oystercatcher		NT										x
	<i>Haematopus longirostris</i>	Pied Oystercatcher												x
	<i>Haliaeetus leucogaster</i>	White breasted Sea Eagle			M		x							
	<i>Haliastur indus</i>	Brahminy Kite												x
	<i>Hirundo neoxena</i>	Welcome Swallow					x	x	x		x	x	x	
	<i>Lalae leucomela</i>	Varied Triller						x		x	x		x	
	<i>Lalage tricolor</i>	White winged Triller								x	x	x		
	<i>Lichmera indistincta</i>	Brown Honeyeater				x	x	x		x		x	x	



Sep-10														
	Species Name	Common Name	Other significance	NCA	EPBC	Area 1	Area 2	Area 3	Area 4	Area 5	Area 6	Area 7	Area 8	Other
	<i>Merops ornatus</i>	Rainbow Bee-eater			M, Mar	x		x	x		x		x	
	<i>Microcarbo melanoleucos</i>	Little Pied Cormorant												x
	<i>Monarcha leucotis</i>	White-eared Monarch						x		x				
	<i>Monarcha melanopsis</i>	Black-faced Monarch			M, Mar			x		x	x		x	
	<i>Monarcha trivirgatus</i>	Spectacled Monarch			M, Mar									
	<i>Myiagra inquieta</i>	Restless Flycatcher			M				x					
	<i>Myiagra rubecula</i>	Leaden Flycatcher			M	x	x	x	x	x	x	x	x	
	<i>Nectarinia jugularis</i>	Olive Backed Sunbird					x	x	x	x	x	x	x	
	<i>Ninox connivens</i>	Barking Owl								x			x	
	<i>Ninox novaeseelandiae</i>	Boobook					x			x	x	x	x	
	<i>Numenius madagascariensis</i>	Eastern Curlew			M, Mar									
	<i>Numenius phaeopus</i>	Whimbrel			M, Mar									
	<i>Nymphicus hollandicus</i>	Cockatiel												x
	<i>Oriolus sagittatus</i>	Olive-backed Oriole								x	x			
	<i>Pachycephala rufiventris</i>	Rufous Whistler						x	x	x				
	<i>Pandion haliaetus</i>	Osprey						x		x	x	x		
	<i>Pavo cristatus*</i>	Peacock*						x		x	x	x	x	



Sep-10														
	Species Name	Common Name	Other significance	NCA	EPBC	Area 1	Area 2	Area 3	Area 4	Area 5	Area 6	Area 7	Area 8	Other
	<i>Petrochelidon nigricans</i>	Tree Martin												x
	<i>Phalacrocorax varius</i>	Large Pied Cormorant												x
	<i>Philemon citreogularis</i>	Little Friarbird				x	x	x	x	x	x	x	x	
	<i>Philemon corniculatus</i>	Noisy Friarbird							x	x				
	<i>Podargus strigoides</i>	Tawny Frogmouth									x			
	<i>Scythrops novaehollandiae</i>	Channel Billed Cuckoo				x	x	x	x					
	<i>Sphecotheres virdis</i>	Figbird									x			
	<i>Sterna bergii</i>	Crested Tern			M, Mar		x					x		
	<i>Todiramphus chloris</i>	Collared Kingfisher												
	<i>Todiramphus macleayii</i>	Forest Kingfisher										x	x	
	<i>Trichoglossus haematodus</i>	Rainbow Lorikeet				x	x	x	x	x	x	x	x	
	<i>Turnix maculosa</i>	Red-backed Button-quail											x	
	<i>Tyto alba</i>	Barn Owl												
	<i>Vanellus miles</i>	Masked lapwing			M	x	x	x	x				x	
	<i>Zosterops lateralis</i>	Silvereye					x	x		x	x	x		
Reptiles	<i>Anomalopus verreauxii</i>	Verreaux's Skink									x			
	<i>Carlia pectoralis</i>									x	x			
	<i>Carlia vivax</i>	Lively Skink								x	x	x	x	
	<i>Cryptobletharus littoralis</i>	Supralittoral Shining Skink					x							







[illegible]



[illegible]



[illegible]



Feb-11																
	Species Name	Common Name	Other Significance	NCA	EPBC	Area 1	area 2	area 3	area 4	area 5	Area 6	area 7	area 8	area 9	area 10	Other
	<i>Egretta sacra</i>	Eastern Reef Egret (Dark Morph)														X
	<i>Entomyzon cyanotis</i>	Blue-faced Honeyeater														
	<i>Eolophus roseicapullus</i>	Galah														
	<i>Esacus neglectus</i>	Beach Stone Curlew	High Priority	V	Mar		X									
	<i>Eudynamys scolopacea</i>	Common Koel								X						
	<i>Eurostopodus mystacalis</i>	White Throated Nightjar														
	<i>Eurystomus orientalis</i>	Dollarbird														
	<i>Geopelia humeralis</i>	Bar-shouldered Dove				x			X		X		X			
	<i>Grallina cyanoleuca</i>	Magpie Lark														
	<i>Haematopus fuliginosus</i>	Sooty Oystercatcher		NT												
	<i>Haematopus longirostris</i>	Pied Oystercatcher													X	
	<i>Haliaeetus leucogaster</i>	White breasted Sea Eagle			M				X							
	<i>Haliastur indus</i>	Brahminy Kite					X		X							
	<i>Hirundo neoxena</i>	Welcome Swallow				x		X				X			X	
	<i>Lalage leucomela</i>	Varied Triller					X		X	X	X				X	
	<i>Lalage tricolor</i>	White winged Triller														
	<i>Lichmera indistincta</i>	Brown Honeyeater				x		x	X		X		X	X	X	



Feb-11																
	Species Name	Common Name	Other Significance	NCA	EPBC	Area 1	area 2	area 3	area 4	area 5	Area 6	area 7	area 8	area 9	area 10	Other
	<i>Merops ornatus</i>	Rainbow Bee-eater			M, Mar			X		X			X			
	<i>Microcarbo melanoleucos</i>	Little Pied Cormorant														X
	<i>Monarcha leucotis</i>	White-eared Monarch														
	<i>Monarcha melanopsis</i>	Black-faced Monarch			M, Mar											
	<i>Monarcha trivirgatus</i>	Spectacled Monarch			M, Mar										X	
	<i>Myiagra inquieta</i>	Restless Flycatcher			M											
	<i>Myiagra rubecula</i>	Leaden Flycatcher			M		x				X				X	
	<i>Nectarinia jugularis</i>	Olive Backed Sunbird						x	X	X	X	X		X	X	
	<i>Ninox connivens</i>	Barking Owl														
	<i>Ninox novaeseelandiae</i>	Boobook							X						X	
	<i>Numenius madagascariensis</i>	Eastern Curlew			M, Mar											X
	<i>Numenius phaeopus</i>	Whimbrel			M, Mar											X
	<i>Nymphicus hollandicus</i>	Cockatiel														
	<i>Oriolus sagittatus</i>	Olive-backed Oriole														
	<i>Pachycephala rufiventris</i>	Rufous Whistler														
	<i>Pandion haliaetus</i>	Osprey											X			
	<i>Pavo cristatus*</i>	Peacock*								X	X		X			



Feb-11																
	Species Name	Common Name	Other Significance	NCA	EPBC	Area 1	area 2	area 3	area 4	area 5	Area 6	area 7	area 8	area 9	area 10	Other
	<i>Petrochelidon nigricans</i>	Tree Martin														
	<i>Phalacrocorax varius</i>	Large Pied Cormorant					X									X
	<i>Philemon citreogularis</i>	Little Friarbird				X	X	X	X				X	X	X	
	<i>Philemon corniculatus</i>	Noisy Friarbird				X	X	X	X		X	X		X	X	
	<i>Podargus strigoides</i>	Tawny Frogmouth														
	<i>Scythrops novaehollandiae</i>	Channel Billed Cuckoo										X		X	X	
	<i>Sphecotheres virdis</i>	Figbird														
	<i>Sterna bergii</i>	Crested Tern			M, Mar		X									
	<i>Todiramphus chloris</i>	Collared Kingfisher														X
	<i>Todiramphus macleayii</i>	Forest Kingfisher							X							
	<i>Trichoglossus haematodus</i>	Rainbow Lorikeet				x		x	X		X			X	X	
	<i>Turnix maculosa</i>	Red-backed Button-quail											X			
	<i>Tyto alba</i>	Barn Owl											X			
	<i>Vanellus miles</i>	Masked lapwing			M		X	X							X	
	<i>Zosterops lateralis</i>	Silvereye										X			X	
Reptiles	<i>Anomalopus verreauxii</i>	Verreaux's Skink								X						
	<i>Carlia pectoralis</i>														X	
	<i>Carlia vivax</i>	Lively Skink				x			X		X		X			



Feb-11																
	Species Name	Common Name	Other Significance	NCA	EPBC	Area 1	area 2	area 3	area 4	area 5	Area 6	area 7	area 8	area 9	area 10	Other
	<i>Cryptobletharus littoralis</i>	Supralittoral Shining Skink					X									
	<i>Cryptobletharus pulcher</i>	Wall Skink				X			X			X	X	X		
	<i>Ctenotus robustus</i>	Eastern Striped Skink				X		X	X			X			X	
	<i>Ctenotus taeniolatus</i>	Copper-tailed Skink				X	X	X						X		
	<i>Demansia psammophis</i>	Yellow-faced Whipsnake											X			
	<i>Dendrelaphis punctulata</i>	Green Tree Snake									X					
	<i>Hemidactylus frenatus</i> *	Asian House Gecko												X	X	
	<i>Heteronotia binoei</i>	Binoe's Gecko				X		X			X			X		
	<i>Lampropholis delicata</i>	Delicate Skink								X	X		X			
	<i>Lialis burtonis</i>	Burton's Legless Lizard														
	<i>Lygisaurus foliorum</i>	Burnett's Skink				X		X	X	X		X		X	X	
	<i>Morelia spilota</i>	Carpet Python														
	<i>Tiliqua scincoides</i>	Blue Tongue Lizard														X
	<i>Varanus gouldii</i>	Sand Goanna						X	X						X	
	<i>Varanus semiremex</i>	Rusty Monitor	High Priority													X
Amphibians	<i>Limnodynastes peronii</i>	Striped Marsh Frog						X		X		X	X	X		
	<i>Litoria alboguttata</i>	Striped Burrowing Frog														X
	<i>Litoria caerulea</i>	Green Tree Frog							X	X						
	<i>Litoria fallax</i>	Eastern Sedge Frog						X	X	X		X	X	X	X	



Feb-11																
	Species Name	Common Name	Other Significance	NCA	EPBC	Area 1	area 2	area 3	area 4	area 5	Area 6	area 7	area 8	area 9	area 10	Other
	<i>Litoria nasuta</i>	Rocket Frog				X			X				X	X		
	<i>Litoria rothii</i>	Northern Laughing Tree Frog							X				X			
	<i>Litoria rubella</i>	Ruddy Tree Frog						X	X				X	X	X	
	<i>Pseudophryne major</i>	Broodfrog										X		X		
Mammals	<i>Canis familiaris</i>	Dog					X									
	<i>Capra hircus*</i>	Goat									X	X				
	<i>Hydromys chrysogaster</i>	Water Rat							X							
	<i>Melomys cervinipes</i>	Fawn-footed Melomys										X				
	<i>Miniopterus australis</i>	Little Bent-wing Bat				X	X	X	X	X	X	X	X		X	
	<i>Miniopterus orianae oceanensis</i>	Not positively identified.														
	<i>Mormopterus ridei</i>	Little north-eastern Freetail Bat											X			
	<i>Myotis macropus</i>	Large Footed Myotis										X				
	<i>Nyctophilus sp.</i>	Not positively identified.														
	<i>Ovis aries*</i>	Sheep														
	<i>Planigale maculata</i>	Common Planigale														
	<i>Pteropus alecto</i>	Black Flying Fox						X	X	X	X	X		X	X	
	<i>Rattus rattus*</i>	Black Rat										X				X



						Feb-11											
	Species Name	Common Name	Other Significance	NCA	EPBC	Area 1	area 2	area 3	area 4	area 5	Area 6	area 7	area 8	area 9	area 10	Other	
	<i>Tachyglossus aculeatus</i>	Echidna		CS													
	<i>Taphozous</i> sp or <i>Mormopterus beccarii</i>	Not positively identified.				X											
	<i>Trichosurus vulpecula</i>	Brushtail Possum				x		X	X	X	X			X	X		
Invertebrates	<i>Araea andromacha</i>	Glasswing									X						
	<i>Catopsilia pomona</i>	Lemon Migrant										X	X				
	<i>Cressida cressida</i>	Big Greasy									X						
	<i>Euploea core corinna</i>	Common Crow Butterfly				X				X			X				
	<i>Eurema hecabe</i>	Common Grass Yellow										X					
	<i>Figuladra incei incei</i>	Shoalwater Bay Banded Snail															
	<i>Gasteracantha minax</i>	Jewelled Spider				X											
	<i>Hypolimnas bolina</i>	Varied Eggfly															
	<i>Laevicaulis alte</i> *	Tropical Leatherleaf Slug															
	<i>Melanitis leda</i>	Evening Brown								X	X				X		
	<i>Methana marginalis</i>	Bush Cockroach				X									X		
	<i>Tirumala hamata</i>	Blue Tiger									X						

**Other Significance:** High Priority = Listed under the Fitzroy Natural Resource Management Region Back on Track Actions for Biodiversity (DERM, 2010c).

**NCA:** V = Vulnerable, NT = Near Threatened, CS = Cultural Significance

**EPBC:** M = Migratory, Mar = Marine.



## APPENDIX I – Significant Fauna Species Analysis



Appendix I- Significant Fauna Species Analysis

Scheduled Species

Literature Review								Results	
Species	NCA Status	EPBC Status	Database	Habitat (foraging and resting) Preferences Breeding/nesting and Seasonal influences	Species Distribution	SEWPAC Survey Requirements	Likelihood of Occurrence (as per literature review)	Assessment to Date	Results and Likely Presence Based on Field Survey
<i>Accipiter novae-hollandiae</i> Grey Goshawk	NT		Wildlife Online	Forests, woodlands, well timbered landscapes, may hunt over open country (Flegg, 2003). Grey Goshawks form permanent pairs that defend a home territory year round. Both sexes constructs a stick nest lined with leaves high in a tree fork, and often re-use the same nest. Breeding season in the north is between January and May (Birds Australia, 2010).	The Grey Goshawk is found in coastal areas in northern and eastern Australia. The white morph is predominant in the more open forests of north-western Australia and coastal Victoria and is the only form found in Tasmania. The grey morph is more common in the thicker, sub-tropical forests of the east coast (Birds Australia, 2010). The Grey Goshawk is sedentary with juveniles moving in search of new territories (Birds Australia, 2010).	No specific guidelines available. General survey guidelines for birds (SEWPAC, 2011) include: <ul style="list-style-type: none"><li>■ Area searches (typically 1-3ha for 10-20mins);</li><li>■ Transect surveys (record birds while travelling between two fixed points of known distance);</li><li>■ Transect surveys by boat are well suited to detecting birds that occur on rocky shores and cliffs of islands and</li><li>■ Point surveys (usually 5-20mins) sampling points are usually predetermined and selected either randomly or systematically through the area.</li></ul>	Possible	<p>Chenoweth EPLA undertook an 8 day fauna survey of the proposed disturbance area in September 2010 and a further 8 days survey in February 2011.</p> <p>The Chenoweth Surveys were undertaken as follows:</p> <ul style="list-style-type: none"><li>■ Dedicated bird watching was undertaken for 20 minutes per area (Figure 12) every morning in the early morning and late afternoon on each day of the survey. During this time, two observers walked quietly over selected areas (point surveys) of the site to detect birds present both through direct observation and through calls.</li><li>■ Birds were also recorded when opportunistically observed during other survey activities.</li><li>■ Nocturnal birds were searched for as part of spotlighting and call playback activities on site</li><li>■ Migratory shorebird searches were undertaken along the beach-front and tidal creeks. Point surveys of these areas were undertaken on foot for 20 minutes and sampled across a range of tide heights.</li><li>■ A survey from a boat of the beaches at low tide was undertaken for a total of 2.5 hours during the dry season survey on 26 September 2010 between 2:00pm – 04:30pm.</li><li>■ Leeke's Estuary (Figure 1) was walked during the wet season survey on 21 February 2011 at low tide (incoming) between 06:20am – 09:30am.</li><li>■ A portion of the Estuary from the mouth to the shed was surveyed over a period of 3 hours to actively search for feeding and roosting waders.</li><li>■ Detailed habitat assessments were also undertaken throughout GKI.</li></ul> <p>Central Queensland University (CQE) undertook bird surveys on GKI between 6 – 8 October 2010 and 21-25 March 2011. CQU bird surveys involved the traversing of the main</p>	<p>Not recorded during survey.</p> <p>Possible foraging habitat.</p> <p>It is unclear how far over open ocean juveniles may move in search of new territories.</p>



Literature Review								Results	
Species	NCA Status	EPBC Status	Database	Habitat (foraging and resting) Preferences Breeding/nesting and Seasonal influences	Species Distribution	SEWPAC Survey Requirements	Likelihood of Occurrence (as per literature review)	Assessment to Date	Results and Likely Presence Based on Field Survey
								development footprint by foot and electric vehicle with regular stops made to look and listen for the presence of birds (point searches). Opportunistic sightings between stop points were also recorded. All beaches and rocky headlands were surveyed for birds during a full circuit of the island by boat on Thursday 7th October.	
<i>Actitis hypoleucos</i> Common Sandpiper		Marine, Migratory	Wildlife Online Birds Australia	<p>Fresh and salt marshes, beside lakes, dams, streams, sheltered coasts, rocky shores (Flegg, 2003).</p> <p>In Australia, the Common Sandpiper is found in coastal or inland wetlands, both saline or fresh. It is found mainly on muddy edges or rocky shores. During the breeding season in the northern hemisphere, it prefers freshwater lakes and shallow rivers (Birds Australia, 2010)</p>	<p>In Australasia the common sandpiper visits New Guinea and Australia, mainly in the north and west. It is migratory, breeding in Eurasia. Most of the western breeding populations winter in Africa and eastern breeding populations winter in Australia and south Asia to Melanesia. Some birds do not return to Eurasia to breed, but remain in the north of Australia throughout the Australian winter (Birds Australia, 2010).</p> <p>In Queensland it occurs mainly in the north: South-eastern Gulf of Carpentaria, Queensland and Cairns Foreshore, Queensland</p>	<p>Surveys for migratory shorebirds (SEWPAC, 2010) should be conducted at sites where either:</p> <ul style="list-style-type: none"> <li>No suitable survey records exist or</li> <li>Records are too old to be considered reliable; or</li> <li>The site characteristics have changed.</li> </ul> <p>The majority of shorebirds are present during the non-breeding season (October to march) and this is when count surveys to establish the presence, number , habitat characteristics and the context of the site (ie how many other similar sites occur and are these used by shorebirds). Survey recommendations are as follows:</p> <ul style="list-style-type: none"> <li>At a minimum cover all the habitat thought to be used by the same population of shorebirds and the entire contiguous habitat where shorebirds occur.</li> <li>Surveys should be conducted during the period when the majority of migratory birds are present in the area and the during the northern hemisphere breeding season to obtain non-breeding, non-migratory immature populations.</li> <li>Surveys for roosting birds are to be conducted as close to high tide as possible (max 2 hours either side). Surveys for foraging birds as close to low tide as possible (no more than 2hours either side). Surveys should not be undertaken during high rainfall or strong winds.</li> <li>Survey effort should be a minimum of 4 surveys for roosting shorebirds during the period when most are present in the area (eg 1 in dec, 2 in Jan and 1 in Feb). A minimum of 4 surveys for foraging shorebirds including 2 at spring low tide and 2 at neap low tide. For large sites or sites where large numbers are expected it is recommended that at least two people undertake the counts.</li> </ul> <p>Data requirements are:</p> <ul style="list-style-type: none"> <li>Roosting sites – total abundance, species richness, species abundance.</li> <li>Shorebird behaviour – activity at site (roosting, foraging, both), foraging location (mapping of foraging habitat).</li> <li>Survey conditions – date, time of day, tide height, weather conditions (temperature, precipitation, wind speed, wind direction).</li> <li>Number of observers and experience level.</li> <li>Habitat characteristics (dominant landform type, site hydrology, dominant vegetation types, inter-tidal substrate, invasive species, disturbance regime, presence of suitable nocturnal roost sites).</li> <li>Methodology used to conduct survey.</li> </ul> <p>Where it is not possible to conduct surveys within the manner recommended a thorough habitat assessment must be done. The characteristics of the site (landform, hydrology, flood levels) should be assessed.</p>	Possible	<p>Chenoweth EPLA undertook an 8 day fauna survey of the proposed disturbance area in September 2010 and a further 8 days survey in February 2011.</p> <p>The Chenoweth Surveys were undertaken as follows:</p> <ul style="list-style-type: none"> <li>Dedicated bird watching was undertaken for 20 minutes per area (Figure 12) every morning in the early morning and late afternoon on each day of the survey. During this time, two observers walked quietly over selected areas (point surveys) of the site to detect birds present both through direct observation and through calls.</li> <li>Birds were also recorded when opportunistically observed during other survey activities.</li> <li>Nocturnal birds were searched for as part of spotlighting and call playback activities on site</li> <li>Migratory shorebird searches were undertaken along the beach-front and tidal creeks. Point surveys of these areas were undertaken on foot for 20 minutes and sampled across a range of tide heights.</li> <li>A survey from a boat of the beaches at low tide was undertaken for a total of 2.5 hours during the dry season survey on 26 September 2010 between 2:00pm – 04:30pm.</li> <li>Leeke's Estuary (Figure 1) was walked during the wet season survey on 21 February 2011 at low tide (incoming) between 06:20am – 09:30am.</li> <li>A portion of the Estuary from the mouth to the shed was surveyed over a period of 3 hours to actively search for feeding and roosting waders.</li> <li>Detailed habitat assessments were also</li> </ul>	<p>Not recorded during field survey.</p> <p>Unlikely that Great Keppel Island is a significant part of its habitat as it's main distribution is from north and western Australia as far south as Cairns. However it is possible that this species may occasionally be present on GKI.</p>



