NATURAL ENVIRONMENT DECISION SUPPORT (NEDS) SYSTEM PHASE 2: CREATION, REVISION AND ENHANCEMENT OF VEGETATION AND HABITAT SPATIAL DATA LAYERS

Report prepared for Redlands City Council

BAAM ECOLOGICAL CONSULTANTS

This page has been intentionally left blank for double sided printing purposes

Document Control Sheet

File Number: 0015-060

Project Manager: Chris Spain

Client: Redland City Council

Project Title: Natural Environment Decision Support (NEDS) system Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers

Project Report Author/s: Chris Spain, Jenni Timbs, Fatih Duh, Lui Weber, Ko Oishi

Project Mapping Author/s: Chris Spain, Maree Gilbert, Alisha Christie, Adam Abbott, Vladimir Wingate

Project Spatial Model Author/s: Fatih Duh, Chris Spain

Project Summary: NEDS is a spatial model expressing conservation value. For phase 2 of the project, existing spatial data layers were revised or enhanced and new layers were created. Supported by ground truthing, a new vegetation dataset for Redland City has been created, utilising a tree mask derived from LiDAR data. A habitat layer was created by determining the potential presence of significant species through habitat associations and historical records.

Draft Preparation History

Draft	Date Draft Completed	Checked By	Issued By
0015-061 Draft A	31/5/2013	Paulette Jones	Chris Spain

Revision/Checking History Track

Version	Date Issued	Checked By	Issued By
Version 0	11/07/2013	Chris Spain	Chris Spain

Destination	Dispatch History					
		Date Dispatched		Date Dispatched		Date Dispatched
Client Copy 1 – digital	A	31/5/2013	0	11/07/2013		
Client Copy 1 – hard copy						
PDF server	A	31/5/2013	0	11/07/2013		
PDF backup – archived disc/tape	A	31/5/2013	0	11/07/2013		
Hard copy – BAAM library						

NOTICE TO USERS OF THIS REPORT

Purpose of Report

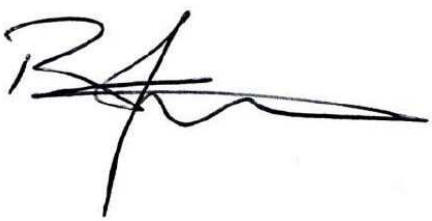
Biodiversity Assessment and Management Pty Ltd has produced this report in its capacity as consultants for and on the request of Redland City Council (the "**Client**") for the sole purpose of reporting on Natural Environment Decision Support (NEDS) system Phase 2 (the "**Specified Purpose**"). This information and any recommendations in this report are particular to the Specified Purpose and are based on facts, matters and circumstances particular to the subject matter of the report and the Specified Purpose at the time of production. This report is not to be used, nor is it suitable, for any purpose other than the Specified Purpose. Biodiversity Assessment and Management Pty Ltd disclaims all liability for any loss and/or damage whatsoever arising either directly or indirectly as a result of any application, use or reliance upon the report for any purpose other than the Specified Purpose.

This report has been produced solely for the benefit of the Client. Biodiversity Assessment and Management Pty Ltd does not accept that a duty of care is owed to any party other than the Client. This report is not to be used by any third party other than as authorised in writing by Biodiversity Assessment and Management Pty Ltd and any such use shall continue to be limited to the Specified Purpose. Further, Biodiversity Assessment and Management Pty Ltd does not make any warranty, express or implied, or assume any legal liability or responsibility for any third party's use in whole or in part of the report or application or use of any other information or process disclosed in this report and to the full extent allowed by law excludes liability in contract, tort or otherwise, for any loss or damage sustained by any person or body corporate arising from or in connection with the supply or use of the whole part of the report through any cause whatsoever.

Biodiversity Assessment and Management Pty Ltd has used information provided to it by the Client and governmental registers, databases, departments and agencies in the preparation of this report. Biodiversity Assessment and Management Pty Ltd does not know, nor does it have any reason to suspect, that the information provided to it was false, inaccurate, incomplete or misleading at the time of its receipt. This report is supplied on the basis that while Biodiversity Assessment and Management Pty Ltd believes all the information in it is deemed reliable at the time of publication, it does not warrant its accuracy or completeness and to the full extent allowed by law excludes liability in contract, tort or otherwise, for any loss or damage sustained by any person or body corporate arising from or in connection with the supply or use of The whole or any part of the information in this report through any cause whatsoever.

Signed on behalf of
Biodiversity Assessment and Management Pty Ltd

Date: 11/7/2013



Managing Director

EXECUTIVE SUMMARY

The Natural Environment Decision Support (NEDS) system is a spatial model designed and developed to provide an expression of conservation value within the Redland City. In Phase 1 of NEDS, the system was developed and implemented. Phase 2, reported here, involved a number of changes to the spatial layers used in the NEDS model:

- the replacement of the State RE layers with refined RE mapping;
- the creation of a new additional layer, the Species Habitat Layer, created using a new model—the Species Habitat Model–and making use of the linework and attributes of the new vegetation layers, plus an additional non-RE habitat layer; and
- the augmentation of the dataset used to make the Species Record Layer, and the integration of this layer into the Species Habitat Layer.

BAAM created the RE mapping products using LiDAR, aerial photo interpretation and field data. These can now replace the State RE mapping in NEDS over their mapped extent. BAAM also included the non-RE layer which has resulted in a detailed dataset capturing a range of habitats not associated with the RE framework.