Literature Review								Results	
Species	NCA Status	EPBC Status	Database	Habitat (foraging and resting) Preferences Breeding/nesting and Seasonal influences	Species Distribution	SEWPAC Survey Requirements	Likelihood of Occurrence (as per literature review)	Assessment to Date	Results and Likely Presence Based on Field Survey
								undertaken throughout GKI.	
								<p>Central Queensland University (CQE) undertook bird surveys on GKI between 6 – 8 October 2010 and 21-25 March 2011. CQU bird surveys involved the traversing of the main development footprint by foot and electric vehicle with regular stops made to look and listen for the presence of birds (point searches). Opportunistic sightings between stop points were also recorded. All beaches and rocky headlands were surveyed for birds during a full circuit of the island by boat on Thursday 7th October.</p>	
<i>Apus pacificus</i> Fork-tailed Swift		Marine, Migratory	EPBC Protected Matters Wildlife Online Birds Australia	<p>Mostly occur over inland plains but sometimes above foothills or in coastal areas. They often occur over cliffs and beaches and also over islands. They mostly occur over dry or open habitats, including riparian woodland and tea-tree swamps, low scrub, heathland or saltmarsh. They are also found at treeless grassland and sandplains covered with spinifex, open farmland and inland and coastal sand-dunes. Forage aerially, up to hundreds of metres above ground, but also less then 1m above open areas or over water (DEWHA, 2010).</p> <p>The Fork-tailed Swift usually arrives in Australia around October; some arrive early in September, however, this is rare. The Fork-tailed Swift leaves southern Australia from mid-April and departs the Darwin area by the end of April. The birds also depart via north-east Queensland, with sightings common from February–March and most birds having departed by May (SEWPAC, 2010).</p>	<p>The Fork-tailed Swift is a non-breeding visitor to all states and territories of Australia.</p> <p>In Queensland there are scattered records of the Fork-tailed Swift in the Gulf Country, and a few records on Cape York Peninsula. In the north-east region there are many records east of the Great Divide from near Cooktown and south to Townsville. They are also widespread but scattered in coastal areas from 20° S, south to Brisbane and in much of the south south-eastern region. They are more widespread west of the Great Divide, and are commonly found west of the line joining Chinchilla and Hughenden. They are found to the west between Richmond and Winton, Longreach, Gowan Range, Maraila National Park and Dirranbandi. They are rarely found further west to Windorah and Thargomindah (SEWPAC, 2010).</p>	As above	Known	<p>Chenoweth EPLA undertook an 8 day fauna survey of the proposed disturbance area in September 2010 and a further 8 days survey in February 2011.</p> <p>The Chenoweth Surveys were undertaken as follows:</p> <ul style="list-style-type: none"> <li>▪ Dedicated bird watching was undertaken for 20 minutes per area (Figure 12) every morning in the early morning and late afternoon on each day of the survey. During this time, two observers walked quietly over selected areas (point surveys) of the site to detect birds present both through direct observation and through calls.</li> <li>▪ Birds were also recorded when opportunistically observed during other survey activities.</li> <li>▪ Nocturnal birds were searched for as part of spotlighting and call playback activities on site</li> <li>▪ Migratory shorebird searches were undertaken along the beach-front and tidal creeks. Point surveys of these areas were undertaken on foot for 20 minutes and sampled across a range of tide heights.</li> <li>▪ A survey from a boat of the beaches at low tide was undertaken for a total of 2.5 hours during the dry season survey on 26 September 2010 between 2:00pm – 04:30pm.</li> <li>▪ Leeke's Estuary (Figure 1) was walked during the wet season survey on 21 February 2011 at low tide (incoming) between 06:20am – 09:30am.</li> </ul>	<p>Not recorded by CEPLA during field survey. CQE recorded a total of 25 birds during the March 2011 survey within the Clam Bay Precinct and Resort Precinct (Refer to (Black and Houston, 2011) for further detail).</p> <p>Possible that Great Keppel Island is a significant part of its habitat as the coastal environment may provide foraging habitat for this species.</p> <p>Breeding habitat – Absent. Does not breed in Australia.</p>



Literature Review								Results	
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								<ul style="list-style-type: none"> <li>A portion of the Estuary from the mouth to the shed was surveyed over a period of 3 hours to actively search for feeding and roosting waders.</li> <li>Detailed habitat assessments were also undertaken throughout GKI.</li> </ul> <p>Central Queensland University (CQE) undertook bird surveys on GKI between 6 – 8 October 2010 and 21-25 March 2011. CQU bird surveys involved the traversing of the main development footprint by foot and electric vehicle with regular stops made to look and listen for the presence of birds (point searches). Opportunistic sightings between stop points were also recorded. All beaches and rocky headlands were surveyed for birds during a full circuit of the island by boat on Thursday 7th October.</p>	
<i>Ardea ibis</i> Cattle Egret		Marine, Migratory	EPBC Protected Matters Wildlife Online Birds Australia	<p>The Cattle Egret occurs in tropical and temperate grasslands, wooded lands and terrestrial wetlands. It has occasionally been seen in arid and semi-arid regions however this is extremely rare. High numbers have been observed in moist, low-lying poorly drained pastures with an abundance of high grass; it avoids low grass pastures. It has been recorded on earthen dam walls and ploughed fields. It is commonly associated with the habitats of farm animals, particularly cattle, but also pigs, sheep, horses and deer. The Cattle Egret is known to follow earth-moving machinery and has been located at rubbish tips. It uses predominately shallow, open and fresh wetlands including meadows and swamps with low emergent vegetation and abundant aquatic flora. They have sometimes been observed in swamps with tall emergent vegetation (SEWPAC, 2010).</p> <p>The Cattle Egret breeds in colonies, either mono-specific or with other Egrets/Herons. In Australia the principal breeding sites are the central east coast from about Newcastle to Bundaberg. East coast colonies operate in a well defined period from October to January, occasionally extending by a month either side. In the Northern Territory, Top End colonies operate mainly November to February with smaller numbers breeding at other times</p>	<p>The Cattle Egret is widespread and common according to migration movements and breeding localities surveys. Two major distributions have been located; from north-east Western Australia to the Top End of the Northern Territory and around south-east Australia. In Western Australia and the Northern Territory, the Cattle Egret is located from Wyndham to Arnhem Land. In south-east Australia it is found from Bundaberg, inland to Roma, Thargominda, and then down through Inverell, Walgett, Nyngan, Cobar, Ivanhoe, Balranald to Swan Hill, and then west to Pinnaroo and Port Augusta (SEWPAC, 2010)</p> <p>In Australia the Cattle Egret is a partial migrant; some of the population migrates to New Zealand, while the remainder migrates locally. The birds migrate from breeding colonies in south-east Queensland and north-east NSW to spend winter in either south-east Australia or New Zealand. In north and west Australia the movement is not as well known as that of the east and south. The birds are recorded during all months in the Northern Territory; however, they are less abundant from February to May, immediately after breeding. Some are believed to migrate to south-west Western Australia, arriving from April. Surveys indicate the Cattle Egret is a migrant to New Guinea during the dry season. It is believed to depart from both the Northern Territory and north-east Queensland. The bird is also known to move east from the Northern Territory to Queensland (SEWPAC, 2010).</p>	As above	Possible	<p>Chenoweth EPLA undertook an 8 day fauna survey of the proposed disturbance area in September 2010 and a further 8 days survey in February 2011.</p> <p>The Chenoweth Surveys were undertaken as follows:</p> <ul style="list-style-type: none"> <li>Dedicated bird watching was undertaken for 20 minutes per area (Figure 12) every morning in the early morning and late afternoon on each day of the survey. During this time, two observers walked quietly over selected areas (point surveys) of the site to detect birds present both through direct observation and through calls.</li> <li>Birds were also recorded when opportunistically observed during other survey activities.</li> <li>Nocturnal birds were searched for as part of spotlighting and call playback activities on site</li> <li>Migratory shorebird searches were undertaken along the beach-front and tidal creeks. Point surveys of these areas were undertaken on foot for 20 minutes and sampled across a range of tide heights.</li> <li>A survey from a boat of the beaches at low tide was undertaken for a total of 2.5 hours during the dry season survey on 26 September</li> </ul>	<p>Not recorded during field survey.</p> <p>Unlikely to breed on Great Keppel Island as the breeding distribution reaches its northern extent at Bundaberg.</p> <p>Possible foraging habitat in restricted parts of GKI. Most wetland areas on the island have tidal influences and the Cattle Egret prefers fresh water.</p>



Literature Review								Results	
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								<p>2010 between 2:00pm – 04:30pm.</p> <ul style="list-style-type: none"> <li>Leeke's Estuary (Figure 1) was walked during the wet season survey on 21 February 2011 at low tide (incoming) between 06:20am – 09:30am.</li> <li>A portion of the Estuary from the mouth to the shed was surveyed over a period of 3 hours to actively search for feeding and roosting waders.</li> <li>Detailed habitat assessments were also undertaken throughout GKI.</li> </ul> <p>Central Queensland University (CQE) undertook bird surveys on GKI between 6 – 8 October 2010 and 21-25 March 2011. CQU bird surveys involved the traversing of the main development footprint by foot and electric vehicle with regular stops made to look and listen for the presence of birds (point searches). Opportunistic sightings between stop points were also recorded. All beaches and rocky headlands were surveyed for birds during a full circuit of the island by boat on Thursday 7th October.</p>	
<i>Ardea modesta</i> Eastern Great Egret		Marine, Migratory	Wildnet Online	<p>The Eastern Great Egret has been reported in a wide range of wetland habitats (for example inland and coastal, freshwater and saline, permanent and ephemeral, open and vegetated, large and small, natural and artificial). These include swamps and marshes; margins of rivers and lakes; damp or flooded grasslands, pastures or agricultural lands; reservoirs; sewage treatment ponds; drainage channels; salt pans and salt lakes; salt marshes; estuarine mudflats, tidal streams; mangrove swamps; coastal lagoons; and offshore reefs. The species usually frequents shallow waters.</p> <p>The Eastern Great Egret may retreat to permanent wetlands or coastal areas when other wetlands are dry (for example, during drought). This may occur annually in some regions with regular wet and dry seasons or erratically where the availability of wetland habitat is also erratic.</p> <p>In Australia, the largest breeding colonies, and greatest concentrations of breeding colonies, are located in near-coastal regions of the Top End of the Northern Territory (SEWPAC, 2011).</p>	<p>Eastern Great Egrets are widespread in Australia. They occur in all states/territories of mainland Australia and in Tasmania. They have also been recorded as vagrants on Lord Howe, Norfolk and Macquarie Islands.</p> <p>The Great Egret is dispersive and, in parts of its range, migratory. In Australia, multi-directional post-breeding movements of up to 280 km have been recorded in south-western Western Australia, and similar patterns of movement have been recorded in eastern Australia. The species undertakes some regular seasonal movements, mostly to and from breeding colonies, and towards the coast in the dry season. There is circumstantial evidence of long-distance migration, with regional differences in reporting rates suggesting that individuals migrate north to winter in tropical northern Australia, consistent with changes in the availability of suitable wetland habitat.</p> <p>Regular migration to locations outside of Australia is suspected but not confirmed. There are records of irruptive movements of individuals from Australia to New Zealand and individuals banded in Australia have been recovered in Papua New Guinea, with regular passage likely to occur across Torres Strait (SEWPAC, 2011).</p>	Eastern Great Egret numbers may be counted or estimated by area search or by transect-point survey. Surveys can be conducted on foot or from light aircraft (SEWPAC, 2011).	Possible	<p>Chenoweth EPLA undertook an 8 day fauna survey of the proposed disturbance area in September 2010 and a further 8 days survey in February 2011.</p> <p>The Chenoweth Surveys were undertaken as follows:</p> <ul style="list-style-type: none"> <li>Dedicated bird watching was undertaken for 20 minutes per area (Figure 12) every morning in the early morning and late afternoon on each day of the survey. During this time, two observers walked quietly over selected areas (point surveys) of the site to detect birds present both through direct observation and through calls.</li> <li>Birds were also recorded when opportunistically observed during other survey activities.</li> <li>Nocturnal birds were searched for as part of spotlighting and call playback activities on site</li> <li>Migratory shorebird searches were undertaken along the beach-front and tidal creeks. Point surveys of these areas were</li> </ul>	<p>Not recorded during field survey.</p> <p>Breeding habitat absent from GKI as breeding occurs in the Northern Territory in Australia.</p> <p>Possible foraging and roosting habitat occurs on GKI.</p>



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								<p>undertaken on foot for 20 minutes and sampled across a range of tide heights.</p> <ul style="list-style-type: none"> <li>A survey from a boat of the beaches at low tide was undertaken for a total of 2.5 hours during the dry season survey on 26 September 2010 between 2:00pm – 04:30pm.</li> <li>Leeke's Estuary (Figure 1) was walked during the wet season survey on 21 February 2011 at low tide (incoming) between 06:20am – 09:30am.</li> <li>A portion of the Estuary from the mouth to the shed was surveyed over a period of 3 hours to actively search for feeding and roosting waders.</li> <li>Detailed habitat assessments were also undertaken throughout GKI.</li> </ul> <p>Central Queensland University (CQE) undertook bird surveys on GKI between 6 – 8 October 2010 and 21-25 March 2011. CQU bird surveys involved the traversing of the main development footprint by foot and electric vehicle with regular stops made to look and listen for the presence of birds (point searches). Opportunistic sightings between stop points were also recorded. All beaches and rocky headlands were surveyed for birds during a full circuit of the island by boat on Thursday 7th October.</p>	
<i>Arenaria interpres</i> Ruddy Turnstone		Marine, Migratory	EPBC Protected Matters Birds Australia	<p>Found singly or in small groups along the coastline and only occasionally inland. Mainly found on exposed rocks or reefs, often with shallow pools, and on beaches. In the north, they are found in a wider range of habitats, including mudflats (Birds in Backyards, 2010).</p> <p>The Ruddy Turnstone mainly forages between lower supralittoral and lower littoral zones of foreshores, from strand-line to wave-zone. They often forage among banks of stranded seaweed or other tide-wrack. They are also known to forage on exposed rocky platforms, coral reefs and mudflats. The Ruddy Turnstone roosts on beaches, above the tideline, among rocks, shells, beachcast seaweed or other debris. They have also been observed roosting on rocky islets among grassy tussocks, and on mudflats and sandflats (SEWPAC, 2010).</p>	<p>The Ruddy Turnstone is widespread within Australia during its non-breeding period of the year, including from Tasmania in the south to Darwin in the north and many coastal areas in between. It is found in most coastal regions, with occasional records of inland populations (SEWPAC, 2010). In Australia, the birds leave sites in the south from mid-March. At some sites the population remains high into April with most departing during the first three weeks of April</p> <p>The Ruddy Turnstone breeds on the coasts of Europe, Asia and North America, generally north of 60° latitude and lays eggs from mid-May to early July. Common breeding coasts include Norway, Denmark, the Baltic coasts of Sweden, Finland, Spitsbergen and Estonia (SEWPAC, 2010). The birds mostly leave from mid-August to early September.</p>	<p>Surveys for migratory shorebirds (SEWPAC, 2010) should be conducted at sites where either:</p> <ul style="list-style-type: none"> <li>No suitable survey records exist or</li> <li>Records are too old to be considered reliable; or</li> <li>The site characteristics have changed.</li> </ul> <p>The majority of shorebirds are present during the non-breeding season (October to march) and this is when count surveys to establish the presence, number, habitat characteristics and the context of the site (ie how many other similar sites occur and are these used by shorebirds). Survey recommendations are as follows:</p> <ul style="list-style-type: none"> <li>At a minimum cover all the habitat thought to be used by the same population of shorebirds and the entire contiguous habitat where shorebirds occur.</li> <li>Surveys should be conducted during the period when the majority of migratory birds are present in the area and the during the northern hemisphere breeding season to obtain non-breeding, non-migratory immature populations.</li> <li>Surveys for roosting birds are to be conducted as close to high tide as possible (max 2 hours either side). Surveys for foraging birds as close to low tide as possible (no more than 2 hours either side). Surveys should not be undertaken during high rainfall or strong winds.</li> </ul>	Possible	<p>Chenoweth EPLA undertook an 8 day fauna survey of the proposed disturbance area in September 2010 and a further 8 days survey in February 2011.</p> <p>The Chenoweth Surveys were undertaken as follows:</p> <ul style="list-style-type: none"> <li>Dedicated bird watching was undertaken for 20 minutes per area (Figure 12) every morning in the early morning and late afternoon on each day of the survey. During this time, two observers walked quietly over selected areas (point surveys) of the site to detect birds present both through direct observation and through calls.</li> <li>Birds were also recorded when opportunistically observed during other survey activities.</li> <li>Nocturnal birds were</li> </ul>	<p>Not recorded during field survey.</p> <p>Breeding habitat absent as breeding does not occur in Australia.</p> <p>Possible foraging and roosting habitat occurs on Great Keppel Island.</p>



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						<ul style="list-style-type: none"> <li>Survey effort should be a minimum of 4 surveys for roosting shorebirds during the period when most are present in the area (eg 1 in dec, 2 in Jan and 1 in Feb). A minimum of 4 surveys for foraging shorebirds including 2 at spring low tide and 2 at neap low tide. For large sites or sites where large numbers are expected it is recommended that at least two people undertake the counts.</li> </ul> <p>Data requirements are:</p> <ul style="list-style-type: none"> <li>Roosting sites – total abundance, species richness, species abundance.</li> <li>Shorebird behaviour – activity at site (roosting, foraging, both), foraging location (mapping of foraging habitat).</li> <li>Survey conditions – date, time of day, tide height, weather conditions (temperature, precipitation, wind speed, wind direction).</li> <li>Number of observers and experience level.</li> <li>Habitat characteristics (dominant landform type, site hydrology, dominant vegetation types, inter-tidal substrate, invasive species, disturbance regime, presence of suitable nocturnal roost sites).</li> <li>Methodology used to conduct survey.</li> </ul> <p>Where it is not possible to conduct surveys within the manner recommended a thorough habitat assessment must be done. The characteristics of the site (landform, hydrology, flood levels) should be assessed.</p>		<p>searched for as part of spotlighting and call playback activities on site</p> <ul style="list-style-type: none"> <li>Migratory shorebird searches were undertaken along the beach-front and tidal creeks. Point surveys of these areas were undertaken on foot for 20 minutes and sampled across a range of tide heights.</li> <li>A survey from a boat of the beaches at low tide was undertaken for a total of 2.5 hours during the dry season survey on 26 September 2010 between 2:00pm – 04:30pm.</li> <li>Leeke's Estuary (Figure 1) was walked during the wet season survey on 21 February 2011 at low tide (incoming) between 06:20am – 09:30am.</li> <li>A portion of the Estuary from the mouth to the shed was surveyed over a period of 3 hours to actively search for feeding and roosting waders.</li> <li>Detailed habitat assessments were also undertaken throughout GKI.</li> </ul> <p>Central Queensland University (CQE) undertook bird surveys on GKI between 6 – 8 October 2010 and 21-25 March 2011. CQU bird surveys involved the traversing of the main development footprint by foot and electric vehicle with regular stops made to look and listen for the presence of birds (point searches). Opportunistic sightings between stop points were also recorded. All beaches and rocky headlands were surveyed for birds during a full circuit of the island by boat on Thursday 7th October.</p>	
<i>Burhinus grallarius</i> Bush Stone Curlew		Migratory	Birds Australia	Nest a scrape or small clearing on bare ground, usually near bush or tree, or beside a fallen dead limb (Readers Digest Complete Book of Australian Birds, 1986).	Found throughout most of Australia and on offshore islands.	As above	Known	<p>Chenoweth EPLA undertook an 8 day fauna survey of the proposed disturbance area in September 2010 and a further 8 days survey in February 2011.</p> <p>The Chenoweth Surveys were undertaken as follows:</p> <ul style="list-style-type: none"> <li>Dedicated bird watching was undertaken for 20 minutes per area (Figure 12) every morning in the early morning and late afternoon on each day of the survey. During this time, two observers walked quietly over selected areas (point surveys) of the site to detect birds present</li> </ul>	Recorded in a range of habitats across GKI by Chenoweth during the dry and wet season surveys (Sept 2010 and Feb 2011). Counts of this species were not undertaken.



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								<p>both through direct observation and through calls.</p> <ul style="list-style-type: none"> <li>■ Birds were also recorded when opportunistically observed during other survey activities.</li> <li>■ Nocturnal birds were searched for as part of spotlighting and call playback activities on site</li> <li>■ Migratory shorebird searches were undertaken along the beach-front and tidal creeks. Point surveys of these areas were undertaken on foot for 20 minutes and sampled across a range of tide heights.</li> <li>■ A survey from a boat of the beaches at low tide was undertaken for a total of 2.5 hours during the dry season survey on 26 September 2010 between 2:00pm – 04:30pm.</li> <li>■ Leeke's Estuary (Figure 1) was walked during the wet season survey on 21 February 2011 at low tide (incoming) between 06:20am – 09:30am.</li> <li>■ A portion of the Estuary from the mouth to the shed was surveyed over a period of 3 hours to actively search for feeding and roosting waders.</li> <li>■ Detailed habitat assessments were also undertaken throughout GKI.</li> </ul> <p>Central Queensland University (CQE) undertook bird surveys on GKI between 6 – 8 October 2010 and 21-25 March 2011. CQU bird surveys involved the traversing of the main development footprint by foot and electric vehicle with regular stops made to look and listen for the presence of birds (point searches). Opportunistic sightings between stop points were also recorded. All beaches and rocky headlands were surveyed for birds during a full circuit of the island by boat on Thursday 7th October.</p>	
<i>Charadrius bicinctus</i> Double-banded Plover		Marine, Migratory	EPBC Protected Matters Birds Australia	Found on littoral, estuarine and fresh or saline terrestrial wetlands and also saltmarsh, grasslands and pasture. Occurs on muddy, sandy, shingled or sometimes rocky beaches, bays and inlets, harbours and margins of fresh or saline terrestrial wetlands such as lakes, lagoons and swamps, shallow estuaries and rivers. Sometimes associated with coastal lagoons, seagrass beds. Sometimes found on	During the non-breeding season, it is common in eastern and southern Australia, mainly between the Tropic of Capricorn and western Eyre Peninsula, with occasional records in northern Queensland and Western Australia. The Double-banded Plover breeds only in New Zealand, where it is widespread (SEWPAC, 2010). Depending on the region in New Zealand, birds begin to leave territories during October and November,	As above	Likely	<p>Chenoweth EPLA undertook an 8 day fauna survey of the proposed disturbance area in September 2010 and a further 8 days survey in February 2011.</p> <p>The Chenoweth Surveys were undertaken as follows:</p> <ul style="list-style-type: none"> <li>■ Dedicated bird watching was</li> </ul>	<p>Not recorded during field survey.</p> <p>Breeding habitat absent as breeding does not occur in Australia.</p> <p>Foraging and roosting habitat occurs on Great Keppel Island.</p>



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				exposed reefs and rock platforms with shallow rock pools and also on coastal sand dunes. In coastal regions, the species breeds on sandy, shelly or shingly beaches, spits and backing dunes, especially around estuaries (SEWPAC, 2010).	peaking in December, and join local flocks. Local flocking peaks during December and January. In inland areas of the southern South Island, these flocks persist until March and April with most departures occurring in February and March. Birds in both New Zealand and Australia return direct to breeding grounds from July, but mostly in August and early September.			<p>undertaken for 20 minutes per area (Figure 12) every morning in the early morning and late afternoon on each day of the survey. During this time, two observers walked quietly over selected areas (point surveys) of the site to detect birds present both through direct observation and through calls.</p> <ul style="list-style-type: none"> <li>■ Birds were also recorded when opportunistically observed during other survey activities.</li> <li>■ Nocturnal birds were searched for as part of spotlighting and call playback activities on site</li> <li>■ Migratory shorebird searches were undertaken along the beach-front and tidal creeks. Point surveys of these areas were undertaken on foot for 20 minutes and sampled across a range of tide heights.</li> <li>■ A survey from a boat of the beaches at low tide was undertaken for a total of 2.5 hours during the dry season survey on 26 September 2010 between 2:00pm – 04:30pm.</li> <li>■ Leeke’s Estuary (Figure 1) was walked during the wet season survey on 21 February 2011 at low tide (incoming) between 06:20am – 09:30am.</li> <li>■ A portion of the Estuary from the mouth to the shed was surveyed over a period of 3 hours to actively search for feeding and roosting waders.</li> <li>■ Detailed habitat assessments were also undertaken throughout GKI.</li> </ul> <p>Central Queensland University (CQE) undertook bird surveys on GKI between 6 – 8 October 2010 and 21-25 March 2011. CQU bird surveys involved the traversing of the main development footprint by foot and electric vehicle with regular stops made to look and listen for the presence of birds (point searches). Opportunistic sightings between stop points were also recorded. All beaches and rocky headlands were surveyed for birds during a full circuit of the island by boat on Thursday 7th October.</p>	
<i>Charadrius</i>		Marine,	EPBC Protected	Bare sandy or dry mud areas, usually on	Very large distribution range including	As above	Possible	Chenoweth EPLA undertook an	Not recorded during field



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<i>ruficapillus</i> Red-capped Plover		Migratory	Matters Wildlife Online Birds Australia	coast. (Flegg, 2003). Widespread on salt lakes and in coastal areas of southern Australia with foraging habitat largely the littoral fringe (Abensperg-Traun and Dickman, 1989).	Australia, Indonesia, Timor-leste and vagrant to New Zealand (Birdlife International, 2009).			<p>8 day fauna survey of the proposed disturbance area in September 2010 and a further 8 days survey in February 2011.</p> <p>The Chenoweth Surveys were undertaken as follows:</p> <ul style="list-style-type: none"> <li>▪ Dedicated bird watching was undertaken for 20 minutes per area (Figure 12) every morning in the early morning and late afternoon on each day of the survey. During this time, two observers walked quietly over selected areas (point surveys) of the site to detect birds present both through direct observation and through calls.</li> <li>▪ Birds were also recorded when opportunistically observed during other survey activities.</li> <li>▪ Nocturnal birds were searched for as part of spotlighting and call playback activities on site</li> <li>▪ Migratory shorebird searches were undertaken along the beach-front and tidal creeks. Point surveys of these areas were undertaken on foot for 20 minutes and sampled across a range of tide heights.</li> <li>▪ A survey from a boat of the beaches at low tide was undertaken for a total of 2.5 hours during the dry season survey on 26 September 2010 between 2:00pm – 04:30pm.</li> <li>▪ Leeke’s Estuary (Figure 1) was walked during the wet season survey on 21 February 2011 at low tide (incoming) between 06:20am – 09:30am.</li> <li>▪ A portion of the Estuary from the mouth to the shed was surveyed over a period of 3 hours to actively search for feeding and roosting waders.</li> <li>▪ Detailed habitat assessments were also undertaken throughout GKI.</li> </ul> <p>Central Queensland University (CQE) undertook bird surveys on GKI between 6 – 8 October 2010 and 21-25 March 2011. CQU bird surveys involved the traversing of the main development footprint by foot and electric vehicle with regular stops made to look and listen for the presence of birds (point searches). Opportunistic</p>	<p>survey.</p> <p>Possible foraging and roosting habitat occurs on Great Keppel Island.</p>



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<i>Esacus magnirostris</i> Beach-stone Curlew	V	Marine	Essential Habitat Mapping Wildlife Online Birds Australia	<p>Open sand beaches, mudflats, reefs, mangroves (Flegg, 2003). Prefers beaches with estuaries or mangroves nearby, however also frequents river mouths, offshore sandbars associated with coral atolls, reefs and rock platforms and coastal lagoons (NSW NPWS,1999). They are mainly active at dawn, dusk and at night, but birds are often seen when they shift or move about sedately during the day. Call at night, breeding birds give a harsh, wailing <i>weer-loo</i> call, which is slightly higher pitched and more shrill than that of the related Bush Stone-curlew <i>Burhinus grallarius</i> (NSW DECC, 2005)</p> <p>The breeding season in temperate Australia lasts from September to November. Nests may be located on sandbanks, sandspits or islands in estuaries, coral ridges, among mangroves or in the sand surrounded by short grass and scattered casuarinas (NSW DECC, 2005).</p>	<p>In Australia, the Beach Stone-curlew occupies coastlines from about Point Cloates in Western Australia, across northern and north-eastern Australia south to north-eastern NSW, with occasional vagrants to south-eastern NSW and Victoria. In NSW, the species occurs regularly to about the Manning River, and the small population of north-eastern NSW is at the limit of the normal range of the species in Australia. (NSW DECC, 2005).</p> <p>An Island wide Wildnet search returned 99 records of this species.</p>	<p>No specific guidelines available. General survey guidelines for birds (SEWPAC, 2011) include:</p> <ul style="list-style-type: none"> <li>Area searches (typically 1-3ha for 10-20mins);</li> <li>Transect surveys (record birds while travelling between tow fixed points of known distance);</li> <li>Transect surveys by boat are well suited to detecting birds that occur on rocky shores and cliffs of islands and</li> <li>Point surveys (usually 5-20mins) sampling points are usually predetermined and selected either randomly or systematically through the area.</li> </ul>	Known	<p>Chenoweth EPLA undertook an 8 day fauna survey of the proposed disturbance area in September 2010 and a further 8 days survey in February 2011. The Chenoweth Surveys were undertaken as follows:</p> <ul style="list-style-type: none"> <li>Dedicated bird watching was undertaken for 20 minutes per area (Figure 12) every morning in the early morning and late afternoon on each day of the survey. During this time, two observers walked quietly over selected areas (point surveys) of the site to detect birds present both through direct observation and through calls.</li> <li>Birds were also recorded when opportunistically observed during other survey activities.</li> <li>Nocturnal birds were searched for as part of spotlighting and call playback activities on site</li> <li>Migratory shorebird searches were undertaken along the beach-front and tidal creeks. Point surveys of these areas were undertaken on foot for 20 minutes and sampled across a range of tide heights.</li> <li>A survey from a boat of the beaches at low tide was undertaken for a total of 2.5 hours during the dry season survey on 26 September 2010 between 2:00pm – 04:30pm.</li> <li>Leeke's Estuary (Figure 1) was walked during the wet season survey on 21 February 2011 at low tide (incoming) between 06:20am – 09:30am.</li> <li>A portion of the Estuary from the mouth to the shed was surveyed over a period of 3 hours to actively search for feeding and roosting waders.</li> <li>Detailed habitat assessments were also undertaken throughout GKI.</li> </ul> <p>Central Queensland University (CQE) undertook bird surveys on GKI between 6 – 8 October</p>	<p>Recorded at Leeks Creek (tidal inlet) by Chenoweth during the dry season survey (Sept 2010).</p> <p>Recorded at Leeks creek, beach and Putney Creek in Feb 2011.</p> <p>CEPLA recorded a total of 5 observations of this species over both the Dry and Wet season surveys.</p> <p>CQE recorded 1 specimen in the Resort Precinct in March 2011.</p>



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<i>Falco cenchroides</i> Nankeen Kestrel		Marine, Migratory	Birds Australia	Mostly avoids forests or dense woodlands, often breeding in cities (Flegg, 2003). Requires open grassy area for hunting, therefore commonly observed in open woodland. Also common on cultivated land where house mice and insects are abundant (Readers Digest Complete Book of Australian Birds, 1986).	Nankeen Kestrels are found in most areas of Australia and are also found on islands along Australia's coastline, as well as New Guinea and Indonesia (Birds Australia, 2010).  An Island wide Wildnet search returned 8 records of this species.	General survey guidelines for birds (SEWPAC, 2011) include: <ul style="list-style-type: none"> <li>Area searches (typically 1-3ha for 10-20mins);</li> <li>Transect surveys (record birds while travelling between tow fixed points of known distance);</li> <li>Transect surveys by boat are well suited to detecting birds that occur on rocky shores and cliffs of islands and</li> <li>Point surveys (usually 5-20mins) sampling points are usually predetermined and selected either randomly or systematically through the area;</li> </ul>	Known	<p>Chenoweth EPLA undertook an 8 day fauna survey of the proposed disturbance area in September 2010 and a further 8 days survey in February 2011.</p> <p>The Chenoweth Surveys were undertaken as follows:</p> <ul style="list-style-type: none"> <li>Dedicated bird watching was undertaken for 20 minutes per area (Figure 12) every morning in the early morning and late afternoon on each day of the survey. During this time, two observers walked quietly over selected areas (point surveys) of the site to detect birds present both through direct observation and through calls.</li> <li>Birds were also recorded when opportunistically observed during other survey activities.</li> <li>Nocturnal birds were searched for as part of spotlighting and call playback activities on site</li> <li>Migratory shorebird searches were undertaken along the beach-front and tidal creeks. Point surveys of these areas were undertaken on foot for 20 minutes and sampled across a range of tide heights.</li> <li>A survey from a boat of the beaches at low tide was undertaken for a total of 2.5 hours during the dry season survey on 26 September 2010 between 2:00pm – 04:30pm.</li> <li>Leeke's Estuary (Figure 1) was walked during the wet season survey on 21 February 2011 at low tide (incoming) between 06:20am – 09:30am.</li> <li>A portion of the Estuary from the mouth to the shed was surveyed over a period of 3 hours to actively search for feeding and roosting</li> </ul>	<p>Not recorded during CEPLA field survey.</p> <p>Recorded by Black and Houston (2011) at Leeks Beach, Putney Beach and Resort Precinct. Black and Houston recorded this species a total of 2 times in 2010 survey and 3 during the 2011 survey.</p> <p>Limited foraging habitat on Great Keppel Island as there are few open grassland areas.</p>



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								<p>waders.</p> <ul style="list-style-type: none"> <li>Detailed habitat assessments were also undertaken throughout GKI.</li> </ul> <p>Central Queensland University (CQE) undertook bird surveys on GKI between 6 – 8 October 2010 and 21-25 March 2011. CQU bird surveys involved the traversing of the main development footprint by foot and electric vehicle with regular stops made to look and listen for the presence of birds (point searches). Opportunistic sightings between stop points were also recorded. All beaches and rocky headlands were surveyed for birds during a full circuit of the island by boat on Thursday 7th October.</p>	
<i>Falco peregrinus</i> Peregrine Falcon		Migratory	Birds Australia	The Peregrine Falcon is found in most habitats, from rainforests to the arid zone, and at most altitudes, from the coast to alpine areas. It requires abundant prey and secure nest sites, and prefers coastal and inland cliffs or open woodlands near water, and may even be found nesting on high city buildings (Birds in Backyards, 2010). Does not build nests, instead laying eggs in recesses in cliffs, hollows in large trees, or abandoned large nests of other birds such as hawks, eagles and ravens (Readers Digest Complete Book of Australian Birds, 1986).	The Peregrine Falcon is found across Australia, but is not common anywhere. It is also found in Europe, Asia, Africa and the Americas (Birds in Backyards, 2010). It is largely resident within large home ranges of 20-30 square kilometres. Young birds roam until ready to breed (Birds in Backyards, 2010).	NO specific guidelines. General survey guidelines for birds (SEWPAC, 2011) include: <ul style="list-style-type: none"> <li>Area searches (typically 1-3ha for 10-20mins);</li> <li>Transect surveys (record birds while travelling between tow fixed points of known distance);</li> <li>Transect surveys by boat are well suited to detecting birds that occur on rocky shores and cliffs of islands and</li> <li>Point surveys (usually 5-20mins) sampling points are usually predetermined and selected either randomly or systematically through the area.</li> </ul>	Possible	<p>Chenoweth EPLA undertook an 8 day fauna survey of the proposed disturbance area in September 2010 and a further 8 days survey in February 2011.</p> <p>The Chenoweth Surveys were undertaken as follows:</p> <ul style="list-style-type: none"> <li>Dedicated bird watching was undertaken for 20 minutes per area (Figure 12) every morning in the early morning and late afternoon on each day of the survey. During this time, two observers walked quietly over selected areas (point surveys) of the site to detect birds present both through direct observation and through calls.</li> <li>Birds were also recorded when opportunistically observed during other survey activities.</li> <li>Nocturnal birds were searched for as part of spotlighting and call playback activities on site</li> <li>Migratory shorebird searches were undertaken along the beach-front and tidal creeks. Point surveys of these areas were undertaken on foot for 20 minutes and sampled across a range of tide heights.</li> <li>A survey from a boat of the beaches at low tide was undertaken for a total of 2.5 hours during the dry season survey on 26 September 2010 between 2:00pm – 04:30pm.</li> <li>Leeke's Estuary (Figure 1) was walked during the wet season survey on 21</li> </ul>	<p>Not recorded during field survey.</p> <p>Possible foraging and breeding habitat occur on Great Keppel Island.</p>



Literature Review								Results	
Species	NCA Status	EPBC Status	Database	Habitat (foraging and resting) Preferences Breeding/nesting and Seasonal influences	Species Distribution	SEWPAC Survey Requirements	Likelihood of Occurrence (as per literature review)	Assessment to Date	Results and Likely Presence Based on Field Survey
								<p>February 2011 at low tide (incoming) between 06:20am – 09:30am.</p> <ul style="list-style-type: none"> <li>A portion of the Estuary from the mouth to the shed was surveyed over a period of 3 hours to actively search for feeding and roosting waders.</li> <li>Detailed habitat assessments were also undertaken throughout GKI.</li> </ul> <p>Central Queensland University (CQE) undertook bird surveys on GKI between 6 – 8 October 2010 and 21-25 March 2011. CQU bird surveys involved the traversing of the main development footprint by foot and electric vehicle with regular stops made to look and listen for the presence of birds (point searches). Opportunistic sightings between stop points were also recorded. All beaches and rocky headlands were surveyed for birds during a full circuit of the island by boat on Thursday 7th October.</p>	
<i>Fregata minor</i> Great Frigatebird		Marine, Migratory	Birds Australia	<p>Wholly adapted to living in the air, Frigatebirds drink while skimming low over fresh or salt water and feed on flying fish and other prey which they pick up from the sea without landing. Frigatebirds nest on offshore islands in tall trees and bushes, constructing a nest with sticks and vines (Readers Digest Complete Book of Australian Birds, 1986). Oceanic habitat, breeding on tropical islands including outer Great Barrier Reef (Flegg, 2003).</p>	<p>This species is considered native in a wide range of countries including Australia. Specifically these countries are American Samoa; Australia; Brazil; British Indian Ocean Territory; Brunei Darussalam; Chile; China; Christmas Island; Cocos (Keeling) Islands; Colombia; Comoros; Costa Rica; Ecuador; Fiji; French Polynesia; Guam; India; Indonesia; Japan; Kenya; Madagascar; Malaysia; Maldives; Marshall Islands; Mayotte; Mexico; Micronesia, Federated States of; Mozambique; Nauru; New Caledonia; Northern Mariana Islands; Palau; Philippines; Réunion; Russian Federation; Seychelles; Solomon Islands; Somalia; South Africa; Sri Lanka; Taiwan, Province of China; Tanzania, United Republic of; Thailand; Timor-Leste; United States; United States Minor Outlying Islands; Vanuatu; Wallis and Futuna.</p> <p>This species is considered a vagrant in the following countries Mauritius; New Zealand; Oman; Singapore; Zimbabwe (Birdlife International, 2009).</p>	<p>Surveys for migratory shorebirds (SEWPAC, 2010) should be conducted at sites where either:</p> <ul style="list-style-type: none"> <li>No suitable survey records exist; or</li> <li>Records are too old to be considered reliable; or</li> <li>The site characteristics have changed.</li> </ul> <p>The majority of shorebirds are present during the non-breeding season (October to March) and this is when count surveys to establish the presence, number, habitat characteristics and the context of the site (ie how many other similar sites occur and are these used by shorebirds). Survey recommendations are as follows:</p> <ul style="list-style-type: none"> <li>At a minimum cover all the habitat thought to be used by the same population of shorebirds and the entire contiguous habitat where shorebirds occur.</li> <li>Surveys should be conducted during the period when the majority of migratory birds are present in the area and the during the northern hemisphere breeding season to obtain non-breeding, non-migratory immature populations.</li> <li>Surveys for roosting birds are to be conducted as close to high tide as possible (max 2 hours either side). Surveys for foraging birds as close to low tide as possible (no more than 2 hours either side). Surveys should not be undertaken during high rainfall or strong winds.</li> <li>Survey effort should be a minimum of 4 surveys for roosting shorebirds during the period when most are present in the area (eg 1 in Dec, 2 in Jan and 1 in Feb). A minimum of 4 surveys for foraging shorebirds including 2 at spring low tide and 2 at neap low tide. For large sites or sites where large numbers are expected it is recommended that at least two people undertake the counts.</li> </ul> <p>Data requirements are:</p> <ul style="list-style-type: none"> <li>Roosting sites – total abundance, species richness, species abundance.</li> <li>Shorebird behaviour – activity at site (roosting, foraging, both), foraging location (mapping of foraging habitat).</li> <li>Survey conditions – date, time of day, tide height, weather conditions (temperature, precipitation, wind speed, wind direction).</li> </ul>	Possible	<p>Chenoweth EPLA undertook an 8 day fauna survey of the proposed disturbance area in September 2010 and a further 8 days survey in February 2011.</p> <p>The Chenoweth Surveys were undertaken as follows:</p> <ul style="list-style-type: none"> <li>Dedicated bird watching was undertaken for 20 minutes per area (Figure 12) every morning in the early morning and late afternoon on each day of the survey. During this time, two observers walked quietly over selected areas (point surveys) of the site to detect birds present both through direct observation and through calls.</li> <li>Birds were also recorded when opportunistically observed during other survey activities.</li> <li>Nocturnal birds were searched for as part of spotlighting and call playback activities on site</li> <li>Migratory shorebird searches were undertaken along the beach-front and tidal creeks. Point surveys of these areas were undertaken on foot for 20 minutes and sampled across a range of tide heights.</li> <li>A survey from a boat of the beaches at low tide was</li> </ul>	<p>Not recorded during field survey.</p> <p>Possible breeding habitat on Great Keppel Island as some parts of the island does support taller trees.</p>



Literature Review								Results	
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						<ul style="list-style-type: none"> <li>Number of observers and experience level.</li> <li>Habitat characteristics (dominant landform type, site hydrology, dominant vegetation types, inter-tidal substrate, invasive species, disturbance regime, presence of suitable nocturnal roost sites).</li> <li>Methodology used to conduct survey.</li> </ul> <p>Where it is not possible to conduct surveys within the manner recommended a thorough habitat assessment must be done. The characteristics of the site (landform, hydrology, flood levels) should be assessed.</p>		<p>undertaken for a total of 2.5 hours during the dry season survey on 26 September 2010 between 2:00pm – 04:30pm.</p> <ul style="list-style-type: none"> <li>Leeke's Estuary (Figure 1) was walked during the wet season survey on 21 February 2011 at low tide (incoming) between 06:20am – 09:30am.</li> <li>A portion of the Estuary from the mouth to the shed was surveyed over a period of 3 hours to actively search for feeding and roosting waders.</li> <li>Detailed habitat assessments were also undertaken throughout GKI.</li> </ul> <p>Central Queensland University (CQE) undertook bird surveys on GKI between 6 – 8 October 2010 and 21-25 March 2011. CQU bird surveys involved the traversing of the main development footprint by foot and electric vehicle with regular stops made to look and listen for the presence of birds (point searches). Opportunistic sightings between stop points were also recorded. All beaches and rocky headlands were surveyed for birds during a full circuit of the island by boat on Thursday 7th October.</p>	
<i>Gallinago hardwickii</i> Japanese Snipe		Marine, Migratory	EPBC Matters Protected	Permanent and ephemeral wetlands that have some form of shelter. Usually inhabit open, freshwater wetlands with low, dense vegetation (e.g. swamps, flooded grasslands or heathlands, around bogs and other water bodies), however can also occur in habitats with saline or brackish water (saltmarsh, mangrove creeks, around bays and beaches, and at tidal rivers), in modified or artificial habitats, and in habitats located close to humans or human activity. Foraging habitats characterized by areas of mud (either exposed or beneath a very shallow covering of water) and some form of cover (e.g. low, dense vegetation) Roost on the ground near (or sometimes in) their foraging areas, usually in sites that provide some degree of shelter, e.g. beside or under clumps of vegetation, among dense tea-tree, in forests, in drainage ditches or plough marks, among boulders, or in shallow water if cover is unavailable (SEWPAC, 2010) They are mostly active under the cover of darkness (i.e. during the night, or in the morning before sunrise).	<p>Latham's Snipe is a non-breeding visitor to south-eastern Australia, and is a passage migrant through northern Australia.</p> <p>Latham's Snipe breed in Japan and far eastern Russia during the northern hemisphere summer.</p> <p>They arrive in northern Australia from July to November. They then move slowly southward, passing along the coastline and through regions near the coast. They arrive in south-eastern Australia between August and January, and it is here that most snipe spend the non-breeding period (SEWPAC, 2010).</p>	<p>Populations of Latham's Snipe can be surveyed by performing area searches or line transects in suitable habitat (i.e. wetlands or other waterbodies and their surrounding vegetation). The surveys should be conducted on foot). To maximise the chances of detecting all birds present, a number of observers should arrange themselves into a line and then advance in unison, preferably whilst accompanied by bird dogs. Another potential technique is to drag a length of rope over an area of suitable habitat (SEWPAC, 2010).</p> <p>In Australia, surveys should be conducted between October and February, which is the period between the species' arrival and departure in Australia. Surveys are best conducted during the day, as the snipe appears to disperse from roosting areas at dusk and then return before or at dawn (SEWPAC, 2010)</p>	Possible	<p>Chenoweth EPLA undertook an 8 day fauna survey of the proposed disturbance area in September 2010 and a further 8 days survey in February 2011.</p> <p>The Chenoweth Surveys were undertaken as follows:</p> <ul style="list-style-type: none"> <li>Dedicated bird watching was undertaken for 20 minutes per area (Figure 12) every morning in the early morning and late afternoon on each day of the survey. During this time, two observers walked quietly over selected areas (point surveys) of the site to detect birds present both through direct observation and through calls.</li> <li>Birds were also recorded when opportunistically observed during other survey activities.</li> <li>Nocturnal birds were searched for as part of spotlighting and call playback activities on site</li> <li>Migratory shorebird searches were undertaken along the beach-front and</li> </ul>	<p>Not recorded during field survey.</p> <p>Breeding habitat absent as Latham's Snipe does not breed in Australia.</p> <p>Possibly occurs on Great Keppel Island as there is suitable foraging and roosting habitat available.</p>