The Species Habitat Layer presents a ‘heat map’ of aggregate habitat values for conservation significant flora and fauna species. Habitat polygon scores ranged from 0–699. Overall, the map highlights the importance of riparian areas, coastal fragments, and the vegetation complexes of the Southern Moreton Bay Islands. The Species Habitat Layer can now be incorporated into NEDS, providing an expression of conservation significant species habitat values in Redland City.

Future work required on these new layers includes field work and data collation, additional mapping and attribution, and refinements to the Species Habitat Model. A future Phase of NEDS should also replace the two remaining State-derived dataset in NEDS (BPA mapping and Wetlands), using the mapping products developed in Phase 2.

NATURAL ENVIRONMENT DECISION SUPPORT (NEDS) SYSTEM PHASE 2: CREATION, REVISION AND ENHANCEMENT OF VEGETATION AND HABITAT SPATIAL DATA LAYERS

Table of Contents

List of Figures

List of Appendices

List of Terms and Abbreviations

BAAM	Biodiversity Assessment and Management Pty Ltd
BPA	Biodiversity Planning Assessment
DEHP	Department of Environment and Heritage Protection
DSEWPAC	Department of Sustainability, Environment, Water, Population and Communities
DSITIA	Department of Science, Information, Technology, Innovation and the Arts
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
EPA	Queensland's Department of Environment and Heritage Protection (former DERM)
EVNT	Endangered, Vulnerable, Near Threatened
IUCN	International Union for Conservation of Nature
LiDAR	'Light Detection and Ranging' – a remote sensing method that uses light in the form of a pulsed laser to measure ranges (variable distances) to the Earth.
NEDS system	Natural Environment Decision Support system
NSI	North Stradbroke Island
NC Act	Queensland's *Nature Conservation Act 1992*
Python Script	A computer language
RCC	Redland City Council
RE	Regional Ecosystems
SEQ	South East Queensland
VM Act	Queensland's *Vegetation Management Act 1999*

1.0 INTRODUCTION

1.1. BACKGROUND AND PURPOSE

The Natural Environment Decision Support (NEDS) system is a spatial model designed and developed to provide an expression of conservation value within the Redland City. Biodiversity Assessment and Management (BAAM) Pty Ltd has prepared this report for the purpose of documenting the enhancement of NEDS, including the creation and revision of vegetation, habitat and significant species spatial data layers of Redland City.

The initial phase of the NEDS project involved an assessment of literature and government initiatives (Stage 1—AECOM and BAAM 2011); the design, development and creation of the NEDS system (Stage 2—AECOM and BAAM 2012a); a review and initial ground-truthing (Stage 3—AECOM and BAAM 2012b); and implementation of training, maintenance and support strategies for NEDS (Stage 4).

Following completion of NEDS Phase 1, it was apparent that while NEDS is informative in relation to the datasets it uses, alternative and supplementary data was required to provide a suitable level of detail for conservation values mapped in NEDS. In particular, the State-based datasets used in NEDS are insufficiently accurate and/or created at an inappropriate scale for the required end use. Hence localised data layers managed by RCC are required to resolve these issues and fill gaps.

The second phase of NEDS (NEDS Phase 2), reported here, involved a number of changes to the spatial layers used in the NEDS model. Specifically:

- the replacement of two existing vegetation layers with new layers:
  - The Regional Ecosystem v6.0b layer was replaced by the NEDS Remnant Regional Ecosystem layer;
  - The High Value Regrowth v2 layer was replaced by the NEDS Regrowth Regional Ecosystem layer;
- the creation of a new additional layer, the Species Habitat Layer, created using a new model—the Species Habitat Model–and making use of the linework and attributes of the new vegetation layers, plus an additional non-RE habitat layer; and
- the augmentation of the dataset used to make the Species Record Layer, and the integration of this layer into the Species Habitat Layer.

The changes to NEDS model layers made between Phase 1 and Phase 2 are summarised in **Table 1.1**.

In order to achieve the aims of the project, four main sets of activities were undertaken:

- field survey and field data analyses;
- vegetation mapping, spatial data geoprocessing, and spatial dataset augmentation;
- auxiliary spatial model creation; and
- reporting and data management.

This report details the rationale, methodologies, findings, limitations and deliverables of Phase 2. It also makes recommendations for Phase 3 and subsequent refinements.

2.0 METHODOLOGY

BAAM's methodology focused on delivering the fundamentals of each new or refined element of NEDS Phase 2 so as to provide as solid basis to which new data can be added and further refinements can be made.

2.1. FIRST REVISION OF REMNANT AND REGROWTH VEGETATION LAYERS

Current remnant and regrowth mapping used in NEDS consists of Regional Ecosystems (RE) Version 6.0 and High Value Regrowth Vegetation Version 2, respectively. While such datasets are appropriate for broad-scale land planning purposes, greater consistency and accuracy can only be achieved from finer-scale mapping targeted at local-level planning and management (Lawson 2007; Table 5 in Neldner *et al.* 2005). Updating the vegetation mapping for the model to be more informative in terms of conservation value required the creation of completely new datasets, derived by BAAM using LiDAR, aerial photo interpretation and field data from a tailored NEDS Phase 2 field investigation (**Section 2.2.1**), and Phase 1 data (AECOM and BAAM 2012a).