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								<p>tidal creeks. Point surveys of these areas were undertaken on foot for 20 minutes and sampled across a range of tide heights.</p> <ul style="list-style-type: none"> <li>A survey from a boat of the beaches at low tide was undertaken for a total of 2.5 hours during the dry season survey on 26 September 2010 between 2:00pm – 04:30pm.</li> <li>Leeke's Estuary (Figure 1) was walked during the wet season survey on 21 February 2011 at low tide (incoming) between 06:20am – 09:30am.</li> <li>A portion of the Estuary from the mouth to the shed was surveyed over a period of 3 hours to actively search for feeding and roosting waders.</li> <li>Detailed habitat assessments were also undertaken throughout GKI.</li> </ul> <p>Central Queensland University (CQE) undertook bird surveys on GKI between 6 – 8 October 2010 and 21-25 March 2011. CQU bird surveys involved the traversing of the main development footprint by foot and electric vehicle with regular stops made to look and listen for the presence of birds (point searches). Opportunistic sightings between stop points were also recorded. All beaches and rocky headlands were surveyed for birds during a full circuit of the island by boat on Thursday 7th October.</p>	
<i>Gallinago megala</i> Swinhoe's Snipe		Marine, Migratory	EPBC Matters Protected	<p>During the non-breeding season Swinhoe's Snipe occurs at the edges of wetlands, such as wet paddy fields, swamps and freshwater streams. The species is also known to occur in grasslands, drier cultivated areas (including crops of rapeseed and wheat) and market gardens (SEWPAC, 2010).</p> <p>Habitat specific to Australia includes the dense clumps of grass and rushes round the edges of fresh and brackish wetlands. This includes swamps, billabongs, river pools, small streams and sewage ponds. They are also found in drying claypans and inundated plains pitted with crab holes (SEWPAC, 2010).</p>	<p>The species has been recorded in the north between the Kimberley Divide and Cape York Peninsula. In Western Australia the species has been recorded in Pilbara, the Kimberley region, Mount Goldsworthy, Mount Blaize and in the north-west regions around the Mitchell Plateau. In the Northern Territory the species is believed to be common and widespread in the Top End. Definite records exist from Darwin, Melville Island, Cannon Hill, Red Lily Lagoon and Mount Brockman. In Queensland specimens have been taken at Normanton. The species has also been sighted at Mount Isa (SEWPAC, 2010). Swinhoe's Snipe breeds in central and southern Siberia.</p> <p>Swinhoe's Snipe is recorded in north Australia, particularly the Kimberley region, from October–April. The species may occur in Pilbara from October–March. It is believed to be a common visitor to subcoastal Northern Territory during the wet season. It has been recorded in northern Queensland in November, March and April. The species leaves Australia in April (SEWPAC, 2010).</p>	As above	Unlikely	<p>Chenoweth EPLA undertook an 8 day fauna survey of the proposed disturbance area in September 2010 and a further 8 days survey in February 2011.</p> <p>The Chenoweth Surveys were undertaken as follows:</p> <ul style="list-style-type: none"> <li>Dedicated bird watching was undertaken for 20 minutes per area (Figure 12) every morning in the early morning and late afternoon on each day of the survey. During this time, two observers walked quietly over selected areas (point surveys) of the site to detect birds present both through direct observation and through calls.</li> <li>Birds were also recorded when opportunistically observed during other survey activities.</li> </ul>	<p>Not recorded during field survey.</p> <p>Unlikely that Great Keppel Island is a significant part of its habitat due to distribution restricted to far north Queensland.</p>



Literature Review								Results	
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								<ul style="list-style-type: none"> <li>Nocturnal birds were searched for as part of spotlighting and call playback activities on site</li> <li>Migratory shorebird searches were undertaken along the beach-front and tidal creeks. Point surveys of these areas were undertaken on foot for 20 minutes and sampled across a range of tide heights.</li> <li>A survey from a boat of the beaches at low tide was undertaken for a total of 2.5 hours during the dry season survey on 26 September 2010 between 2:00pm – 04:30pm.</li> <li>Leeke's Estuary (Figure 1) was walked during the wet season survey on 21 February 2011 at low tide (incoming) between 06:20am – 09:30am.</li> <li>A portion of the Estuary from the mouth to the shed was surveyed over a period of 3 hours to actively search for feeding and roosting waders.</li> <li>Detailed habitat assessments were also undertaken throughout GKI.</li> </ul> <p>Central Queensland University (CQE) undertook bird surveys on GKI between 6 – 8 October 2010 and 21-25 March 2011. CQU bird surveys involved the traversing of the main development footprint by foot and electric vehicle with regular stops made to look and listen for the presence of birds (point searches). Opportunistic sightings between stop points were also recorded. All beaches and rocky headlands were surveyed for birds during a full circuit of the island by boat on Thursday 7th October.</p>	
<i>Gallinago stenura</i> Pin-tailed Snipe		Marine, Migratory	EPBC Matters Protected	<p>During non-breeding period the Pin-tailed Snipe occurs most often in or at the edges of shallow freshwater swamps, ponds and lakes with emergent, sparse to dense cover of grass/sedge or other vegetation. The species is also found in drier, more open wetlands such as claypans in more arid parts of species' range. It is also commonly seen at sewage ponds; not normally in saline or inter-tidal wetlands.</p> <p>The Pin-tailed Snipe arrives in Australia, at Pilburra, mainly from late September to the end of March. It has been recorded in south-west Western Australia in late March. There are no winter records in Australia (SEWPAC, 2010).</p>	<p>Breeds in Arctic Tundra. Mainly seen in North West Western Australia.</p> <p>The species distribution within Australia is not well understood. There are confirmed records from NSW, south-west Western Australia, Pilbara and the Top End. In NSW a single banded bird was reported near West Wyalong. In Western Australia the species was reported at Pilbara, Port Headland, Myaree Pool, Maitland River and near Karratha. In Pilbarra the distribution is believed to be bound by Pardoo (Banningarra Spring) and the lower Maitland River and Shay Gap. The Pin-tailed Snipe has also been reported on the Cocos-Keeling Islands as well as Christmas Island (SEWPAC, 2010).</p>	As above	Unlikely	<p>Chenoweth EPLA undertook an 8 day fauna survey of the proposed disturbance area in September 2010 and a further 8 days survey in February 2011.</p> <p>The Chenoweth Surveys were undertaken as follows:</p> <ul style="list-style-type: none"> <li>Dedicated bird watching was undertaken for 20 minutes per area (Figure 12) every morning in the early morning and late afternoon on each day of the survey. During this time, two observers walked quietly over selected areas (point surveys) of the site to detect birds present</li> </ul>	<p>Not recorded during field survey.</p> <p>Unlikely that Great Keppel Island is a significant part of its habitat due to distribution mainly in Western Australia.</p>



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								<p>both through direct observation and through calls.</p> <ul style="list-style-type: none"> <li>■ Birds were also recorded when opportunistically observed during other survey activities.</li> <li>■ Nocturnal birds were searched for as part of spotlighting and call playback activities on site</li> <li>■ Migratory shorebird searches were undertaken along the beach-front and tidal creeks. Point surveys of these areas were undertaken on foot for 20 minutes and sampled across a range of tide heights.</li> <li>■ A survey from a boat of the beaches at low tide was undertaken for a total of 2.5 hours during the dry season survey on 26 September 2010 between 2:00pm – 04:30pm.</li> <li>■ Leeke's Estuary (Figure 1) was walked during the wet season survey on 21 February 2011 at low tide (incoming) between 06:20am – 09:30am.</li> <li>■ A portion of the Estuary from the mouth to the shed was surveyed over a period of 3 hours to actively search for feeding and roosting waders.</li> <li>■ Detailed habitat assessments were also undertaken throughout GKI.</li> </ul> <p>Central Queensland University (CQE) undertook bird surveys on GKI between 6 – 8 October 2010 and 21-25 March 2011. CQU bird surveys involved the traversing of the main development footprint by foot and electric vehicle with regular stops made to look and listen for the presence of birds (point searches). Opportunistic sightings between stop points were also recorded. All beaches and rocky headlands were surveyed for birds during a full circuit of the island by boat on Thursday 7th October.</p>	
<i>Haematopus fuliginosus</i> Sooty Oystercatcher	NT		Wildlife Online	<p>Prefers rocky coasts but may be recorded on coral reefs or sandy beaches near mudflats. Breeds on offshore islands and isolated rocky headlands between October to January (Birds in Backyards, 2010). The Sooty Oystercatcher feeds on molluscs, crabs and other crustaceans, marine worms, starfish and sea urchins, and small fish. Breeds in spring and summer, almost exclusively on offshore islands, and</p>	<p>Endemic to Australia and is widespread in coastal eastern, southern and western Australia. (Birds in Backyards, 2010).</p> <p>An Island wide Wildnet search returned 47 records of this species.</p>	<p>No specific guidelines available. General survey guidelines for birds (SEWPAC, 2011) include:</p> <ul style="list-style-type: none"> <li>■ Area searches (typically 1-3ha for 10-20mins);</li> <li>■ Transect surveys (record birds while travelling between tow fixed points of known distance);</li> <li>■ Transect surveys by boat are well suited to detecting birds that occur on rocky shores and cliffs of islands and</li> <li>■ Point surveys (usually 5-20mins) sampling points are usually predetermined and selected either randomly or systematically through the area.</li> </ul>	Known	<p>Chenoweth EPLA undertook an 8 day fauna survey of the proposed disturbance area in September 2010 and a further 8 days survey in February 2011.</p> <p>The Chenoweth Surveys were undertaken as follows:</p> <ul style="list-style-type: none"> <li>■ Dedicated bird watching was undertaken for 20 minutes</li> </ul>	<p>Recorded by Chenoweth during the dry season survey (Sept 2010). A total of 2 Sooty Oystercatchers were recorded on Wreck Beach during the boat survey in September.</p>



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				occasionally on isolated promontories. The nest is a shallow scrape on the ground, or small mounds of pebbles, shells or seaweed when nesting among rocks (NSW DECC, 2005).				<p>per area (Figure 12) every morning in the early morning and late afternoon on each day of the survey. During this time, two observers walked quietly over selected areas (point surveys) of the site to detect birds present both through direct observation and through calls.</p> <ul style="list-style-type: none"> <li>■ Birds were also recorded when opportunistically observed during other survey activities.</li> <li>■ Nocturnal birds were searched for as part of spotlighting and call playback activities on site</li> <li>■ Migratory shorebird searches were undertaken along the beach-front and tidal creeks. Point surveys of these areas were undertaken on foot for 20 minutes and sampled across a range of tide heights.</li> <li>■ A survey from a boat of the beaches at low tide was undertaken for a total of 2.5 hours during the dry season survey on 26 September 2010 between 2:00pm – 04:30pm.</li> <li>■ Leeke's Estuary (Figure 1) was walked during the wet season survey on 21 February 2011 at low tide (incoming) between 06:20am – 09:30am.</li> <li>■ A portion of the Estuary from the mouth to the shed was surveyed over a period of 3 hours to actively search for feeding and roosting waders.</li> <li>■ Detailed habitat assessments were also undertaken throughout GKI.</li> </ul> <p>Central Queensland University (CQE) undertook bird surveys on GKI between 6 – 8 October 2010 and 21-25 March 2011. CQU bird surveys involved the traversing of the main development footprint by foot and electric vehicle with regular stops made to look and listen for the presence of birds (point searches). Opportunistic sightings between stop points were also recorded. All beaches and rocky headlands were surveyed for birds during a full circuit of the island by boat on Thursday 7th October.</p>	
<i>Haliaeetus leucogaster</i>		Migratory	EPBC Protected Matters	The White-bellied Sea-Eagle is found in coastal habitats (especially those close to	The White-bellied Sea-Eagle is distributed along the coastline (including offshore	Populations of the White-bellied Sea-Eagle can be surveyed by performing systematic searches (area searches, line transects)	Known	Chenoweth EPLA undertook an 8 day fauna survey of the	Recorded by Chenoweth during the dry season



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White-bellied Sea-Eagle			Wildlife online Birds Australia	<p>the sea-shore) and around terrestrial wetlands in tropical and temperate regions of mainland Australia and its offshore islands. The habitats occupied by the sea-eagle are characterised by the presence of large areas of open water (larger rivers, swamps, lakes, the sea). Birds have been recorded in (or flying over) a variety of terrestrial habitats.</p> <p>The species is mostly recorded in coastal lowlands, but can occupy habitats up to 1400 m above sea level on the Northern Tablelands of NSW and up to 800 m above sea level in Tasmania and South Australia.</p> <p>Birds have been recorded at or in the vicinity of freshwater swamps, lakes, reservoirs, billabongs, saltmarsh and sewage ponds. They also occur at sites near the sea or sea-shore, such as around bays and inlets, beaches, reefs, lagoons, estuaries and mangroves.</p> <p>Terrestrial habitats include coastal dunes, tidal flats, grassland, heathland, woodland, forest (including rainforest) and even urban areas.</p> <p>Breeding has been recorded on the coast, at inland sites, and on offshore islands. Breeding territories are located close to water, and mainly in tall open forest or woodland, although nests are sometimes located in other habitats such as dense forest (including rainforest), closed scrub or in remnant trees on cleared land. Pairs usually return to the same breeding territory each year, and often the same nest, although territories tend to contain one or two additional, less developed nests. The breeding season extends from June to January (or sometimes February) in southern Australia, but begins one or two months earlier in northern Australia, for example, eggs are laid from June to September (or sometimes later) in southern Australia, and from May to August in northern Australia</p> <p>The White-bellied Sea-Eagle generally forages over large expanses of open water; this is particularly true of birds that occur in coastal environments close to the sea-shore, where they forage over in-shore waters. However, the White-bellied Sea-Eagle will also forage over open terrestrial habitats (such as grasslands). Birds may move to and congregate in favourable sites during drought or food shortage) (SEWPAC, 2010).</p>	<p>islands) of mainland Australia and Tasmania. It also extends inland along some of the larger waterways, especially in eastern Australia. The inland limits of the species are most restricted in south-central and south-western Australia, where it is confined to a narrow band along the coast. Recent analysis indicates that the distribution of the sea-eagle may shift in response to climatic conditions, with an apparent decreased occupancy of inland sites (and increased occupancy of coastal sites) during drought conditions.</p> <p>Breeding has been recorded from only a relatively small area of the total distribution. Breeding records are patchily distributed, mainly along the coastline, and especially the eastern coast, extending from Queensland to Victoria, and to Tasmania. Breeding has also been recorded at some sites further inland, e.g. around the Murray, Murrumbidgee and Lachlan Rivers in northern Victoria and south-west NSW, and at other large drainage systems and water storages (SEWPAC, 2010).</p>	for birds or nests. Searches can be conducted from the ground or air, or from a boat (SEWPAC, 2010).		<p>proposed disturbance area in September 2010 and a further 8 days survey in February 2011.</p> <p>The Chenoweth Surveys were undertaken as follows:</p> <ul style="list-style-type: none"> <li>■ Dedicated bird watching was undertaken for 20 minutes per area (Figure 12) every morning in the early morning and late afternoon on each day of the survey. During this time, two observers walked quietly over selected areas (point surveys) of the site to detect birds present both through direct observation and through calls.</li> <li>■ Birds were also recorded when opportunistically observed during other survey activities.</li> <li>■ Nocturnal birds were searched for as part of spotlighting and call playback activities on site</li> <li>■ Migratory shorebird searches were undertaken along the beach-front and tidal creeks. Point surveys of these areas were undertaken on foot for 20 minutes and sampled across a range of tide heights.</li> <li>■ A survey from a boat of the beaches at low tide was undertaken for a total of 2.5 hours during the dry season survey on 26 September 2010 between 2:00pm – 04:30pm.</li> <li>■ Leeke's Estuary (Figure 1) was walked during the wet season survey on 21 February 2011 at low tide (incoming) between 06:20am – 09:30am.</li> <li>■ A portion of the Estuary from the mouth to the shed was surveyed over a period of 3 hours to actively search for feeding and roosting waders.</li> <li>■ Detailed habitat assessments were also undertaken throughout GKI.</li> </ul> <p>Central Queensland University (CQE) undertook bird surveys on GKI between 6 – 8 October 2010 and 21-25 March 2011. CQU bird surveys involved the traversing of the main development footprint by foot and electric vehicle with regular stops made to look and listen for the presence of birds (point searches). Opportunistic sightings between stop points</p>	<p>survey (Sept 2010). No nests were identified. The bird was identified during point searches and during the boat survey.</p> <p>CQE recorded a total of 3 Eagles in 2010 and 2 at Leeke's Beach in 2011.</p>



Literature Review								Results	
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								were also recorded. All beaches and rocky headlands were surveyed for birds during a full circuit of the island by boat on Thursday 7th October.	
<i>Heteroscelus brevipes</i> Grey-tailed tattler		Migratory Marine	EPBC Protected Matters Wildlife Online Birds Australia	<p>Found on sheltered coasts with reefs and rock platforms or with intertidal mudflats. Also at intertidal rocky, coral or stony reefs as well as platforms and islets that are exposed at low tide. It has been found around shores of rock, shingle, gravel or shells and also on intertidal mudflats in embayments, estuaries and coastal lagoons, especially fringed with mangroves. Less often on open flat sandy beaches or sandbanks, especially around accumulated seaweed or isolated clumps of dead coral. It is occasionally found around near-coastal wetlands, such as lagoons and lakes. Forages in shallow water, on hard intertidal substrates, such as reefs and rock platforms, in rock pools and among rocks and coral rubble, over which water may surge.</p> <p>It has also been recorded foraging on exposed intertidal mudflats, especially with mangroves and possibly seagrass nearby. Occasionally it forages on intertidal sandflats, around banks of seaweed or protruding rocks or lumps of coral. Roosts in the branches of mangroves or, rarely, in dense stands of other shrubs, or on snags or driftwood. Where mangroves are not present, it roosts on rocks that are sometimes partly submerged. It is also known to roost on beaches and reefs; however, it is rarely reported roosting on bare sandy beaches or sandbanks (SEWPAC, 2010).</p>	<p>The Grey-tailed Tattler is found along the entire Queensland coast, with small numbers located in the Gulf of Carpentaria. It is widespread along the east coast and the Torres Strait. There is a continuous population along the entire east coast of Cape York Peninsula. Inland records include Burdekin Weir, Charters Towers and Mount Isa; however these are rare, with the species preferring coastal locations. The species breeds in north Siberia within the period from late May–August.</p> <p>The Grey-tailed Tattler arrives in Australia mostly in August, however, they sometimes appear south of the breeding range as early as July. Some are known to remain on breeding grounds as late as September or October. Adults arrive at the north Australian coast from late August and early September, with first-year birds apparently arriving four weeks later.</p>	<p>Surveys for migratory shorebirds (SEWPC, 2010) should be conducted at sites where either:</p> <ul style="list-style-type: none"> <li>No suitable survey records exist or</li> <li>Records are too old to be considered reliable; or</li> <li>The site characteristics have changed.</li> </ul> <p>The majority of shorebirds are present during the non-breeding season (October to march) and this is when count surveys to establish the presence, number, habitat characteristics and the context of the site (ie how many other similar sites occur and are these used by shorebirds). Survey recommendations are as follows:</p> <ul style="list-style-type: none"> <li>At a minimum cover all the habitat thought to be used by the same population of shorebirds and the entire contiguous habitat where shorebirds occur.</li> <li>Surveys should be conducted during the period when the majority of migratory birds are present in the area and the during the northern hemisphere breeding season to obtain non-breeding, non-migratory immature populations.</li> <li>Surveys for roosting birds are to be conducted as close to high tide as possible (max 2 hours either side). Surveys for foraging birds as close to low tide as possible (no more than 2 hours either side). Surveys should not be undertaken during high rainfall or strong winds.</li> <li>Survey effort should be a minimum of 4 surveys for roosting shorebirds during the period when most are present in the area (eg 1 in Dec, 2 in Jan and 1 in Feb). A minimum of 4 surveys for foraging shorebirds including 2 at spring low tide and 2 at neap low tide. For large sites or sites where large numbers are expected it is recommended that at least two people undertake the counts.</li> </ul> <p>Data requirements are:</p> <ul style="list-style-type: none"> <li>Roosting sites – total abundance, species richness, species abundance.</li> <li>Shorebird behaviour – activity at site (roosting, foraging, both), foraging location (mapping of foraging habitat).</li> <li>Survey conditions – date, time of day, tide height, weather conditions (temperature, precipitation, wind speed, wind direction).</li> <li>Number of observers and experience level.</li> <li>Habitat characteristics (dominant landform type, site hydrology, dominant vegetation types, inter-tidal substrate, invasive species, disturbance regime, presence of suitable nocturnal roost sites).</li> <li>Methodology used to conduct survey.</li> </ul> <p>Where it is not possible to conduct surveys within the manner recommended a thorough habitat assessment must be done. The characteristics of the site (landform, hydrology, flood levels) should be assessed.</p>	Known	<p>Chenoweth EPLA undertook an 8 day fauna survey of the proposed disturbance area in September 2010 and a further 8 days survey in February 2011.</p> <p>The Chenoweth Surveys were undertaken as follows:</p> <ul style="list-style-type: none"> <li>Dedicated bird watching was undertaken for 20 minutes per area (Figure 12) every morning in the early morning and late afternoon on each day of the survey. During this time, two observers walked quietly over selected areas (point surveys) of the site to detect birds present both through direct observation and through calls.</li> <li>Birds were also recorded when opportunistically observed during other survey activities.</li> <li>Nocturnal birds were searched for as part of spotlighting and call playback activities on site</li> <li>Migratory shorebird searches were undertaken along the beach-front and tidal creeks. Point surveys of these areas were undertaken on foot for 20 minutes and sampled across a range of tide heights.</li> <li>A survey from a boat of the beaches at low tide was undertaken for a total of 2.5 hours during the dry season survey on 26 September 2010 between 2:00pm – 04:30pm.</li> <li>Leeke's Estuary (Figure 1) was walked during the wet season survey on 21 February 2011 at low tide (incoming) between 06:20am – 09:30am.</li> <li>A portion of the Estuary from the mouth to the shed was surveyed over a period of 3 hours to actively search for feeding and roosting waders.</li> <li>Detailed habitat assessments were also undertaken throughout GKI.</li> </ul> <p>Central Queensland University (CQE) undertook bird surveys on GKI between 6 – 8 October 2010 and 21-25 March 2011.</p>	<p>Not recorded during CEPLA field survey. Two Grey Tattlers were recorded by CQE (Black and Houston, 2011) from Leeke's Estuary.</p> <p>Breeding habitat absent as the species does not breed in Australia.</p> <p>Foraging and roosting habitat occur on Great Keppel Island.</p>



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								CQU bird surveys involved the traversing of the main development footprint by foot and electric vehicle with regular stops made to look and listen for the presence of birds (point searches). Opportunistic sightings between stop points were also recorded. All beaches and rocky headlands were surveyed for birds during a full circuit of the island by boat on Thursday 7th October.	
<i>Himantopus himantopus</i> Black-winged Stilt		Marine, Migratory	EPBC Protected Matters Birds Australia	<p>Black-winged Stilts prefer freshwater and saltwater marshes, mudflats, and the shallow edges of lakes and rivers (Birds Australia, 2010). Also Lakes, salt pans, coastal lagoons and marshes (Flegg, 2003).</p> <p>The breeding season is highly variable but usually between August and December. The nest may be anything from a simple shallow scrape on the ground to a mound of vegetation placed in or near the water (Birds Australia, 2010).</p>	The Black-winged Stilt has a wide range, including Australia, Central and South America, Africa, southern and south-eastern Asia and parts of North America and Eurasia. More locally it also occurs through Indonesia, New Guinea, the Solomon Islands, the Philippines and New Zealand. Although widespread on the Australian mainland, it is an uncommon visitor to Tasmania (Birds Australia, 2010).	As above	Possible	<p>Chenoweth EPLA undertook an 8 day fauna survey of the proposed disturbance area in September 2010 and a further 8 days survey in February 2011.</p> <p>The Chenoweth Surveys were undertaken as follows:</p> <ul style="list-style-type: none"> <li>■ Dedicated bird watching was undertaken for 20 minutes per area (Figure 12) every morning in the early morning and late afternoon on each day of the survey. During this time, two observers walked quietly over selected areas (point surveys) of the site to detect birds present both through direct observation and through calls.</li> <li>■ Birds were also recorded when opportunistically observed during other survey activities.</li> <li>■ Nocturnal birds were searched for as part of spotlighting and call playback activities on site</li> <li>■ Migratory shorebird searches were undertaken along the beach-front and tidal creeks. Point surveys of these areas were undertaken on foot for 20 minutes and sampled across a range of tide heights.</li> <li>■ A survey from a boat of the beaches at low tide was undertaken for a total of 2.5 hours during the dry season survey on 26 September 2010 between 2:00pm – 04:30pm.</li> <li>■ Leeke's Estuary (Figure 1) was walked during the wet season survey on 21 February 2011 at low tide (incoming) between 06:20am – 09:30am.</li> <li>■ A portion of the Estuary from the mouth to the shed was surveyed over a period of 3 hours to actively search for feeding and roosting waders.</li> </ul>	<p>Not recorded during field survey.</p> <p>Possible foraging, breeding and roosting habitat occur on Great Keppel Island.</p>



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								<ul style="list-style-type: none"> <li>Detailed habitat assessments were also undertaken throughout GKI.</li> </ul> <p>Central Queensland University (CQE) undertook bird surveys on GKI between 6 – 8 October 2010 and 21-25 March 2011. CQU bird surveys involved the traversing of the main development footprint by foot and electric vehicle with regular stops made to look and listen for the presence of birds (point searches). Opportunistic sightings between stop points were also recorded. All beaches and rocky headlands were surveyed for birds during a full circuit of the island by boat on Thursday 7th October.</p>	
<i>Hirundapus caudacutus</i> White-throated Needletail		Migratory	EPBC Matters Protected	<p>In Australia, the White-throated Needletail is almost exclusively aerial, from heights of less than 1 m up to more than 1000 m above the ground. This species does not breed in Australia.</p> <p>In Australia, White-throated Needletails almost always forage aerially, at heights up to 'cloud level', above a wide variety of habitats ranging from heavily treed forests to open habitats, such as farmland, heathland or mudflats.</p> <p>The species has been recorded roosting in trees in forests and woodlands, both among dense foliage in the canopy or in hollows (SEWPAC, 2010).</p>	<p>The White-throated Needletail is widespread in eastern and south-eastern Australia. In eastern Australia, it is recorded in all coastal regions of Queensland and NSW, extending inland to the western slopes of the Great Divide and occasionally onto the adjacent inland plains. Further south on the mainland, it is widespread in Victoria, though more so on and south of the Great Divide, and there are few records in western Victoria outside the Grampians and the South West. When wintering in eastern and south-eastern Australia, the species is widespread and numerous at many sites.</p> <p>The nominate subspecies caudacutus of the White-throated Needletail is a trans-equatorial migrant, breeding in the Northern Hemisphere and flying south for the boreal winter (SEWPAC, 2010).</p>	Any surveys must be conducted between October and April in northern and eastern Australia and between December and March in south-eastern Australia, when numbers of White-throated Needletails are highest (SEWPAC, 2010).	Possible	<p>Chenoweth EPLA undertook an 8 day fauna survey of the proposed disturbance area in September 2010 and a further 8 days survey in February 2011.</p> <p>The Chenoweth Surveys were undertaken as follows:</p> <ul style="list-style-type: none"> <li>Dedicated bird watching was undertaken for 20 minutes per area (Figure 12) every morning in the early morning and late afternoon on each day of the survey. During this time, two observers walked quietly over selected areas (point surveys) of the site to detect birds present both through direct observation and through calls.</li> <li>Birds were also recorded when opportunistically observed during other survey activities.</li> <li>Nocturnal birds were searched for as part of spotlighting and call playback activities on site</li> <li>Migratory shorebird searches were undertaken along the beach-front and tidal creeks. Point surveys of these areas were undertaken on foot for 20 minutes and sampled across a range of tide heights.</li> <li>A survey from a boat of the beaches at low tide was undertaken for a total of 2.5 hours during the dry season survey on 26 September 2010 between 2:00pm – 04:30pm.</li> <li>Leeke's Estuary (Figure 1) was walked during the wet season survey on 21 February 2011 at low tide (incoming) between</li> </ul>	<p>Not recorded during field survey.</p> <p>Breeding habitat absent as the species does not breed in Australia.</p> <p>Possible foraging and roosting habitat occur on Great Keppel Island.</p>



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								<p>06:20am – 09:30am.</p> <ul style="list-style-type: none"> <li>A portion of the Estuary from the mouth to the shed was surveyed over a period of 3 hours to actively search for feeding and roosting waders.</li> <li>Detailed habitat assessments were also undertaken throughout GKI.</li> </ul> <p>Central Queensland University (CQE) undertook bird surveys on GKI between 6 – 8 October 2010 and 21-25 March 2011. CQU bird surveys involved the traversing of the main development footprint by foot and electric vehicle with regular stops made to look and listen for the presence of birds (point searches). Opportunistic sightings between stop points were also recorded. All beaches and rocky headlands were surveyed for birds during a full circuit of the island by boat on Thursday 7th October.</p>	
<i>Hirundo rustica</i> Barn Swallow		Marine, Migratory	EPBC Protected Matters	<p>Coastal, wetland and urban areas, feeds over most habitats (Flegg, 2003).</p> <p>The Barn Swallow uses a range of habitat types including canals, drainage ditches, arable land, urban areas, grassland, savanna, shrubland, marshes, swamps, freshwater lakes at an altitude of 0-3000m (Birdlife International, 2011). The Barn Swallow does not breed in Australia.</p>	Within Australia this species occurs across northern coastal Australia south to around Gladstone in Queensland and Carnarvon in Western Australia (SEWPAC, 2011).		Possible	<p>Chenoweth EPLA undertook an 8 day fauna survey of the proposed disturbance area in September 2010 and a further 8 days survey in February 2011.</p> <p>The Chenoweth Surveys were undertaken as follows:</p> <ul style="list-style-type: none"> <li>Dedicated bird watching was undertaken for 20 minutes per area (Figure 12) every morning in the early morning and late afternoon on each day of the survey. During this time, two observers walked quietly over selected areas (point surveys) of the site to detect birds present both through direct observation and through calls.</li> <li>Birds were also recorded when opportunistically observed during other survey activities.</li> <li>Nocturnal birds were searched for as part of spotlighting and call playback activities on site</li> <li>Migratory shorebird searches were undertaken along the beach-front and tidal creeks. Point surveys of these areas were undertaken on foot for 20 minutes and sampled across a range of tide heights.</li> <li>A survey from a boat of the beaches at low tide was undertaken for a total of 2.5 hours during the dry season survey on 26 September</li> </ul>	<p>Not recorded during field survey.</p> <p>Breeding habitat absent as the species does not breed in Australia.</p> <p>Possible foraging and roosting habitat occur on Great Keppel Island.</p>



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								<p>2010 between 2:00pm – 04:30pm.</p> <ul style="list-style-type: none"> <li>Leeke's Estuary (Figure 1) was walked during the wet season survey on 21 February 2011 at low tide (incoming) between 06:20am – 09:30am.</li> <li>A portion of the Estuary from the mouth to the shed was surveyed over a period of 3 hours to actively search for feeding and roosting waders.</li> <li>Detailed habitat assessments were also undertaken throughout GKI.</li> </ul> <p>Central Queensland University (CQE) undertook bird surveys on GKI between 6 – 8 October 2010 and 21-25 March 2011. CQU bird surveys involved the traversing of the main development footprint by foot and electric vehicle with regular stops made to look and listen for the presence of birds (point searches). Opportunistic sightings between stop points were also recorded. All beaches and rocky headlands were surveyed for birds during a full circuit of the island by boat on Thursday 7th October.</p>	
<i>Macronectes giganteus</i> Southern Giant Petrel		E Marine, Migratory	EPBC Protected Matters	<p>The Southern Giant-Petrel is marine bird that occurs in Antarctic to subtropical waters. In summer, it mainly occurs over Antarctic waters, and it is widespread south as far as the pack-ice and onto the Antarctic continent.</p> <p>In the Ross Sea, the Southern Giant-Petrel ranges from the Antarctic continent to the 3° C sea surface temperature isotherm. In early summer, it is most abundant over the continental slope, and in late summer, it has a uniform distribution from the continental slope north to the Antarctic Polar Front. It also occurs south to the Ross Ice Shelf at low densities. It has no preference for pack-ice of a particular density, but it may avoid crossing extensive ice sheets, which dampen sea swell and inhibit soaring.</p> <p>The Southern Giant-Petrel is abundant over the pack-ice near penguin colonies. In summer, it also occurs over subantarctic waters near its breeding islands in the Atlantic and Indian Oceans, in subantarctic to southern subtropical waters on the Argentinean continental shelf and off New Zealand and the cold eastern boundary current off South America. It possibly concentrates north of 50° S in winter, as it is rare in waters of the southern Indian Ocean, but common off South America, South Africa, Australia and New Zealand.</p> <p>It occurs in both pelagic and inshore waters. It is attracted to land at sewage outfalls. It</p>	<p>The Southern Giant-Petrel is widespread throughout the Southern Ocean. The Southern Giant-Petrel breeds on six subantarctic and Antarctic islands in Australian territory; Macquarie Island, Heard Island and McDonald Island in the Southern Ocean, and Giganteus Island, Hawker Island, and Frazier Island in the Australian Antarctic Territories.</p> <p>Throughout the colder months, immatures and most adults disperse widely, with Antarctic colonies becoming completely deserted during winter. The winter dispersal is circumpolar, extending north from 50° south to the Tropic of Capricorn (23° south) and sometimes beyond these latitudes. Thus, in winter they are rare in the southern waters of the Indian Ocean, and more common off South America, South Africa, Australia and New Zealand. The waters off southeastern Australia may be particularly important wintering grounds. In southeastern Australia, birds (mostly immatures) were recorded in all months except February, but most were recorded between June and December (SEWPAC, Population and Communities, 2010).</p>	<p>To avoid disturbance at breeding colonies, population surveys should be undertaken with minimal disturbance at three to five year intervals (Department of Sustainability, Environment, Water, Population and Communities, 2010).</p> <p>On land area searches or transect surveys (in areas up to 10ha) and observation from onshore vantage points (using telescopes). Land-based sea observations recommended survey effort is 8 hours /4 days and land-based area searches or transects recommended survey effort is 12 hours/4 days (SEWPAC, 2010)</p>	Unlikely	<p>Chenoweth EPLA undertook an 8 day fauna survey of the proposed disturbance area in September 2010 and a further 8 days survey in February 2011.</p> <p>The Chenoweth Surveys were undertaken as follows:</p> <ul style="list-style-type: none"> <li>Dedicated bird watching was undertaken for 20 minutes per area (Figure 12) every morning in the early morning and late afternoon on each day of the survey. During this time, two observers walked quietly over selected areas (point surveys) of the site to detect birds present both through direct observation and through calls.</li> <li>Birds were also recorded when opportunistically observed during other survey activities.</li> <li>Nocturnal birds were searched for as part of spotlighting and call playback activities on site</li> <li>Migratory shorebird searches were undertaken along the beach-front and tidal creeks. Point surveys of these areas were</li> </ul>	<p>Not recorded during field survey.</p> <p>Breeding habitat Absent.</p> <p>Unlikely that Great Keppel Island is a significant part of its habitat as the Tropic of Capricorn is the northern extent of migration.</p>



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				scavenges ashore, so at Iles Crozet, its distribution shifts towards land in summer, when birds frequent penguin and seal colonies (SEWPAC, 2010)				<p>undertaken on foot for 20 minutes and sampled across a range of tide heights.</p> <ul style="list-style-type: none"> <li>A survey from a boat of the beaches at low tide was undertaken for a total of 2.5 hours during the dry season survey on 26 September 2010 between 2:00pm – 04:30pm.</li> <li>Leeke’s Estuary (Figure 1) was walked during the wet season survey on 21 February 2011 at low tide (incoming) between 06:20am – 09:30am.</li> <li>A portion of the Estuary from the mouth to the shed was surveyed over a period of 3 hours to actively search for feeding and roosting waders.</li> <li>Detailed habitat assessments were also undertaken throughout GKI.</li> </ul> <p>Central Queensland University (CQE) undertook bird surveys on GKI between 6 – 8 October 2010 and 21-25 March 2011. CQU bird surveys involved the traversing of the main development footprint by foot and electric vehicle with regular stops made to look and listen for the presence of birds (point searches). Opportunistic sightings between stop points were also recorded. All beaches and rocky headlands were surveyed for birds during a full circuit of the island by boat on Thursday 7th October.</p>	
<i>Merops ornatus</i> Rainbow Bee-eater		Migratory	Wildlife Online Birds Australia	<p>Widespread in open country. Excavates burrows in sandy banks or cuttings (Flegg, 2003).</p> <p>The Rainbow Bee-eater occurs mainly in open forests and woodlands, shrublands, and in various cleared or semi-cleared habitats, including farmland and areas of human habitation. It usually occurs in open, cleared or lightly-timbered areas that are often, but not always, located in close proximity to permanent water. It also occurs in inland and coastal sand dune systems, and in mangroves in northern Australia, and has been recorded in various other habitat types including heathland, sedgeland, vine forest and vine thicket, and on beaches.</p> <p>The Rainbow Bee-eater occurs in open woodlands and shrublands, including mallee, and in open forests that are usually dominated by eucalypts. It also occurs in grasslands and, especially in arid or semi-arid areas, in riparian, floodplain or wetland vegetation assemblages</p>	The Rainbow Bee-eater is distributed across much of mainland Australia, and occurs on several near-shore islands. It is not found in Tasmania, and is thinly distributed in the most arid regions of central and Western Australia. majority of the global population breeds in Australia (including on Rottnest Island and islands in the south-west Torres Strait) (SEWPAC, 2010).	The southern populations of the Rainbow Bee-eater migrate northward from February to April, and return to their breeding grounds in September and October (SEWPAC, 2010).	Likely	<p>Chenoweth EPLA undertook an 8 day fauna survey of the proposed disturbance area in September 2010 and a further 8 days survey in February 2011.</p> <p>The Chenoweth Surveys were undertaken as follows:</p> <ul style="list-style-type: none"> <li>Dedicated bird watching was undertaken for 20 minutes per area (Figure 12) every morning in the early morning and late afternoon on each day of the survey. During this time, two observers walked quietly over selected areas (point surveys) of the site to detect birds present both through direct observation and through calls.</li> <li>Birds were also recorded when opportunistically observed during other survey activities.</li> <li>Nocturnal birds were</li> </ul>	<p>Recorded by Chenoweth during the dry season survey (Sept 2010). No nests were recorded during surveys, however due to the timing of the survey (September which is when the species returns to the breeding grounds) it is possible that this species does breed on GKI.</p> <p>CQE recorded a total of 6 Rainbow Bee-eaters during 2010 survey.</p>



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								<p>searched for as part of spotlighting and call playback activities on site</p> <ul style="list-style-type: none"> <li>■ Migratory shorebird searches were undertaken along the beach-front and tidal creeks. Point surveys of these areas were undertaken on foot for 20 minutes and sampled across a range of tide heights.</li> <li>■ A survey from a boat of the beaches at low tide was undertaken for a total of 2.5 hours during the dry season survey on 26 September 2010 between 2:00pm – 04:30pm.</li> <li>■ Leeke's Estuary (Figure 1) was walked during the wet season survey on 21 February 2011 at low tide (incoming) between 06:20am – 09:30am.</li> <li>■ A portion of the Estuary from the mouth to the shed was surveyed over a period of 3 hours to actively search for feeding and roosting waders.</li> <li>■ Detailed habitat assessments were also undertaken throughout GKI.</li> </ul> <p>Central Queensland University (CQE) undertook bird surveys on GKI between 6 – 8 October 2010 and 21-25 March 2011. CQU bird surveys involved the traversing of the main development footprint by foot and electric vehicle with regular stops made to look and listen for the presence of birds (point searches). Opportunistic sightings between stop points were also recorded. All beaches and rocky headlands were surveyed for birds during a full circuit of the island by boat on Thursday 7th October.</p>	
<i>Monarcha melanopsis</i> Black-faced Monarch		Migratory	Wildlife Online	<p>When breeding inhabits forest and woodlands, often damp. At other times inhabits open forest and woodland.</p> <p>The nest is located in an enlarged chamber at the end of long burrow or tunnel that is excavated, by both sexes, in flat or sloping ground, in the banks of rivers, creeks or dams, in roadside cuttings, in the walls of gravel pits or quarries, in mounds of gravel, or in cliff-faces. Nesting areas are often re-used, and banding studies indicate that at least some migrant birds return to the same nesting area each year (SEWPAC, 2010).</p>	The Black-faced Monarch is found along the coast of eastern Australia, becoming less common further south (Birds Australia, 2010).	In Australia, the breeding season extends from August to January (SEWPAC, 2010).	Possible	<p>Chenoweth EPLA undertook an 8 day fauna survey of the proposed disturbance area in September 2010 and a further 8 days survey in February 2011.</p> <p>The Chenoweth Surveys were undertaken as follows:</p> <ul style="list-style-type: none"> <li>■ Dedicated bird watching was undertaken for 20 minutes per area (Figure 12) every morning in the early morning and late afternoon on each day of the survey. During this time, two observers walked quietly over selected areas (point surveys) of the site to detect birds present both through direct</li> </ul>	Recorded by Chenoweth during the dry season survey (Sept 2010). No breeding or nesting records were made.