Table 1.1 NEDS spatial layer changes between Phase 1 and 2

NEDS Phase 1					NEDS Phase 2			
Layer Name	**Origin**	**Scale**	**Derivation Method**	**Revision Type**	**Layer Name**	**Origin**	**Scale**	**Derivation Method**
Regional Ecosystem v6.0b	State dataset (Queensland Herbarium).	1:50000	See Neldner *et al.* 2004 and layer metadata.	Replacement	NEDS Remnant Vegetation	BAAM	~1:5000	Vegetation mask polygonisation, remote sensing interpretation, geology mapping and field data (**Section 2.2**).
High Value Regrowth v2	State dataset (Department of Environment and Resource Management), modified by AECOM.	1:100 000	Layer was attributed with RE data through a spatial join with the RE preclear layer (AECOM and BAAM 2012b). Also see layer metadata.	Replacement	NEDS Regrowth Vegetation	BAAM	~1:5000	As per NEDS Remnant Vegetation (**Section 2.2**).
No analogous layer	N/A	N/A	N/A	Creation	Species Habitat Layer	BAAM	~1:5000	Creation of a Species Habitat Model, using Remnant and Regrowth Vegetation layers (**Section 2.2**) plus a non-RE habitats layer (**Section 2.3.2**), in concert with habitat association and scoring tables.
Species Record Layer	BAAM, with buffered point data derived from HERBRECS, Queensland Museum, BAAM and RCC.	N/A	Appropriately concatenated, unioned and dissolved buffered points of historical records (AECOM and BAAM 2012b).	Integration	Species Habitat Layer	BAAM, incorporating buffered point data derived from HERBRECS, Queensland Museum, BAAM and RCC.	~1:5000	Buffered point component of this hybrid dataset which also includes the habitat polygons described above (**Section 2.2**).

2.1.1. Vegetation Assessments

While NEDS Phase 2 was predominantly a desktop exercise, some limited field verification was undertaken to inform the creation of the NEDS Phase 2 products. In particular, the approach focused on inspection of field elements that would assist vegetation mapping. In addition to vegetation assessments undertaken for RE mapping purposes, surveys targeting Koalas and their habitat were also undertaken in part to inform Koala habitat layer. Habitat notes from these surveys were also used for to inform the RE mapping exercise. The details of the Koala survey are presented in a sister report (BAAM 2013).

Following the identification of priority areas (in consultation with RCC), a specially tailored field survey was carried out. Nine field investigations were undertaken in bouts of 1–3 days during February to April 2013 by Chris Spain (Principal Botanist), Jenni Timbs (Project Ecologist) and Ria Zoeller (Project Botanist).

The survey approach aimed to yield data of a high standard that would have maximal utility for initiating the process of accurate vegetation mapping and the creation of the Species Habitat Layer including integration of the Species Record Layer. Survey techniques encompassed community-level vegetation assessments as well as opportunistic searches for species of conservation significance within specific habitats.

Flora assessments were conducted using best practice botanical sampling and methodologies (Neldner *et al.* 2012), and captured a range of the RE types within the Redland City.

Within State government datasets, the Redland City is mapped as containing 28,983 ha of remnant vegetation and 8,218 ha of high value regrowth vegetation. With 47 RE vegetation communities mapped as present within Redland City, only a sample structurally assessed during NEDS Phase 2, while 57% were ground truthed (**Table 2.1**). Priority was given to areas that were considered most informative to the overall mapping process including priority areas identified by RCC. A particular focus was pairs or groups of regional ecosystems (REs) within the same land zone with differing dominant floristic composition but exhibiting similar tree heights and aerial photo-pattern. Such communities are difficult to differentiate through remote sensing and therefore warranted priority field investigation. This included for example vegetation communities within the RE 12.11.5 open-forest complex and associated REs 12.11.23 and 12.11.3.

Tertiary sites (Neldner *et al.* 2012) offered an optimal level of site detail to provide rigorous data on structure and floristic composition. Transects (10 x 50 m) were used to assess the species structure, assemblage, diversity and abundance of dominant and conspicuous plant species at each survey site. Assessments consisted of 12 tertiary-level assessments within 11 Remnant RE vegetation communities and one Regrowth RE vegetation community (**Figure 2.1**, **Table 2.1**).

The quaternary site surveys using methods specified in Neldner *et al*. (2012) aimed to maximise site coverage of the target study areas to enhance the accuracy of vegetation mapping. Survey activities consisted of traverses through each focal study area, usually on foot. Additional rapid assessments were undertaken during vehicle transit among focal study areas and to or from the BAAM head office. Assessments consisted of rapid assessments at 259 quaternary-level vegetation sites across 26 REs (**Figure 2.1**) using a personal digital assistant (PDA—a handheld computer) with global positioning system (GPS) capability to fix the site positions. Data were recorded using ArcPad™ v. 10.0 (ESRI®) loaded with relevant geographic information system (GIS) layers. In later field bouts, drafts of the NEDS vegetation layers were taken into the field for direct verification. For the areas surveyed, this ensured boundary identifications were accurate and aerial imagery interpretation was effective. Data collected at each quaternary site consisted of:

- land unit types present;
- dominant flora in canopy; and
- a qualitative description of community structure.

The GPS points from the quaternary and tertiary sites assisted with vegetation pattern interpretation and subsequent mapping. Maps were produced using the ArcMap® v. 10 GIS software package (ESRI®).