Literature Review								Results	
Species	NCA Status	EPBC Status	Database	Habitat (foraging and resting) Preferences Breeding/nesting and Seasonal influences	Species Distribution	SEWPAC Survey Requirements	Likelihood of Occurrence (as per literature review)	Assessment to Date	Results and Likely Presence Based on Field Survey
								<p>observation and through calls.</p> <ul style="list-style-type: none"> <li>■ Birds were also recorded when opportunistically observed during other survey activities.</li> <li>■ Nocturnal birds were searched for as part of spotlighting and call playback activities on site</li> <li>■ Migratory shorebird searches were undertaken along the beach-front and tidal creeks. Point surveys of these areas were undertaken on foot for 20 minutes and sampled across a range of tide heights.</li> <li>■ A survey from a boat of the beaches at low tide was undertaken for a total of 2.5 hours during the dry season survey on 26 September 2010 between 2:00pm – 04:30pm.</li> <li>■ Leeke's Estuary (Figure 1) was walked during the wet season survey on 21 February 2011 at low tide (incoming) between 06:20am – 09:30am.</li> <li>■ A portion of the Estuary from the mouth to the shed was surveyed over a period of 3 hours to actively search for feeding and roosting waders.</li> <li>■ Detailed habitat assessments were also undertaken throughout GKI.</li> </ul> <p>Central Queensland University (CQE) undertook bird surveys on GKI between 6 – 8 October 2010 and 21-25 March 2011. CQU bird surveys involved the traversing of the main development footprint by foot and electric vehicle with regular stops made to look and listen for the presence of birds (point searches). Opportunistic sightings between stop points were also recorded. All beaches and rocky headlands were surveyed for birds during a full circuit of the island by boat on Thursday 7th October.</p>	
<i>Monarcha trivirgatus</i> Spectacled Monarch		Migratory, Marine	Wildlife ONline	<p>The Spectacled Monarch prefers thick understorey in rainforests, wet gullies and waterside vegetation, as well as mangroves. Resident in Queensland to Rockhampton, summer breeding migrant further south (Birds Australia, 2010).</p> <p>The Spectacled Monarch builds a small cup nest of fine bark, plant fibres, moss and spider web in a tree fork or in hanging vines, 1 m - 6 m above the ground, often near water (Birds Australia, 2010).</p>	The Spectacled Monarch is found in coastal north-eastern and eastern Australia, including coastal islands, from Cape York, Queensland to Port Stephens, New South Wales. It is much less common in the south. It is also found in Papua New Guinea, the Moluccas and Timor (Birds Australia, 2010).		Possible	<p>Chenoweth EPLA undertook an 8 day fauna survey of the proposed disturbance area in September 2010 and a further 8 days survey in February 2011.</p> <p>The Chenoweth Surveys were undertaken as follows:</p> <ul style="list-style-type: none"> <li>■ Dedicated bird watching was undertaken for 20 minutes per area (Figure 12) every</li> </ul>	Recorded by CEPLA during the wet season survey (Feb, 2011). No records of breeding or nesting were made.



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								<p>morning in the early morning and late afternoon on each day of the survey. During this time, two observers walked quietly over selected areas (point surveys) of the site to detect birds present both through direct observation and through calls.</p> <ul style="list-style-type: none"> <li>■ Birds were also recorded when opportunistically observed during other survey activities.</li> <li>■ Nocturnal birds were searched for as part of spotlighting and call playback activities on site</li> <li>■ Migratory shorebird searches were undertaken along the beach-front and tidal creeks. Point surveys of these areas were undertaken on foot for 20 minutes and sampled across a range of tide heights.</li> <li>■ A survey from a boat of the beaches at low tide was undertaken for a total of 2.5 hours during the dry season survey on 26 September 2010 between 2:00pm – 04:30pm.</li> <li>■ Leeke's Estuary (Figure 1) was walked during the wet season survey on 21 February 2011 at low tide (incoming) between 06:20am – 09:30am.</li> <li>■ A portion of the Estuary from the mouth to the shed was surveyed over a period of 3 hours to actively search for feeding and roosting waders.</li> <li>■ Detailed habitat assessments were also undertaken throughout GKI.</li> </ul> <p>Central Queensland University (CQE) undertook bird surveys on GKI between 6 – 8 October 2010 and 21-25 March 2011. CQU bird surveys involved the traversing of the main development footprint by foot and electric vehicle with regular stops made to look and listen for the presence of birds (point searches). Opportunistic sightings between stop points were also recorded. All beaches and rocky headlands were surveyed for birds during a full circuit of the island by boat on Thursday 7th October.</p>	
<i>Myiagra cyano-leuca</i> Satin Flycatcher		Migratory	EPBC Protected Matters Wildlife Online	Satin Flycatchers mainly inhabit eucalypt forests, often near wetlands or watercourses. They generally occur in moister, taller forests than the Leaden Flycatcher, <i>Myiagra</i>	The Satin Flycatcher is widespread in eastern Australia and vagrant to New Zealand. In Queensland, it is widespread but scattered in the east, being recorded on	They move through Queensland from late August to November, mainly along the coast, arriving in south-eastern Queensland mainly in September (SEWPAC, 2010).	Possible	Chenoweth EPLA undertook an 8 day fauna survey of the proposed disturbance area in September 2010 and a further 8	Not recorded during field survey.  Possible foraging and



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			Birds Australia	<p><i>rebecula</i>, often occurring in gullies. They also occur in eucalypt woodlands with open understorey and grass ground cover, and are generally absent from rainforest. In south-eastern Australia, they occur at elevations of up to 1400 m above sea level, and in the ACT, they occur mainly between 800 m above sea level and the treeline.</p> <p>Satin Flycatchers are mainly recorded in eucalypt forests, especially wet sclerophyll forest, often dominated by eucalypts such as Brown Barrel, <i>Eucalypt fastigata</i>, Mountain Gum, <i>E. dalrympleana</i>, Mountain Grey Gum, Narrow-leaved Peppermint, Messmate or Manna Gum, or occasionally Mountain Ash, <i>E. regnans</i>. Such forests usually have a tall shrubby understorey of tall acacias, for example Blackwood, <i>Acacia melanoxylon</i>. In higher altitude Black Sallee, <i>E. stellulata</i>, woodlands, they are often associated with tea-trees and tree-ferns. They sometimes also occur in dry sclerophyll forests and woodlands, usually dominated by eucalypts such as Blakely's Red Gum, <i>E. blakelyi</i>, Mugga Ironbark, <i>E. sideroxylon</i>, Yellow Box, White Box, <i>E. albens</i>, Manna Gum or stringybarks, including Red Stringybark, <i>E. macrorhyncha</i> and Broad-leaved Stringybark, usually with open understorey (SEWPAC, 2010).</p>	<p>passage on a few islands in the western Torres Strait. It is patchily recorded on Cape York Peninsula, from the Cape south to a line between Aurukun and Coen. The species is more widespread farther south, though still scattered, from Musgrave Station south to c. 24° S, mostly in coastal areas, but also on the Great Divide, and occasionally further west. Satin Flycatchers are widespread in south-eastern Queensland, in the area from Fraser Island, west to Goombi and south to the NSW border (SEWPAC, 2010).</p> <p>Satin Flycatchers are migratory, moving north in autumn to spend winter in northern Australia and New Guinea. They return south in spring to spend summer in south-eastern Australia.</p>			<p>days survey in February 2011.</p> <p>The Chenoweth Surveys were undertaken as follows:</p> <ul style="list-style-type: none"><li>■ Dedicated bird watching was undertaken for 20 minutes per area (Figure 12) every morning in the early morning and late afternoon on each day of the survey. During this time, two observers walked quietly over selected areas (point surveys) of the site to detect birds present both through direct observation and through calls.</li><li>■ Birds were also recorded when opportunistically observed during other survey activities.</li><li>■ Nocturnal birds were searched for as part of spotlighting and call playback activities on site</li><li>■ Migratory shorebird searches were undertaken along the beach-front and tidal creeks. Point surveys of these areas were undertaken on foot for 20 minutes and sampled across a range of tide heights.</li><li>■ A survey from a boat of the beaches at low tide was undertaken for a total of 2.5 hours during the dry season survey on 26 September 2010 between 2:00pm – 04:30pm.</li><li>■ Leeke's Estuary (Figure 1) was walked during the wet season survey on 21 February 2011 at low tide (incoming) between 06:20am – 09:30am.</li><li>■ A portion of the Estuary from the mouth to the shed was surveyed over a period of 3 hours to actively search for feeding and roosting waders.</li><li>■ Detailed habitat assessments were also undertaken throughout GKI.</li></ul> <p>Central Queensland University (CQE) undertook bird surveys on GKI between 6 – 8 October 2010 and 21-25 March 2011. CQU bird surveys involved the traversing of the main development footprint by foot and electric vehicle with regular stops made to look and listen for the presence of birds (point searches). Opportunistic sightings between stop points were also recorded. All beaches and rocky headlands were</p>	<p>roosting habitat in some parts of Great Keppel Island.</p>



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								surveyed for birds during a full circuit of the island by boat on Thursday 7th October.	
<i>Myiagra inquieta</i> Restless Flycatcher		Migratory	Birds Australia	Inhabits open forests and woodlands, often near water, and quite dry scrub out of breeding season (Flegg, 2003).  Breeds July to January in south and August to march in north.	Restless Flycatcher is found throughout northern and eastern mainland Australia, as well as in south-western Australia. It is also found in Papua New Guinea. The southern subspecies, inquieta, is found in south-western Australia and from eastern South Australia to Julia Creek and Mount Isa, Queensland. The northern subspecies, nana, is found from the Kimberley region, Western Australia, to Cooktown and Townsville, Queensland. The two subspecies do not seem to mix where their ranges meet in central eastern Queensland (Birds in Backyards, 2010).		Possible	<p>Chenoweth EPLA undertook an 8 day fauna survey of the proposed disturbance area in September 2010 and a further 8 days survey in February 2011.</p> <p>The Chenoweth Surveys were undertaken as follows:</p> <ul style="list-style-type: none"> <li>▪ Dedicated bird watching was undertaken for 20 minutes per area (Figure 12) every morning in the early morning and late afternoon on each day of the survey. During this time, two observers walked quietly over selected areas (point surveys) of the site to detect birds present both through direct observation and through calls.</li> <li>▪ Birds were also recorded when opportunistically observed during other survey activities.</li> <li>▪ Nocturnal birds were searched for as part of spotlighting and call playback activities on site</li> <li>▪ Migratory shorebird searches were undertaken along the beach-front and tidal creeks. Point surveys of these areas were undertaken on foot for 20 minutes and sampled across a range of tide heights.</li> <li>▪ A survey from a boat of the beaches at low tide was undertaken for a total of 2.5 hours during the dry season survey on 26 September 2010 between 2:00pm – 04:30pm.</li> <li>▪ Leeke's Estuary (Figure 1) was walked during the wet season survey on 21 February 2011 at low tide (incoming) between 06:20am – 09:30am.</li> <li>▪ A portion of the Estuary from the mouth to the shed was surveyed over a period of 3 hours to actively search for feeding and roosting waders.</li> <li>▪ Detailed habitat assessments were also undertaken throughout GKI.</li> </ul> <p>Central Queensland University (CQE) undertook bird surveys on GKI between 6 – 8 October 2010 and 21-25 March 2011. CQU bird surveys involved the traversing of the main</p>	<p>Recorded by Chenoweth during the dry season survey only(Sept 2010).</p> <p>No records of nesting or breeding were made.</p>



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								development footprint by foot and electric vehicle with regular stops made to look and listen for the presence of birds (point searches). Opportunistic sightings between stop points were also recorded. All beaches and rocky headlands were surveyed for birds during a full circuit of the island by boat on Thursday 7th October.	
<i>Myiagra rubecula</i> Leaden Flycatcher		Migratory	Birds Australia	The Leaden Flycatcher is found in tall and medium open forests, mainly in coastal areas, preferring drier habitats than the Satin Flycatcher. Southern populations make seasonal movements northwards in winter to northern Queensland and Papua New Guinea, returning south to breed in spring. Northern populations tend to be sedentary or only locally nomadic (Birds in Backyards, 2010).	The Leaden Flycatcher is found across northern Australia and down the east coast of Australia, from the Kimberley region, Western Australia to eastern Victoria. It is a vagrant to the Mount Lofty Ranges, South Australia and to Tasmania. It is also found in New Guinea and nearby islands.		Possible	<p>Chenoweth EPLA undertook an 8 day fauna survey of the proposed disturbance area in September 2010 and a further 8 days survey in February 2011.</p> <p>The Chenoweth Surveys were undertaken as follows:</p> <ul style="list-style-type: none"> <li>▪ Dedicated bird watching was undertaken for 20 minutes per area (Figure 12) every morning in the early morning and late afternoon on each day of the survey. During this time, two observers walked quietly over selected areas (point surveys) of the site to detect birds present both through direct observation and through calls.</li> <li>▪ Birds were also recorded when opportunistically observed during other survey activities.</li> <li>▪ Nocturnal birds were searched for as part of spotlighting and call playback activities on site</li> <li>▪ Migratory shorebird searches were undertaken along the beach-front and tidal creeks. Point surveys of these areas were undertaken on foot for 20 minutes and sampled across a range of tide heights.</li> <li>▪ A survey from a boat of the beaches at low tide was undertaken for a total of 2.5 hours during the dry season survey on 26 September 2010 between 2:00pm – 04:30pm.</li> <li>▪ Leeke's Estuary (Figure 1) was walked during the wet season survey on 21 February 2011 at low tide (incoming) between 06:20am – 09:30am.</li> <li>▪ A portion of the Estuary from the mouth to the shed was surveyed over a period of 3 hours to actively search for feeding and roosting waders.</li> <li>▪ Detailed habitat assessments were also</li> </ul>	<p>Recorded by Chenoweth during both the dry &amp; wet season surveys (Sept 2010; Feb 2011).</p> <p>Recorded by CQE. 2 were recorded in 2010 and 7 during 2011.</p> <p>No records of nesting or breeding were made.</p>



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								undertaken throughout GKI.  Central Queensland University (CQE) undertook bird surveys on GKI between 6 – 8 October 2010 and 21-25 March 2011. CQU bird surveys involved the traversing of the main development footprint by foot and electric vehicle with regular stops made to look and listen for the presence of birds (point searches). Opportunistic sightings between stop points were also recorded. All beaches and rocky headlands were surveyed for birds during a full circuit of the island by boat on Thursday 7th October.	
<i>Numenius madagascariensis</i> Eastern curlew	NT	Migratory Marine	Wildlife Online Birds Australia	Most commonly associated with sheltered coasts, especially estuaries, bays, harbours, inlets and coastal lagoons, with large intertidal mudflats or sandflats, often with beds of seagrass. Occasionally occurs on ocean beaches (often near estuaries), and coral reefs, rock platforms, or rocky islets. Often recorded among saltmarsh and on mudflats fringed by mangroves, and sometimes use the mangroves. Mainly forages on soft sheltered intertidal sandflats or mudflats, open and without vegetation or covered with seagrass, often near mangroves, on saltflats and in saltmarsh, rockpools and among rubble on coral reefs, and on ocean beaches near the tideline. Roosts on sandy spits and islets, especially on dry beach sand near the high-water mark, and among coastal vegetation including low saltmarsh or mangroves. It occasionally roosts on reef-flats, in the shallow water of lagoons and other near-coastal wetlands (SEWPAC, 2010).	The Eastern Curlew breeds in Russia and north-eastern China but its distribution is poorly known. During the non-breeding season a few birds occur in southern Korea and China, but most spend the non-breeding season in north, east and south-east Australia. Eastern Curlews are regular non-breeding visitors to New Zealand in small numbers, and are also known from Kermadec Island and Chatham Island. In Australia, most Eastern Curlews leave between late February and March-April. A large proportion of the population winters in Australia, mostly in the northern regions. After breeding, they move south for the Northern Hemisphere winter. The birds migrate by day and night at varying altitudes, usually along coasts approximately 100 m from shore. Within Australia, immature birds, which do not migrate, move northward in winter.	The Eastern Curlew is most often counted using ground-based surveys within Australia. Population monitoring counts were able to illustrate the northward movement of many immature birds in winter within Australia. At Moreton Bay, Queensland, the constancy of numbers within-season across sites suggests that short surveys can give reliable results (SEWPAC, 2010).	Possible	Chenoweth EPLA undertook an 8 day fauna survey of the proposed disturbance area in September 2010 and a further 8 days survey in February 2011.  The Chenoweth Surveys were undertaken as follows: <ul style="list-style-type: none"> <li>■ Dedicated bird watching was undertaken for 20 minutes per area (Figure 12) every morning in the early morning and late afternoon on each day of the survey. During this time, two observers walked quietly over selected areas (point surveys) of the site to detect birds present both through direct observation and through calls.</li> <li>■ Birds were also recorded when opportunistically observed during other survey activities.</li> <li>■ Nocturnal birds were searched for as part of spotlighting and call playback activities on site</li> <li>■ Migratory shorebird searches were undertaken along the beach-front and tidal creeks. Point surveys of these areas were undertaken on foot for 20 minutes and sampled across a range of tide heights.</li> <li>■ A survey from a boat of the beaches at low tide was undertaken for a total of 2.5 hours during the dry season survey on 26 September 2010 between 2:00pm – 04:30pm.</li> <li>■ Leeke's Estuary (Figure 1) was walked during the wet season survey on 21 February 2011 at low tide (incoming) between 06:20am – 09:30am.</li> <li>■ A portion of the Estuary from</li> </ul>	Recorded by Creighton (1984) on Great Keppel Island.  Recorded by Chenoweth during the wet season survey (Feb, 2011). CEPLA recorded 1 bird feeding in Leeke's Estuary in 2011.



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								<p>the mouth to the shed was surveyed over a period of 3 hours to actively search for feeding and roosting waders.</p> <ul style="list-style-type: none"> <li>Detailed habitat assessments were also undertaken throughout GKI.</li> </ul> <p>Central Queensland University (CQE) undertook bird surveys on GKI between 6 – 8 October 2010 and 21-25 March 2011. CQU bird surveys involved the traversing of the main development footprint by foot and electric vehicle with regular stops made to look and listen for the presence of birds (point searches). Opportunistic sightings between stop points were also recorded. All beaches and rocky headlands were surveyed for birds during a full circuit of the island by boat on Thursday 7th October.</p>	
<i>Numenius minutus</i> Little Curlew Little Whimbrel		Marine, Migratory	EPBC Protected Matters	<p>Open, short grassland (may not be close to water), tidal mudflats (Flegg, 2003). Gathers in large flocks on coastal and inland grasslands and black soil plains in northern Australia, near swamps and flooded areas. They also feed on playing fields, paddocks and urban lawns (Birds in Backyards, 2010).</p>	<p>The Little Curlew is widespread in the north of Australia and scattered elsewhere. It is an irregular visitor to New Zealand and Tasmania. It breeds in Siberia and is seen on passage through Mongolia, China, Japan, Indonesia and New Guinea. Breeds May to August (Birds in Backyards, 2010).</p> <p>Little Curlews breed in Siberia, moving south to the non-breeding areas in northern Australia and southern New Guinea. They are dispersive in Australia, probably in response to rainfall. They arrive in the north from mid to late September, then disperse, leaving again mainly in early April (Birds in Backyards, 2010).</p>		Unlikely	<p>Chenoweth EPLA undertook an 8 day fauna survey of the proposed disturbance area in September 2010 and a further 8 days survey in February 2011.</p> <p>The Chenoweth Surveys were undertaken as follows:</p> <ul style="list-style-type: none"> <li>Dedicated bird watching was undertaken for 20 minutes per area (Figure 12) every morning in the early morning and late afternoon on each day of the survey. During this time, two observers walked quietly over selected areas (point surveys) of the site to detect birds present both through direct observation and through calls.</li> <li>Birds were also recorded when opportunistically observed during other survey activities.</li> <li>Nocturnal birds were searched for as part of spotlighting and call playback activities on site</li> <li>Migratory shorebird searches were undertaken along the beach-front and tidal creeks. Point surveys of these areas were undertaken on foot for 20 minutes and sampled across a range of tide heights.</li> <li>A survey from a boat of the beaches at low tide was undertaken for a total of 2.5 hours during the dry season survey on 26 September 2010 between 2:00pm – 04:30pm.</li> </ul>	<p>Not recorded during field survey.</p> <p>Breeding habitat absent as this species does not breed in Australia.</p> <p>Unlikely that Great Keppel Island is a significant part of its habitat due to lack of large areas of grassland.</p>



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								<ul style="list-style-type: none"> <li>Leeke's Estuary (Figure 1) was walked during the wet season survey on 21 February 2011 at low tide (incoming) between 06:20am – 09:30am.</li> <li>A portion of the Estuary from the mouth to the shed was surveyed over a period of 3 hours to actively search for feeding and roosting waders.</li> <li>Detailed habitat assessments were also undertaken throughout GKI.</li> </ul> <p>Central Queensland University (CQE) undertook bird surveys on GKI between 6 – 8 October 2010 and 21-25 March 2011. CQU bird surveys involved the traversing of the main development footprint by foot and electric vehicle with regular stops made to look and listen for the presence of birds (point searches). Opportunistic sightings between stop points were also recorded. All beaches and rocky headlands were surveyed for birds during a full circuit of the island by boat on Thursday 7th October.</p>	
<i>Numenius phaeopus</i> Whimbrel		Migratory Marine	EPBC Protected Matters Wildlife Online Birds Australia	<p>Intertidal mudflats of sheltered coasts and also in harbours, lagoons, estuaries and river deltas, often those with mangroves, but also open, unvegetated mudflats. Occasionally found on sandy or rocky beaches, on coral or rocky islets, or on intertidal reefs and platforms. Infrequently recorded using saline or brackish lakes near coastal areas. Also uses saltflats with saltmarsh, or saline grasslands with standing water left after high spring-tides. Forages on intertidal mudflats, along the muddy banks of estuaries and in coastal lagoons, either in open unvegetated areas or among mangroves, sometimes forage on sandy beaches or among rocks. It has occasionally been sighted feeding on exposed coral or rocky reefs and rock platforms and known to probe holes and crevices among rubble and on reef flats, but not on reef crests. Regularly roost in mangroves and other structures flooded at high tide. They often roost in the branches of mangroves around mudflats and in estuaries and occasionally in tall coastal trees. They have also been observed to roost on the ground (sometimes under mangroves or in shallow water), on muddy, sandy or rocky beaches; rocky islets and coral cays (SEWPAC, 2010).</p>	<p>The Whimbrel is a regular migrant to Australia and New Zealand, with a primarily coastal distribution. seen on the south coast of Western Australia and has occasionally been recorded in south-west Western Australia and further north to Shark Bay. It has been found around the coasts of the Top End, where it sometimes follows rivers inland. It is found along almost the entire coast of Queensland and NSW and regularly at some places in Victoria, Tasmania, and South Australia.</p> <p>The Whimbrel breeds in north and west Alaska. Breeding occurs in the Northern Hemisphere summer, with laying occurring from May to mid-June.</p> <p>Within Australia, Whimbrels move south through Roebuck Bay, Western Australia, from August and September. They arrive on the north and north-east coasts from August-October. Within Australia, Whimbrels begin migrating from February onwards. Influxes occur at most sites in Queensland from early March to early April. The birds leave the north and north-east coasts by late April (SEWPAC, 2010).</p>	As above	Known	<p>Chenoweth EPLA undertook an 8 day fauna survey of the proposed disturbance area in September 2010 and a further 8 days survey in February 2011.</p> <p>The Chenoweth Surveys were undertaken as follows:</p> <ul style="list-style-type: none"> <li>Dedicated bird watching was undertaken for 20 minutes per area (Figure 12) every morning in the early morning and late afternoon on each day of the survey. During this time, two observers walked quietly over selected areas (point surveys) of the site to detect birds present both through direct observation and through calls.</li> <li>Birds were also recorded when opportunistically observed during other survey activities.</li> <li>Nocturnal birds were searched for as part of spotlighting and call playback activities on site</li> <li>Migratory shorebird searches were undertaken along the beach-front and tidal creeks. Point surveys of these areas were undertaken on foot for 20 minutes and sampled across a range of tide heights.</li> </ul>	<p>Recorded by CEPLA during wet season survey (Feb, 2011). Two birds were recorded feeding in Leeke's Estuary in 2011.</p> <p>CQE recorded 3 during 2010 survey and 2 in Leeke's Estuary during the 2011 survey.</p> <p>Feeding and roosting habitat is present on the Island. Breeding and nesting habitat is not confirmed.</p>



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								<ul style="list-style-type: none"> <li>A survey from a boat of the beaches at low tide was undertaken for a total of 2.5 hours during the dry season survey on 26 September 2010 between 2:00pm – 04:30pm.</li> <li>Leeke's Estuary (Figure 1) was walked during the wet season survey on 21 February 2011 at low tide (incoming) between 06:20am – 09:30am.</li> <li>A portion of the Estuary from the mouth to the shed was surveyed over a period of 3 hours to actively search for feeding and roosting waders.</li> <li>Detailed habitat assessments were also undertaken throughout GKI.</li> </ul> <p>Central Queensland University (CQE) undertook bird surveys on GKI between 6 – 8 October 2010 and 21-25 March 2011. CQU bird surveys involved the traversing of the main development footprint by foot and electric vehicle with regular stops made to look and listen for the presence of birds (point searches). Opportunistic sightings between stop points were also recorded. All beaches and rocky headlands were surveyed for birds during a full circuit of the island by boat on Thursday 7th October.</p>	
<i>Phaethon rubricauda</i> Red-tailed tropicbird	V	Migratory Marine	Wildlife Online Birds Australia	<p>Oceanic, breeds on tropical islands in inaccessible locations such as cliffs, visitor to Australian north-east coast (Flegg, 2003).</p> <p>Inhabits tropical marine waters preferably between 24 and 30C. Breeding occurs between October and April (NSW NPWS, 1999)</p>	<p>In Australia it occurs from the south-western corner of WA along the coast to Cape York with scattered records along the east and south coasts to SA (NSW NPWS, 1999).</p> <p>The red tailed tropicbird nests on islands throughout its range including Lady Elliott Island in QLD (NSW NPWS, 1999).</p>	As Above	Possible	<p>Chenoweth EPLA undertook an 8 day fauna survey of the proposed disturbance area in September 2010 and a further 8 days survey in February 2011.</p> <p>The Chenoweth Surveys were undertaken as follows:</p> <ul style="list-style-type: none"> <li>Dedicated bird watching was undertaken for 20 minutes per area (Figure 12) every morning in the early morning and late afternoon on each day of the survey. During this time, two observers walked quietly over selected areas (point surveys) of the site to detect birds present both through direct observation and through calls.</li> <li>Birds were also recorded when opportunistically observed during other survey activities.</li> <li>Nocturnal birds were searched for as part of spotlighting and call playback activities on site</li> </ul>	<p>Not recorded during field survey.</p> <p>Possible breeding, foraging and roosting habitat occur on Great Keppel Island.</p>



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								<ul style="list-style-type: none"> <li>■ Migratory shorebird searches were undertaken along the beach-front and tidal creeks. Point surveys of these areas were undertaken on foot for 20 minutes and sampled across a range of tide heights.</li> <li>■ A survey from a boat of the beaches at low tide was undertaken for a total of 2.5 hours during the dry season survey on 26 September 2010 between 2:00pm – 04:30pm.</li> <li>■ Leeke's Estuary (Figure 1) was walked during the wet season survey on 21 February 2011 at low tide (incoming) between 06:20am – 09:30am.</li> <li>■ A portion of the Estuary from the mouth to the shed was surveyed over a period of 3 hours to actively search for feeding and roosting waders.</li> <li>■ Detailed habitat assessments were also undertaken throughout GKI.</li> </ul> <p>Central Queensland University (CQE) undertook bird surveys on GKI between 6 – 8 October 2010 and 21-25 March 2011. CQU bird surveys involved the traversing of the main development footprint by foot and electric vehicle with regular stops made to look and listen for the presence of birds (point searches). Opportunistic sightings between stop points were also recorded. All beaches and rocky headlands were surveyed for birds during a full circuit of the island by boat on Thursday 7th October.</p>	
<i>Pluvialis fulva</i> Pacific Golden Plover		Marine, Migratory	EPBC Protected Matters Wildlife Online Birds Australia	<p>Inhabits coastal habitats, though it occasionally occurs around inland wetlands. Usually occur on beaches, mudflats and sandflats (sometimes in vegetation such as mangroves, low saltmarsh or beds of seagrass) in sheltered areas including harbours, estuaries and lagoons. Sometimes recorded on islands, sand and coral cays and exposed reefs and rocks. They are less often recorded in terrestrial habitats, usually wetlands such as fresh, brackish or saline lakes, billabongs, pools, swamps and wet claypans, especially those with muddy margins and often with submerged vegetation or short emergent grass. Forages on sandy or muddy shores (including mudflats and sandflats) or margins of sheltered areas such as estuaries and lagoons, though it also feeds on rocky shores, islands or reefs. Occasionally forage among vegetation, such as saltmarsh, mangroves or in pasture or crops. Roost</p>	<p>Within Australia, the Pacific Golden Plover is widespread in coastal regions, though there are also a number of inland records (in all states), sometimes far inland and usually along major river systems, especially the Murray and Darling Rivers and their tributaries. Most Pacific Golden Plovers occur along the east coast, and are especially widespread along the Queensland and NSW coastlines.</p> <p>The Pacific Golden Plover breeds mostly in northern Siberia, between the Yamal Peninsula and the Chukotski Peninsula and the Gulf of Anadyr.</p> <p>The Pacific Golden Plover is a migratory species, breeding in the Northern Hemisphere and flying south for the boreal winter. The species is present at non-breeding grounds in Australia mostly between September and May, with greatest</p>	<p>Surveys for migratory shorebirds (SEWPAC, 2010) should be conducted at sites where either:</p> <ul style="list-style-type: none"> <li>■ No suitable survey records exist; or</li> <li>■ Records are too old to be considered reliable; or</li> <li>■ The site characteristics have changed.</li> </ul> <p>The majority of shorebirds are present during the non-breeding season (October to March) and this is when count surveys to establish the presence, number, habitat characteristics and the context of the site (ie how many other similar sites occur and are these used by shorebirds). Survey recommendations are as follows:</p> <ul style="list-style-type: none"> <li>■ At a minimum cover all the habitat thought to be used by the same population of shorebirds and the entire contiguous habitat where shorebirds occur.</li> <li>■ Surveys should be conducted during the period when the majority of migratory birds are present in the area and the during the northern hemisphere breeding season to obtain non-breeding, non-migratory immature populations.</li> <li>■ Surveys for roosting birds are to be conducted as close to high tide as possible (max 2 hours either side). Surveys for foraging birds as close to low tide as possible (no more than</li> </ul>	Possible	<p>Chenoweth EPLA undertook an 8 day fauna survey of the proposed disturbance area in September 2010 and a further 8 days survey in February 2011.</p> <p>The Chenoweth Surveys were undertaken as follows:</p> <ul style="list-style-type: none"> <li>■ Dedicated bird watching was undertaken for 20 minutes per area (Figure 12) every morning in the early morning and late afternoon on each day of the survey. During this time, two observers walked quietly over selected areas (point surveys) of the site to detect birds present both through direct observation and through calls.</li> <li>■ Birds were also recorded</li> </ul>	<p>Not recorded during field survey.</p> <p>Breeding habitat absent as this species does not breed in Australia.</p> <p>Possible foraging and roosting habitat occur on Great Keppel Island.</p>



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				near foraging areas, on sandy beaches and spits or rocky points, islets or exposed reefs, occasionally among or beneath vegetation including mangroves or low saltmarsh, or among beachcast seaweed (SEWPAC, 2010).	numbers in eastern and south-eastern Australia. Pacific Golden Plovers arrive back at their breeding grounds in mid- to late May (SEWPAC, 2010).	<p>2hours either side). Surveys should not be undertaken during high rainfall or strong winds.</p> <ul style="list-style-type: none"> <li>Survey effort should be a minimum of 4 surveys for roosting shorebirds during the period when most are present in the area (eg 1 in dec, 2 in Jan and 1 in Feb). A minimum of 4 surveys for foraging shorebirds including 2 at spring low tide and 2 at neap low tide. For large sites or sites where large numbers are expected it is recommended that at least two people undertake the counts.</li> </ul> <p>Data requirements are:</p> <ul style="list-style-type: none"> <li>Roosting sites – total abundance, species richness, species abundance.</li> <li>Shorebird behaviour – activity at site (roosting, foraging, both), foraging location (mapping of foraging habitat).</li> <li>Survey conditions – date, time of day, tide height, weather conditions (temperature, precipitation, wind speed, wind direction).</li> <li>Number of observers and experience level.</li> <li>Habitat characteristics (dominant landform type, site hydrology, dominant vegetation types, inter-tidal substrate, invasive species, disturbance regime, presence of suitable nocturnal roost sites).</li> <li>Methodology used to conduct survey.</li> </ul> <p>Where it is not possible to conduct surveys within the manner recommended a thorough habitat assessment must be done. The characteristics of the site (landform, hydrology, flood levels) should be assessed.</p>		<p>when opportunistically observed during other survey activities.</p> <ul style="list-style-type: none"> <li>Nocturnal birds were searched for as part of spotlighting and call playback activities on site</li> <li>Migratory shorebird searches were undertaken along the beach-front and tidal creeks. Point surveys of these areas were undertaken on foot for 20 minutes and sampled across a range of tide heights.</li> <li>A survey from a boat of the beaches at low tide was undertaken for a total of 2.5 hours during the dry season survey on 26 September 2010 between 2:00pm – 04:30pm.</li> <li>Leeke’s Estuary (Figure 1) was walked during the wet season survey on 21 February 2011 at low tide (incoming) between 06:20am – 09:30am.</li> <li>A portion of the Estuary from the mouth to the shed was surveyed over a period of 3 hours to actively search for feeding and roosting waders.</li> <li>Detailed habitat assessments were also undertaken throughout GKI.</li> </ul> <p>Central Queensland University (CQE) undertook bird surveys on GKI between 6 – 8 October 2010 and 21-25 March 2011. CQU bird surveys involved the traversing of the main development footprint by foot and electric vehicle with regular stops made to look and listen for the presence of birds (point searches). Opportunistic sightings between stop points were also recorded. All beaches and rocky headlands were surveyed for birds during a full circuit of the island by boat on Thursday 7th October.</p>	
<i>Pluvialis squatarola</i> Grey Plover		Marine, Migratory	EPBC Protected Matters Wildlife Online Birds Australia	Usually inhabit sheltered embayments, estuaries and lagoons with mudflats and sandflats, and occasionally on rocky coasts with wave-cut platforms or reef-flats, or on reefs within muddy lagoons. Also occur around terrestrial wetlands such as near-coastal lakes and swamps, or salt-lakes. Usually forage on large areas of exposed mudflats and beaches of sheltered coastal shores such as inlets, estuaries and lagoons. Occasionally feed in pasture and at the muddy margins of inland wetlands. Roost in sandy areas, such as on unvegetated sandbanks or sand-spits on sheltered beaches or other sheltered environments	<p>Grey Plovers breed north of 65° N in the Northern Hemisphere, in northern Siberia, from the White Sea east to the Gulf of Anadyr, and in Alaska and northern Canada from the shores of the Bering Sea east to Baffin Island. During the non-breeding season, the species is widespread on the coasts of North and South America, western and southern Europe, Africa, western, southern, south-eastern and eastern Asia, and Australia.</p> <p>The species usually leaves its breeding grounds in northern Siberia between mid-September and mid-October, but some leave</p>	As above	Possible	<p>Chenoweth EPLA undertook an 8 day fauna survey of the proposed disturbance area in September 2010 and a further 8 days survey in February 2011.</p> <p>The Chenoweth Surveys were undertaken as follows:</p> <ul style="list-style-type: none"> <li>Dedicated bird watching was undertaken for 20 minutes per area (Figure 12) every morning in the early morning and late afternoon on each day of the survey. During this time, two observers</li> </ul>	<p>Not recorded during field survey.</p> <p>Breeding habitat absent as this species does not breed in Australia.</p> <p>Possible foraging and roosting habitat occur on Great Keppel Island.</p>



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				such as estuaries or lagoons Less often roost on the muddy edges of estuaries or water storages (SEWPAC, 2010)	as early as mid-August. Morphometric data suggests that Grey Plovers wintering in Australia originate from Siberian breeding grounds located east of the Lena River, with south-eastern Australia mainly supporting birds which bred on Wrangel Island. They arrive in northern Australia in August and early September, and sometimes October. Many then move south, mainly in October. Some of these southerly movements are overland, as all inland records are from the period September to January, though others certainly follow the coast. The species usually arrives at sites on the southern coast between October and November. They remain at southern non-breeding grounds until March-May. Birds move northwards along the east coast in March; they leave south-western Australia in April, and other birds pass through the area between March and May, possibly originating from the South Australian coast, travelling westward in the initial stages of their northward migration. Plovers which have remained along the northern coastline for the non-breeding season leave between February and April (SEWPAC, 2010).			<p>walked quietly over selected areas (point surveys) of the site to detect birds present both through direct observation and through calls.</p> <ul style="list-style-type: none"> <li>■ Birds were also recorded when opportunistically observed during other survey activities.</li> <li>■ Nocturnal birds were searched for as part of spotlighting and call playback activities on site</li> <li>■ Migratory shorebird searches were undertaken along the beach-front and tidal creeks. Point surveys of these areas were undertaken on foot for 20 minutes and sampled across a range of tide heights.</li> <li>■ A survey from a boat of the beaches at low tide was undertaken for a total of 2.5 hours during the dry season survey on 26 September 2010 between 2:00pm – 04:30pm.</li> <li>■ Leeke's Estuary (Figure 1) was walked during the wet season survey on 21 February 2011 at low tide (incoming) between 06:20am – 09:30am.</li> <li>■ A portion of the Estuary from the mouth to the shed was surveyed over a period of 3 hours to actively search for feeding and roosting waders.</li> <li>■ Detailed habitat assessments were also undertaken throughout GKI.</li> </ul> <p>Central Queensland University (CQE) undertook bird surveys on GKI between 6 – 8 October 2010 and 21-25 March 2011. CQU bird surveys involved the traversing of the main development footprint by foot and electric vehicle with regular stops made to look and listen for the presence of birds (point searches). Opportunistic sightings between stop points were also recorded. All beaches and rocky headlands were surveyed for birds during a full circuit of the island by boat on Thursday 7th October.</p>	
<i>Pterodroma neglecta neglecta</i> Kermadec Petrel		Vulnerable	EPBC Protected Matters Database	Oceanic, breeds on south pacific islands (Flegg, 2003). The species has been observed over waters with surface-temperatures of 15-25°C. Breeding occurs on atolls and rocky islets across subtropical South Pacific Ocean on vegetated coastal slopes, cliffs or mountainous terrain inland.	The Kermadec Petrel occurs in subtropical seas between 20 and 35°S. Breeding colonies are located in the South Pacific Ocean, 25-35 °S, from Lord Howe Island to Juan Fernandez Island. Non-breeding Kermadec Petrels migrate trans-equatorially. Individuals have	On land area searches or transect surveys (in areas up to 10ha) for nest sites during the breeding season. Birds are nocturnal so spotlight searches at night for landed birds and vocal detection of flying birds around colony. Land-based area searches or transects recommended survey effort is 20 hours/4 days (SEWPAC, 2010).	Unlikely	<p>Chenoweth EPLA undertook an 8 day fauna survey of the proposed disturbance area in September 2010 and a further 8 days survey in February 2011.</p> <p>The Chenoweth Surveys were</p>	<p>Not recorded during field survey.</p> <p>Unlikely to breed on Great Keppel Island as GKI is further north than the usual breeding</p>



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				<p>Nests are located on the ground or in rock crevices under ferns, shrubs or trees (NSW NPWS, 1999). Breeding time may vary between spring-summer to summer-autumn.</p>	<p>been recorded as far north as 28°N in the central Pacific Ocean and 21°N in the eastern Pacific Ocean. The species is usually present around Kermadec Island throughout the year and is a vagrant to the east coast of Australia (NSW NPWS, 1999).</p> <p>Ranges over subtropical and tropical waters of the South Pacific. Balls Pyramid, near Lord Howe Island, is the only known breeding site in Australian waters.</p>			<p>undertaken as follows:</p> <ul style="list-style-type: none"> <li>▪ Dedicated bird watching was undertaken for 20 minutes per area (Figure 12) every morning in the early morning and late afternoon on each day of the survey. During this time, two observers walked quietly over selected areas (point surveys) of the site to detect birds present both through direct observation and through calls.</li> <li>▪ Birds were also recorded when opportunistically observed during other survey activities.</li> <li>▪ Nocturnal birds were searched for as part of spotlighting and call playback activities on site</li> <li>▪ Migratory shorebird searches were undertaken along the beach-front and tidal creeks. Point surveys of these areas were undertaken on foot for 20 minutes and sampled across a range of tide heights.</li> <li>▪ A survey from a boat of the beaches at low tide was undertaken for a total of 2.5 hours during the dry season survey on 26 September 2010 between 2:00pm – 04:30pm.</li> <li>▪ Leeke's Estuary (Figure 1) was walked during the wet season survey on 21 February 2011 at low tide (incoming) between 06:20am – 09:30am.</li> <li>▪ A portion of the Estuary from the mouth to the shed was surveyed over a period of 3 hours to actively search for feeding and roosting waders.</li> <li>▪ Detailed habitat assessments were also undertaken throughout GKI.</li> </ul> <p>Central Queensland University (CQE) undertook bird surveys on GKI between 6 – 8 October 2010 and 21-25 March 2011. CQU bird surveys involved the traversing of the main development footprint by foot and electric vehicle with regular stops made to look and listen for the presence of birds (point searches). Opportunistic sightings between stop points were also recorded. All beaches and rocky headlands were surveyed for birds during a full circuit of the island by boat on Thursday 7th October.</p>	<p>colony range at 23°S.</p> <p>Unlikely that Great Keppel Island is a significant part of its habitat.</p>



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<i>Sterna dougallii</i> Roseate Tern		Marine, Migratory	Wildnet Online	<p>The species breeds in large, dense single- or mixed-species colonies that may contain several thousands of pairs. It remains gregarious throughout the year, roosting in large groups and feeding singly, in small loose groups or in flocks of many hundreds of individuals.</p> <p>The species nests on sand-dunes, sand-spits, shingle beaches, saltmarshes and rocky, sandy or coral, showing a preference for densely vegetated sites in temperate regions but sparsely vegetated sites in the tropics. It also shows a preference for nest sites close to clear, shallow, sandy fishing grounds in tidal bays and sheltered inshore waters. The nest is a bare scrape in sand, shingle or coral rubble, preferably in sites surrounded by walls and rocks, or, in temperate regions, in the shelter of vegetation, also in crevices between and under rocks, or in the entrances to rabbit or Puffin burrows.</p> <p>Throughout the year the species often rests and forages in sheltered estuaries, creeks, inshore waters and up to several kilometres offshore, moving to warm tropical coasts after breeding (Birdlife International, 2009).</p>	This species breeds in widely but sparsely distributed colonies along the east coast and offshore islands of Canada, USA, from Honduras to Venezuela, possibly to Brazil, the Caribbean (including the Bahamas, Greater and Lesser Antilles and the West Indies), UK, France, Ireland, Portugal (Azores, Salvages and perhaps Madeira), Spain (Canary Islands), South Africa, Kenya, Somalia, Madagascar, Oman, Seychelles, St Brandon and the Mascarene Islands (Mauritius), Maldives, Chagos (British Indian Ocean Territory), Andaman and Nicobar Islands (India), Sri Lanka, Ryukyu Islands (Japan), Indonesia, Fiji, Solomon Islands, New Guinea (Papua New Guinea), New Caledonia (to France) and Australia (Birdlife International, 2009).		Possible	<p>Chenoweth EPLA undertook an 8 day fauna survey of the proposed disturbance area in September 2010 and a further 8 days survey in February 2011.</p> <p>The Chenoweth Surveys were undertaken as follows:</p> <ul style="list-style-type: none"> <li>■ Dedicated bird watching was undertaken for 20 minutes per area (Figure 12) every morning in the early morning and late afternoon on each day of the survey. During this time, two observers walked quietly over selected areas (point surveys) of the site to detect birds present both through direct observation and through calls.</li> <li>■ Birds were also recorded when opportunistically observed during other survey activities.</li> <li>■ Nocturnal birds were searched for as part of spotlighting and call playback activities on site</li> <li>■ Migratory shorebird searches were undertaken along the beach-front and tidal creeks. Point surveys of these areas were undertaken on foot for 20 minutes and sampled across a range of tide heights.</li> <li>■ A survey from a boat of the beaches at low tide was undertaken for a total of 2.5 hours during the dry season survey on 26 September 2010 between 2:00pm – 04:30pm.</li> <li>■ Leeke's Estuary (Figure 1) was walked during the wet season survey on 21 February 2011 at low tide (incoming) between 06:20am – 09:30am.</li> <li>■ A portion of the Estuary from the mouth to the shed was surveyed over a period of 3 hours to actively search for feeding and roosting waders.</li> <li>■ Detailed habitat assessments were also undertaken throughout GKI.</li> </ul> <p>Central Queensland University (CQE) undertook bird surveys on GKI between 6 – 8 October 2010 and 21-25 March 2011. CQU bird surveys involved the traversing of the main development footprint by foot and electric vehicle with regular stops made to look and listen for</p>	<p>Not recorded during field survey.</p> <p>Possible foraging and breeding habitat exists on Great Keppel Island.</p>