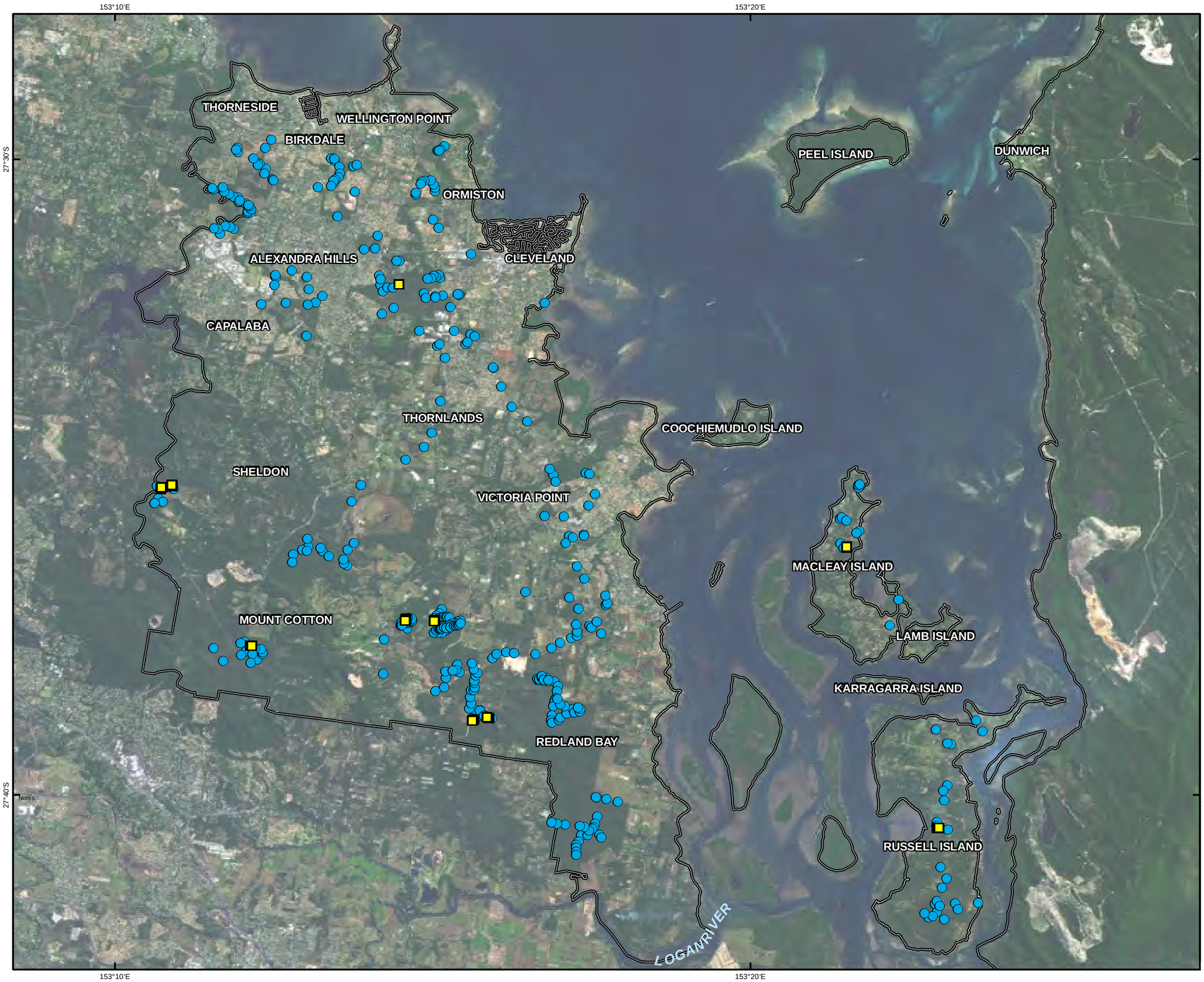


Figure: **2-1**

Title:

Vegetation Assessment Sites

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Assessment level

- Tertiary
- Quaternary
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009)
supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:105,000 at A3

0 0.5 1 2 3 4 5
Kilometers

Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

Table 2.1 Summary of Vegetation Field Survey Effort

RE	Field survey effort- NEDS Phase 1		Field survey effort- NEDS Phase 2		Total field survey effort
	Quaternary	Tertiary	Quaternary	Tertiary	
Land zone 1: Tidal Flats and Beaches					
12.1.1	2	0	3	0	5
12.1.2	0	0	2	0	2
12.1.3	0	0	6	0	6
Land zone 2: Coastal Dunes					
12.2.1	0	0	0	0	0
12.2.2	0	0	4	0	4
12.2.5	2	0	0	0	2
12.2.5a	0	0	0	1	1
12.2.6	1	0	0	0	1
12.2.7	2	0	1	0	3
12.2.8	0	0	1	0	1
12.2.9	0	0	0	0	0
12.2.10	1	0	0	0	1
12.2.12	0	0	0	0	0
12.2.13	1	0	0	0	1
12.2.14	0	0	0	0	0
12.2.15	1	0	3	0	4
12.2.15f	0	0	0	0	0
12.2.16	0	0	0	0	0
Land zone 3: Alluvial River and Creek Flats					
12.3.1	0	0	1	1	2
12.3.3d	2	0	0	0	2
12.3.5	10	0	14	0	24
12.3.5a	0	0	0	0	0
12.3.6	25	0	32	0	57
12.3.8	0	0	1	0	1
12.3.11	5	0	20	1	26
12.3.11a	0	0	0	0	0
12.3.12	0	0	3	0	3
Land zone 5: Uniform sand plains					
12.5.2	1	0	5	0	6
12.5.3	9	0	16	1	26
12.5.6c	0	0	2	0	2
12.5.9	0	0	2	1	3
Land zone 9-10: Fine and course grained sedimentary rocks					
12.9-10.17c	0	0	0	0	0
12.9-10.17d	0	0	0	0	0
12.9-10.19a	0	0	0	0	0
12.9-10.4	11	0	13	1	25
Land zone 11: Metamorphic Hills and Lowlands					
12.11.3	0	0	10	1	11
12.11.3a	0	0	1	0	1
12.11.5	0	0	1	0	1
12.11.5a	0	0	5	1	6
12.11.5e	1	0	2	2	5