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<i>Sterna hirundo</i> Common Tern		Marine, Migratory	Birds Australia	<p>The habitat of the Common Tern is mainly coastal when not breeding and typically in offshore waters, ocean beaches, estuaries and large lakes. Common Terns are occasionally seen in freshwater swamps, floodwaters, sewage farms and brackish and saline lakes (Birds in Backyards, 2010).</p> <p>Common Terns forage in marine environments, often close to the shore, including sheltered embayments and in the surf-zone, but also well out to sea. They also forage in near-coastal terrestrial wetlands, including estuaries, rivers and swamps (SEWPAC, 2010)</p>	<p>This species is strongly migratory, breeding in the northern hemisphere in the boreal spring-summer and migrating south to wintering areas in the Northern and Southern Hemispheres (SEWPAC, 2010)</p> <p>In Australia the Common Tern is a regular non-breeding visitor. It breeds across much of northern North America, Europe and Asia as far east as the Pacific coast of Siberia, and as far south as the Mediterranean, North Africa and Central Asia. Breeds May to August (Birds in Backyards, 2010).</p> <p>In Australia, Common Terns are mainly found along the eastern coast, where they are widespread and common from south-eastern Queensland to eastern Victoria (SEWPAC, 2010). Common Terns do not breed in Australia but this country appears to be an important wintering destination. In eastern Australia, they appear to move south along the coast. Common Terns are recorded in Queensland from September (SEWPAC, 2010).</p>	Common Terns are in Australia primarily during the austral spring-summer, with only small numbers present in the austral. Most surveys of the species are ground counts conducted from the shoreline or counts from boats due to access issues. The species has been counted during aerial surveys of wetlands of the Northern Territory, and surveyed at sea by boat. However, the largely marine foraging of this species in northern Australia, and elsewhere, means numbers are not adequately recorded during surveys of terrestrial wetlands (SEWPAC, 2010).	Possible	<p>Chenoweth EPLA undertook an 8 day fauna survey of the proposed disturbance area in September 2010 and a further 8 days survey in February 2011.</p> <p>The Chenoweth Surveys were undertaken as follows:</p> <ul style="list-style-type: none"> <li>■ Dedicated bird watching was undertaken for 20 minutes per area (Figure 12) every morning in the early morning and late afternoon on each day of the survey. During this time, two observers walked quietly over selected areas (point surveys) of the site to detect birds present both through direct observation and through calls.</li> <li>■ Birds were also recorded when opportunistically observed during other survey activities.</li> <li>■ Nocturnal birds were searched for as part of spotlighting and call playback activities on site</li> <li>■ Migratory shorebird searches were undertaken along the beach-front and tidal creeks. Point surveys of these areas were undertaken on foot for 20 minutes and sampled across a range of tide heights.</li> <li>■ A survey from a boat of the beaches at low tide was undertaken for a total of 2.5 hours during the dry season survey on 26 September 2010 between 2:00pm – 04:30pm.</li> <li>■ Leeke's Estuary (Figure 1) was walked during the wet season survey on 21 February 2011 at low tide (incoming) between 06:20am – 09:30am.</li> <li>■ A portion of the Estuary from the mouth to the shed was surveyed over a period of 3 hours to actively search for feeding and roosting waders.</li> <li>■ Detailed habitat assessments were also undertaken throughout GKI.</li> </ul>	<p>Not recorded during field survey.</p> <p>Breeding habitat absent as this species does not breed in Australia.</p> <p>Possible foraging and roosting habitat occur on Great Keppel Island.</p>



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<i>Sternula albifrons</i> Little Tern	E	Marine, Migratory	Wildlife Online Birds Australia	<p>Sheltered coastal environments including lagoons, estuaries, river mouths and deltas, lakes, bays, harbours and inlets, especially those with exposed sandbanks or sand-spits, and also on exposed ocean beaches. Nest on sand-spits, banks, ridges or islets in sheltered coastal environments, such as coastal lakes, estuaries and inlets, and also on wide and flat or gently sloping sandy ocean beaches, and also, occasionally, in sand-dunes. forage in shallow waters of estuaries, coastal lagoons and lakes, frequently over channels next to spits and banks or entrances, and often close to breeding colonies. Also forage along open coasts, especially around bars off the entrances to rivers and lagoons, less often at sea, and usually within 50 m of shore. Roost or loaf on sand-spits, banks and bars within sheltered estuarine or coastal environments, or on the sandy shores of lakes and ocean beaches (SEWPAC, 2010).</p> <p>In the Northern Territory, Little Terns have an extended breeding season, with breeding recorded from April to early January, with the main periods being late April-July and September-early January. Formerly, far more limited data from northern Australia, mainly from the Gulf of Carpentaria and Cape York Peninsula, indicated breeding in the austral autumn-winter, with breeding reported April-July and December and eggs recorded mid-April to late June and in October, consistent with the more recent observations from the Northern Territory. The eastern subpopulation breeds in the austral spring-summer, with laying from late August to January-February, more usually beginning late October and with peak laying in late November to mid-December (SEWPAC, 2010).</p>	<p>Widespread on islands off the Northern Territory coast and less often on offshore continental islands or coral cays off Queensland. (SEWPAC, 2010).</p> <p>The Australian breeding population can be divided into two major subpopulations: (1) a northern subpopulation that breeds across northern Australia, from about Broome in north-western Western Australia (where first recorded only in December 1995), through coastal Northern Territory (mainly from just west of Darwin to the Queensland border) to the Gulf of Carpentaria and eastern Cape York Peninsula (with an extended breeding season covering most of the year); and (2) an eastern subpopulation that breeds on the eastern and south-eastern coast of the mainland and northern and eastern Tasmania, occasionally extending as far west as western Victoria and south-eastern South Australia (and breeding in the austral spring-summer).</p> <p>In addition, a third population of Asian migrants that spend the northern non-breeding season (austral spring-autumn) in Australia, and leave for their northern breeding grounds in March-April is recognised (SEWPAC, 2010).</p>	<p>Surveys for migratory shorebirds (SEWPAC, 2010) should be conducted at sites where either:</p> <ul style="list-style-type: none"> <li>No suitable survey records exist or</li> <li>Records are too old to be considered reliable; or</li> <li>The site characteristics have changed.</li> </ul> <p>The majority of shorebirds are present during the non-breeding season (October to march) and this is when count surveys to establish the presence, number , habitat characteristics and the context of the site (ie how many other similar sites occur and are these used by shorebirds). Survey recommendations are as follows:</p> <ul style="list-style-type: none"> <li>At a minimum cover all the habitat thought to be used by the same population of shorebirds and the entire contiguous habitat where shorebirds occur.</li> <li>Surveys should be conducted during the period when the majority of migratory birds are present in the area and the during the northern hemisphere breeding season to obtain non-breeding, non-migratory immature populations.</li> <li>Surveys for roosting birds are to be conducted as close to high tide as possible (max 2 hours either side). Surveys for foraging birds as close to low tide as possible (no more than 2hours either side). Surveys should not be undertaken during high rainfall or strong winds.</li> <li>Survey effort should be a minimum of 4 surveys for roosting shorebirds during the period when most are present in the area (eg 1 in dec, 2 in Jan and 1 in Feb). A minimum of 4 surveys for foraging shorebirds including 2 at spring low tide and 2 at neap low tide. For large sites or sites where large numbers are expected it is recommended that at least two people undertake the counts.</li> </ul> <p>Data requirements are:</p> <ul style="list-style-type: none"> <li>Roosting sites – total abundance, species richness, species abundance.</li> <li>Shorebird behaviour – activity at site (roosting, foraging, both), foraging location (mapping of foraging habitat).</li> <li>Survey conditions – date, time of day, tide height, weather conditions (temperature, precipitation, wind speed, wind direction).</li> <li>Number of observers and experience level.</li> <li>Habitat characteristics (dominant landform type, site hydrology, dominant vegetation types, inter-tidal substrate, invasive species, disturbance regime, presence of suitable nocturnal roost sites).</li> <li>Methodology used to conduct survey.</li> </ul> <p>Where it is not possible to conduct surveys within the manner recommended a thorough habitat assessment must be done. The characteristics of the site (landform, hydrology, flood levels) should be assessed.</p>	Possible	<p>Chenoweth EPLA undertook an 8 day fauna survey of the proposed disturbance area in September 2010 and a further 8 days survey in February 2011.</p> <p>The Chenoweth Surveys were undertaken as follows:</p> <ul style="list-style-type: none"> <li>Dedicated bird watching was undertaken for 20 minutes per area (Figure 12) every morning in the early morning and late afternoon on each day of the survey. During this time, two observers walked quietly over selected areas (point surveys) of the site to detect birds present both through direct observation and through calls.</li> <li>Birds were also recorded when opportunistically observed during other survey activities.</li> <li>Nocturnal birds were searched for as part of spotlighting and call playback activities on site</li> <li>Migratory shorebird searches were undertaken along the beach-front and tidal creeks. Point surveys of these areas were undertaken on foot for 20 minutes and sampled across a range of tide heights.</li> <li>A survey from a boat of the beaches at low tide was undertaken for a total of 2.5 hours during the dry season survey on 26 September 2010 between 2:00pm – 04:30pm.</li> <li>Leeke's Estuary (Figure 1) was walked during the wet season survey on 21 February 2011 at low tide (incoming) between 06:20am – 09:30am.</li> <li>A portion of the Estuary from the mouth to the shed was</li> </ul>	<p>Not recorded during field survey.</p> <p>Possible breeding habitat exists on Great Keppel Island and possible foraging habitat occurs on Great Keppel Island.</p>



Literature Review								Results	
Species	NCA Status	EPBC Status	Database	Habitat (foraging and resting) Preferences Breeding/nesting and Seasonal influences	Species Distribution	SEWPAC Survey Requirements	Likelihood of Occurrence (as per literature review)	Assessment to Date	Results and Likely Presence Based on Field Survey
								<p>surveyed over a period of 3 hours to actively search for feeding and roosting waders.</p> <ul style="list-style-type: none"> <li>Detailed habitat assessments were also undertaken throughout GKI.</li> </ul> <p>Central Queensland University (CQE) undertook bird surveys on GKI between 6 – 8 October 2010 and 21-25 March 2011. CQU bird surveys involved the traversing of the main development footprint by foot and electric vehicle with regular stops made to look and listen for the presence of birds (point searches). Opportunistic sightings between stop points were also recorded. All beaches and rocky headlands were surveyed for birds during a full circuit of the island by boat on Thursday 7th October.</p>	
<i>Sula leucogaster</i> Brown Booby		Marine, Migratory	Birds Australia	Harbours and rivermouths to search for fish and squid, it also forages hundreds of kilometres out to sea. Nest is a platform of sticks, leaves and debris, most commonly on the ground on cliff edge, in small clear spot among bushes, or on coral pinnacle (Readers Digest Complete Book of Australian Birds, 1986). Oceanic habitat, breeding on islands including those off the north Australian coast, nesting on the ground often in clearings in scrubby vegetation (Flegg, 2003).	<p>The species is considered native in a number of countries including Australia (American Samoa; Anguilla; Antigua and Barbuda; Argentina; Aruba; Australia; Bahamas; Barbados; Belize; Brazil; British Indian Ocean Territory; Brunei Darussalam; Canada; Cape Verde; Cayman Islands; China; Christmas Island; Cocos (Keeling) Islands; Colombia; Comoros; Cook Islands; Costa Rica; Cuba; Djibouti; Dominica; Dominican Republic; Ecuador; Egypt; El Salvador; Equatorial Guinea; Eritrea; Fiji; French Guiana; French Polynesia; Gabon; Grenada; Guadeloupe; Guam; Guatemala; Guinea; Guinea-Bissau; Guyana; Haiti; Honduras; India; Indonesia; Israel; Jamaica; Japan; Jordan; Kenya; Kiribati; Liberia; Madagascar; Malaysia; Maldives; Marshall Islands; Martinique; Mauritania; Mayotte; Mexico; Micronesia, Federated States of; Montserrat; Myanmar; Nauru; Netherlands Antilles; New Caledonia; Nicaragua; Nigeria; Northern Mariana Islands; Palau; Panama; Philippines; Puerto Rico; Saint Helena; Saint Kitts and Nevis; Saint Lucia; Saint Vincent and the Grenadines; Samoa; Sao Tomé and Principe; Saudi Arabia; Seychelles; Singapore; Solomon Islands; Somalia; Sri Lanka; Sudan; Suriname; Taiwan, Province of China; Thailand; Timor-Leste; Tonga; Trinidad and Tobago; Turks and Caicos Islands; United States; United States Minor Outlying Islands; Vanuatu; Venezuela; Viet Nam; Virgin Islands, British; Virgin Islands, U.S.; Wallis and Futuna; Yemen).</p> <p>The species is considered a vagrant in the following countries: Benin; Bermuda; Gambia; Ghana; Hong Kong; Morocco; Mozambique; New Zealand; Oman; Portugal; Senegal; Sierra Leone; South Africa; Spain; United Arab Emirates; Uruguay (Birdlife International, 2009).</p>	<p>Surveys for migratory shorebirds (SEWPAC, 2010) should be conducted at sites where either:</p> <ul style="list-style-type: none"> <li>No suitable survey records exist; or</li> <li>Records are too old to be considered reliable; or</li> <li>The site characteristics have changed.</li> </ul> <p>The majority of shorebirds are present during the non-breeding season (October to March) and this is when count surveys to establish the presence, number, habitat characteristics and the context of the site (ie how many other similar sites occur and are these used by shorebirds). Survey recommendations are as follows:</p> <ul style="list-style-type: none"> <li>At a minimum cover all the habitat thought to be used by the same population of shorebirds and the entire contiguous habitat where shorebirds occur.</li> <li>Surveys should be conducted during the period when the majority of migratory birds are present in the area and the during the northern hemisphere breeding season to obtain non-breeding, non-migratory immature populations.</li> <li>Surveys for roosting birds are to be conducted as close to high tide as possible (max 2 hours either side). Surveys for foraging birds as close to low tide as possible (no more than 2 hours either side). Surveys should not be undertaken during high rainfall or strong winds.</li> <li>Survey effort should be a minimum of 4 surveys for roosting shorebirds during the period when most are present in the area (eg 1 in Dec, 2 in Jan and 1 in Feb). A minimum of 4 surveys for foraging shorebirds including 2 at spring low tide and 2 at neap low tide. For large sites or sites where large numbers are expected it is recommended that at least two people undertake the counts.</li> </ul> <p>Data requirements are:</p> <ul style="list-style-type: none"> <li>Roosting sites – total abundance, species richness, species abundance.</li> <li>Shorebird behaviour – activity at site (roosting, foraging, both), foraging location (mapping of foraging habitat).</li> <li>Survey conditions – date, time of day, tide height, weather conditions (temperature, precipitation, wind speed, wind direction).</li> <li>Number of observers and experience level.</li> <li>Habitat characteristics (dominant landform type, site hydrology, dominant vegetation types, inter-tidal substrate, invasive species, disturbance regime, presence of suitable nocturnal roost sites).</li> <li>Methodology used to conduct survey.</li> </ul>	Possible	<p>Chenoweth EPLA undertook an 8 day fauna survey of the proposed disturbance area in September 2010 and a further 8 days survey in February 2011.</p> <p>The Chenoweth Surveys were undertaken as follows:</p> <ul style="list-style-type: none"> <li>Dedicated bird watching was undertaken for 20 minutes per area (Figure 12) every morning in the early morning and late afternoon on each day of the survey. During this time, two observers walked quietly over selected areas (point surveys) of the site to detect birds present both through direct observation and through calls.</li> <li>Birds were also recorded when opportunistically observed during other survey activities.</li> <li>Nocturnal birds were searched for as part of spotlighting and call playback activities on site</li> <li>Migratory shorebird searches were undertaken along the beach-front and tidal creeks. Point surveys of these areas were undertaken on foot for 20 minutes and sampled across a range of tide heights.</li> <li>A survey from a boat of the beaches at low tide was undertaken for a total of 2.5 hours during the dry season survey on 26 September 2010 between 2:00pm – 04:30pm.</li> </ul>	<p>Not recorded during field survey.</p> <p>Possible foraging, breeding and roosting habitat occur on Great Keppel Island.</p>



Literature Review								Results	
Species	NCA Status	EPBC Status	Database	Habitat (foraging and resting) Preferences Breeding/nesting and Seasonal influences	Species Distribution	SEWPAC Survey Requirements	Likelihood of Occurrence (as per literature review)	Assessment to Date	Results and Likely Presence Based on Field Survey
						Where it is not possible to conduct surveys within the manner recommended a thorough habitat assessment must be done. The characteristics of the site (landform, hydrology, flood levels) should be assessed.		<ul style="list-style-type: none"> <li>Leeke's Estuary (Figure 1) was walked during the wet season survey on 21 February 2011 at low tide (incoming) between 06:20am – 09:30am.</li> <li>A portion of the Estuary from the mouth to the shed was surveyed over a period of 3 hours to actively search for feeding and roosting waders.</li> <li>Detailed habitat assessments were also undertaken throughout GKI.</li> </ul> <p>Central Queensland University (CQE) undertook bird surveys on GKI between 6 – 8 October 2010 and 21-25 March 2011. CQU bird surveys involved the traversing of the main development footprint by foot and electric vehicle with regular stops made to look and listen for the presence of birds (point searches). Opportunistic sightings between stop points were also recorded. All beaches and rocky headlands were surveyed for birds during a full circuit of the island by boat on Thursday 7th October.</p>	
<i>Thalasseus bengalensis</i> Lesser Crested Tern		Marine, Migratory	Birds Australia	Breeds in small colonies on tropical beaches and islands, dispersing into coastal areas (Flegg, 2003). No nest is made (Readers Digest Complete Book of Australian Birds, 1986).	Breeds from Point Cloates, WA, round northern coasts and offshore islands to about Gladstone, Qld (Readers Digest Complete Book of Australian Birds, 1986).	As above	Known	<p>Chenoweth EPLA undertook an 8 day fauna survey of the proposed disturbance area in September 2010 and a further 8 days survey in February 2011.</p> <p>The Chenoweth Surveys were undertaken as follows:</p> <ul style="list-style-type: none"> <li>Dedicated bird watching was undertaken for 20 minutes per area (Figure 12) every morning in the early morning and late afternoon on each day of the survey. During this time, two observers walked quietly over selected areas (point surveys) of the site to detect birds present both through direct observation and through calls.</li> <li>Birds were also recorded when opportunistically observed during other survey activities.</li> <li>Nocturnal birds were searched for as part of spotlighting and call playback activities on site</li> <li>Migratory shorebird searches were undertaken along the beach-front and tidal creeks. Point surveys of these areas were undertaken on foot for 20 minutes and sampled across a range of tide heights.</li> </ul>	<p>Not recorded during CEPLA field survey. One was recorded by CQE (Black and Houston, 2010) from Leeke's Estuary.</p> <p>Foraging and roosting habitat occur on Great Keppel Island. Breeding habitat is not confirmed.</p>



Literature Review								Results	
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<i>Vanellus miles</i> Masked Lapwing		Migratory	Birds Australia	The Masked Lapwing inhabits marshes, mudflats, beaches and grasslands, and is often seen in urban areas (Birds in Backyards, 2010). It can also be found on the margins of ponds and dams (Flegg, 2003). Nest is a scrape in the ground lined with grass and debris, sometimes on a flat roof. When not breeding they form flocks of up to 100 and may travel extensively. At night the flocks roost, standing in large expanses of shallow water or on small islands (Readers Digest Complete Book of Australian Birds, 1986).	The Masked Lapwing is common throughout northern, central and eastern Australia. Masked Lapwings are also found in Indonesia, New Guinea, New Caledonia and New Zealand. The New Zealand and New Caledonian populations have been formed from birds that have flown there from Australia (Birds Australia, 2010). Masked Lapwings may breed when conditions are suitable.	As above	Known	<p>Chenoweth EPLA undertook an 8 day fauna survey of the proposed disturbance area in September 2010 and a further 8 days survey in February 2011.</p> <p>The Chenoweth Surveys were undertaken as follows:</p> <ul style="list-style-type: none"> <li>Dedicated bird watching was undertaken for 20 minutes per area (Figure 12) every morning in the early morning and late afternoon on each day of the survey. During this time, two observers walked quietly over selected areas (point surveys) of the site to detect birds present both through direct observation and through calls.</li> <li>Birds were also recorded when opportunistically observed during other survey activities.</li> <li>Nocturnal birds were searched for as part of spotlighting and call playback activities on site</li> </ul>	<p>Recorded by Chenoweth during the dry season survey (Sept 2010) and wet season (Feb, 2011).</p> <p>CQE recorded 4 during the 2010 survey and 16 throughout GKI during the 2011 survey. Masked Lapwing was identified from Leeke's Beach, Leeke's Estuary, Putney Beach and the Resort Precinct.</p> <p>No breeding or nesting birds were identified during surveys. Feeding and roosting habitat occur on GKI.</p>



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								<ul style="list-style-type: none"> <li>■ Migratory shorebird searches were undertaken along the beach-front and tidal creeks. Point surveys of these areas were undertaken on foot for 20 minutes and sampled across a range of tide heights.</li> <li>■ A survey from a boat of the beaches at low tide was undertaken for a total of 2.5 hours during the dry season survey on 26 September 2010 between 2:00pm – 04:30pm.</li> <li>■ Leeke's Estuary (Figure 1) was walked during the wet season survey on 21 February 2011 at low tide (incoming) between 06:20am – 09:30am.</li> <li>■ A portion of the Estuary from the mouth to the shed was surveyed over a period of 3 hours to actively search for feeding and roosting waders.</li> <li>■ Detailed habitat assessments were also undertaken throughout GKI.</li> </ul> <p>Central Queensland University (CQE) undertook bird surveys on GKI between 6 – 8 October 2010 and 21-25 March 2011. CQU bird surveys involved the traversing of the main development footprint by foot and electric vehicle with regular stops made to look and listen for the presence of birds (point searches). Opportunistic sightings between stop points were also recorded. All beaches and rocky headlands were surveyed for birds during a full circuit of the island by boat on Thursday 7th October.</p>	



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