RE	Field survey effort- NEDS Phase 1		Field survey effort- NEDS Phase 2		Total field survey effort
	Quaternary	Tertiary	Quaternary	Tertiary	
12.11.5h	6	0	9	1	16
12.11.5j	8	0	31	0	39
12.11.5k	0	0	5	0	5
12.11.10	0	0	0	0	0
12.11.23	1	0	66	1	68
Land zone 12: Granitic Hills and Lowlands					
12.12.14	0	0	0	0	0
12.12.19	0	0	0	0	0
Total	89	0	259	12	**360**

2.1.2. Mapping and attribution

Mapping was carried at a scale of 1: 5000[1]. However, due to the limited amount of field assessment work that could be undertaken for this phase of the project, insufficient field observations were carried out to achieve recommended minimum ground observation density for this mapping scale (Neldner *et al*. 2012). Resultantly, areas that were ground-truthed during the fieldwork phase (or had been previously ground-truthed by BAAM) were attributed with a higher accuracy rating than areas for which on-the-ground data are not available, and were sometimes also mapped at a higher resolution. As per the 1:5000 mapping scale, the minimum size of an isolated polygon in the dataset was 500 m^2 (after BRS 2002). However following Neldner *et al*. 2012, the size limits refers to vegetation cover. Therefore a smaller individual polygon of a regional ecosystem was delineated where necessary if it was contiguous with a larger area of vegetation. The mapping scale and minimum polygon size threshold was selected on the basis of the minimum area that could be structurally assessed using quaternary or tertiary methodology (Neldner *et al.* 2012).

The initial primary drivers of the revised remnant and regrowth vegetation linework were derived from LiDAR. BAAM made particular use of the vegetation mask created during NEDS Phase 1 (AECOM and BAAM 2012a). The data from the tree mask were polygonised, summarising the data rich LiDAR information into a usable format for vegetation mapping. This was done using the program ET GeoWizards, which is an ArcMap extension that increases geoprocessing functionality. It features a tool that creates polygons from point clusters. As per the scale mapping rules above, all polygons <500 m^2 were excluded from the dataset. Similarly, gaps within the broader of vegetation cover that were less than <500 m^2 were filled in by the surrounding polygon(s).

Further geoprocessing was then employed to generate additional polygons. First, the contours from the digital elevation model were used to create polygons within areas between 0 m and 1.75 m height above sea level. This included many areas of Land Zone 1 as well as parts of Land Zones 2 and 3. In particular areas of mud flat and intertidal zone were captured as well as low mangroves (parts of RE 12.1.3) as well as RE 12.1.2 (tidal plain and saltpan vegetation). Intertidal and mudflat polygons that did not correspond to an RE were later moved to the Non-RE Habitat Layer (**Section 2.3.2**).

In addition to the vegetation mask (AECOM and BAAM 2012b), a digital elevation model had also been derived from the LiDAR data, and BAAM used this to derive two additional datasets to inform the vegetation mapping process—a slope raster and an aspect raster. These, in combination with geology and soil mapping, remnant, mature regrowth and pre-clearing State RE mapping, and field captured point data were used to inform the next phase of the vegetation mapping exercise.

Linework was manually edited, being informed by high resolution aerial imagery and field data points (**Section 2.1**) including Koala habitat field observations (BAAM 2013). This involved extensive manual linework edits and aerial photo interpretation. As aerial imagery was not made available for North Stradbroke Island (NSI) and Peel Island during the main vegetation mapping phase of the project, mapping was not revised for these areas as part of NEDS Phase 2.

For mapping areas of vegetation along roads where ground truthing had not been carried out, Google Street View was used to visually assess dominant species. However this approach was limited to specific points of interest.

Each polygon was attributed with the RE vegetation types contained within it. Where vegetation patterning warranted that two or more vegetation communities be mapped within the same polygon, the percentage contribution of each community was specified. In addition, two mapping confidence ratings were attributed; one for linework and one for RE designation. Mapping attribution was carried out manually for the vast majority of remnant polygons, using aerial imagery interpretation and field data. For a small number of polygons, attribution was carried out using a Python script which intersected attributes from the State Preclear RE layer following the mapping rules of Neldner *et al.* 2012. Due to the large number of regrowth vegetation patches, often including vegetation of a young age, a larger number of polygons were attributed in this way in the Regrowth dataset. This is reflected in the lower attribute accuracy rating for these polygons.

[1] See also 9 in BRS (2002).This scale applies to the majority of mapped areas. The draft mapping as delivered in Phase 2 contains attribution mosaics that are inconsistent with the 1:5000 scale.

Biodiversity status was ascribed using Version 7.1 of the Regional Ecosystem Description Database (Queensland Herbarium 2013). Following Neldner *et al.* 2012, where two or more vegetation communities formed a mosaic within the one polygon, the entire polygon was always ascribed the status of the community with the highest conservation status. Like the State RE layers previously used, Biodiversity Status forms the basis of scoring the BAAM RE layers within the NEDS model (DEHP 2013). Biodiversity Status is based on an assessment of the condition of remnant vegetation as well as remnant extent. It is therefore a more comprehensive assessment conservation status than VM Act status, which considers remnant extent only. As NEDS is a conservation value model, Biodiversity Status was the most suitable to use. However, the status is ascribed on the basis of condition and extent across the entire range of an RE. It therefore does not take into account local conservation significance, which is a desirable aspect to capture in the NEDS framework. To capture local biodiversity significance of vegetation communities, a criterion was added to the model, based on the concept of 'critically limited' regional ecosystems (DERM, 2011) but modified for the local government scale. Critically limited REs within Redland City were thus defined as: (1a) having a remnant extent below 30% of their pre-clearing extent and (1b) that are less than 500 hectares in total extent, or (2) that have a remnant extent less than 100 hectares, or that are at risk of the remnant extent falling below 100 hectares.[2] As the revised BAAM mapping does not have a preclear component, the State mapping datasets were used to assess the criteria for critically limited REs within Redland City.

Figure 2.2 summarises the steps taken to create the remnant and regrowth vegetation layers, and the datasets that contributed to or informed it.

Remnant woody vegetation in Queensland is defined by Neldner *et al.* 2012 as 'vegetation, part of which forms the predominant canopy of the vegetation—

(a) covering more than 50% of the undisturbed predominant canopy; and

(b) averaging more than 70% of the vegetation's undisturbed height; and

(c) composed of species characteristic of the vegetation's undisturbed predominant canopy.

Validation of this definition in practice requires a structural assessment at the potentially non-remnant site and comparison with undisturbed local analogues (preferably replicated). As NEDS Phase 2 was predominantly a desktop exercise (but see **Section 2.1**) this was not practical. Instead, remnant status was ascribed in potentially ambiguous cases by comparison with the same vegetation communities that were unambiguously remnant. In the absence of field data, comparisons were made using remote sensing data, in particular the tree mask and aerial imagery interpretation. In addition, guidance was taken from the State Remnant RE layer, which was assumed to have been created with some degree of historical photo interpretation. The differences in scale between the two mapping datasets were taken into account for this exercise.

Vegetation that had regrown after clearing or been heavily thinned was mapped as regrowth vegetation. The revised regrowth layer was mapped to contain vegetation of all ages recognisably attributed to a native ecosystem, but non-remnant. It does not correspond to the State High Value Regrowth or Mature Regrowth mapping definitions as these datasets define regrowth as REs that have not been cleared since 31 December 1989. BAAM took a broader definition of regrowth than this because NEDS is a conservation value model and regrowth younger than this age is still of conservation value. In addition, determining the age of regrowth requires extensive historical imagery interpretation and/or site structural assessments, both of which were beyond the scope of NEDS Phase 2.

As the revised vegetation layers are based on LiDAR data from 25/03/2009 and 09/06/2009, they are versioned to this date and do not include any vegetation changes after this.

2.2. CREATION OF THE SPECIES HABITAT LAYER

One of the shortcomings of the NEDS model highlighted by the fieldwork component of Phase 1 was the lack of habitat data, particularly in relation to significant species, such as those that are endangered, vulnerable or threatened. In order to express this key

[2] These criteria relate to extent within Redland City.

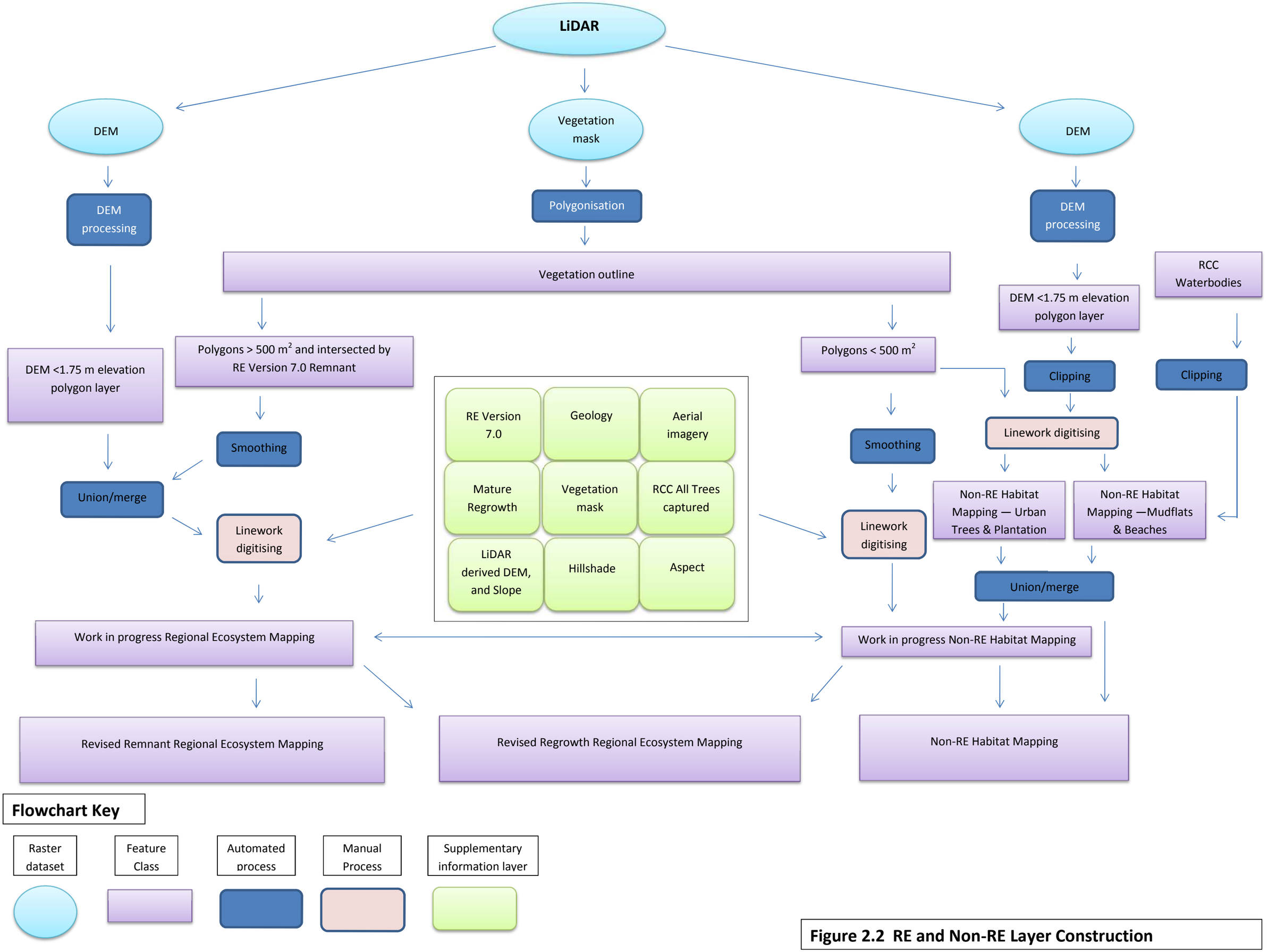


Figure 2.2 RE and Non-RE Layer Construction

conservation value, BAAM created a new layer, the Species Habitat Layer. This layer is itself created using a new spatial model, developed, designed and implemented during Phase 2 to operate as part of the overall NEDS system. The Species Habitat Model scores habitats based on the conservation significant species that are associated with them (on a presence/absence basis), and maps the results. It also makes use of known species records in a similar but more refined way as the Species Record Layer used in Phase 1. This known record component is discussed in **Section 2.2.4**. The resultant model output is the Species Habitat Layer.

As spatial inputs, the model uses the revised remnant regrowth RE layers (refer **Section 2.2**) plus an additional new layer of non-RE habitat layer (**Section 2.2.2**) to create a species habitat layer by aligning REs and other habitat types with the conservation significant species associated with them. The Species Habitat Layer allows the interrogation of the aggregate significant species value of an area of habitat within the Redland City. Specifically, it expresses how many, and what species are associated in a habitat polygon. Each individual species is weighted by its aggregate conservation status, and historical records are also utilised. The summation of these values across all species associated with the polygon gives an overall score for that polygon.

The NEDS model allows for the input of seven Primary Layers. As the Species Record Layer has been integrated into the Species Habitat Layer (see **Section 2.4** below) it will replace it in the model. Resultantly the layer allocation currently set aside for a pre-defined optional layer (see AECOM and BAAM 2012b) can be retained for this purpose in the revised NEDS model.

The NEDS Koala layer, which can also be used to inform the 2015 Redland City Planning Scheme, was created using the same habitat association methodology as the Species Habitat layer, but includes some modifications that increase the sensitivity of habitat suitability mapping for Koala. Specifically, it grades Koala Habitats into three rankings of suitability, rather than just specifying presence/absence. The details for the creation of this layer are reported in BAAM (2013). As the NEDS Koala layer provides a more nuanced habitat mapping of this species than the Koala mapping in the Species Habitat model, it is recommended that it be used as the pre-defined optional layer in the NEDS model. As such, Koala is not included in the Species Habitat layer. Instead, the significance of Koala in relation to other species can be weighted using the weighting tables in the overall NEDS model (AECOM and BAAM 2012a). For planning and management scenarios where the Species Habitat Layer is to be used as a standalone layer, outside NEDS, Koala can always be added by modifying the input tables used in the Species Habitat Model—**Appendix 1**).

The species that are represented in the Species Habitat Model are identified in **Section 2.3.3.**

2.2.1. Use of remnant and regrowth vegetation layers

The BAAM remnant and regrowth RE layers (**Section 2.1**) were used to map native vegetation habitats. This was achieved by creating associations between the mapped RE vegetation community types and the species in the model (**Section 2.2.3)**. As such, these two revised RE vegetation layers, together with the non-RE habitat layer (**Section 2.3.2**) form the spatial component of the Species Habitat Layer.

Together these layers make up the main input for the model—the Habitat Feature Class (**Figure 2.3**). It contains all the spatial data for the model other than known records, and represents the layout of the map but without any associated species information.

2.2.2. Creation of non-RE habitat layer

Native species can inhabit a variety of anthropogenic landscapes (Matthews *et al.* 2004), and such habitats may be of high importance to individual EVNT or otherwise significant species due to the diverse range of natural and artificial habitat niches and conditions (Garden *et al.* 2006). For example, individual eucalypts in an urban environment may act as important Koala refuge (Catterall, 1993). Similarly, Tusked Frog has been recorded in degraded ponds and polluted drainage lines (Brisbane City Council, 2010). For species such as Glossy Black -Cockatoos, patches of Black She-oak growing in urban backyards and parks may be some of the very few remaining food source (Glossy Black Conservancy, 2010). Whilst coastal tidal areas in south-east Queensland are highly developed, they too provide important feeding ground for Eastern Curlew and other migratory shorebirds

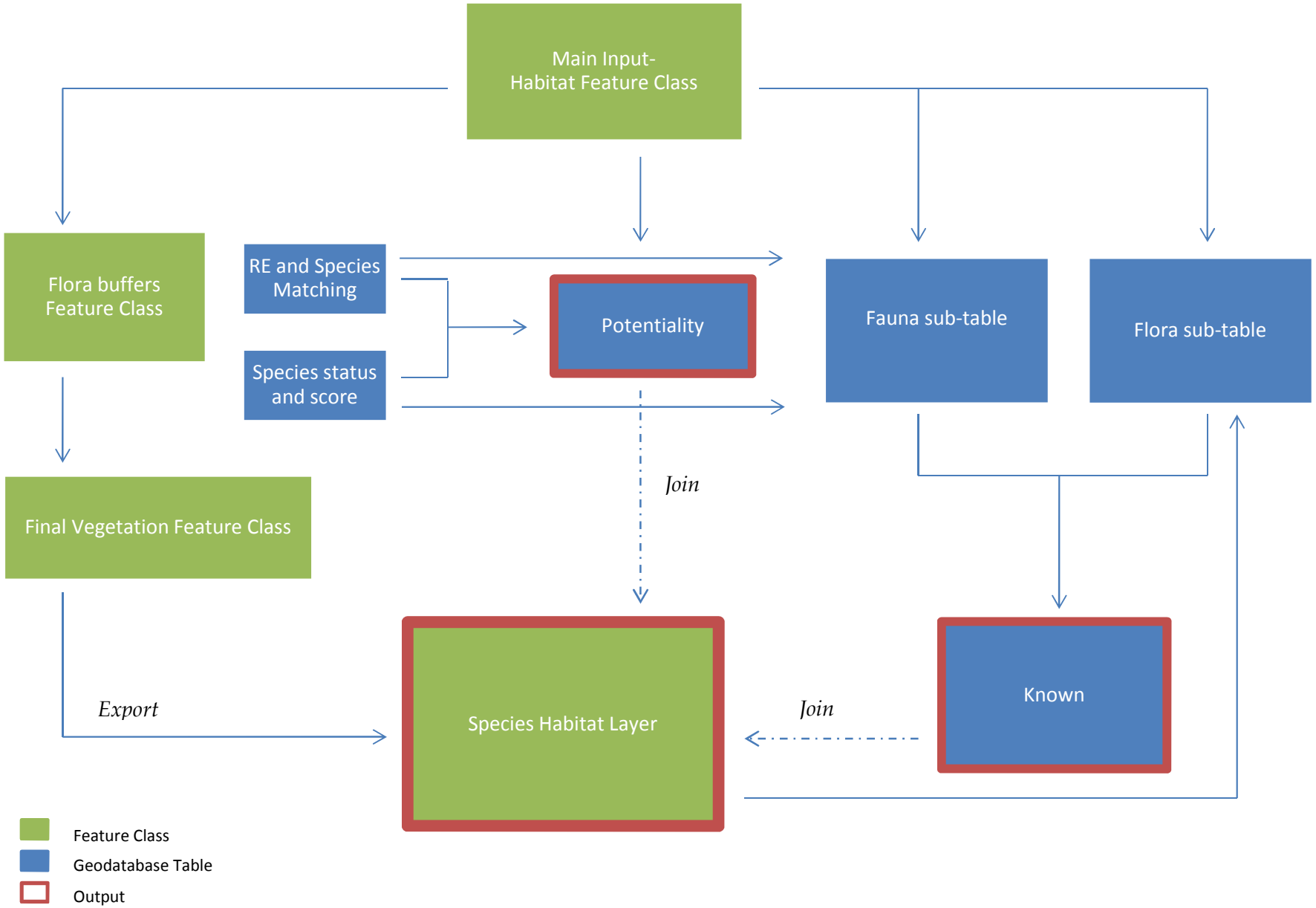


Figure 2.3 Species Habitat Model

(Congdon & Catterall, 1994), and as such, their habitats may not be captured by the RE framework, including unvegetated intertidal flats and beach faces.

For this reason, the habitat model component of the overall NEDS model needed a mapping layer to account for features not captured in the native vegetation layers (remnant and regrowth REs). BAAM therefore created the non-RE layer to attribute and delimitate anthropogenic habitats and natural terrestrial or semi-terrestrial habitats either not vegetated or vegetated by non-terrestrial species. The habitat categories contained in this layer are specified in **Table 2.2**. Future refinements to this layer may include adding more habitat types as the need arises due to the adding of more species to the layer, or more information about the habitat preferences of the species being forthcoming.

Table 2.2 Habitat Categories of Vegetation Represented in the Non-RE Habitat Layer

Attribute	Attribute designation in layer	Included Habitat features	Linework source
Woody vegetation that is not a Regional Ecosystem	urban_trees	• Gardens • Street plantings • Semi-natural areas dominated by exotic species	• Vegetation Mask polygonisation • Manual linework
Plantations	plant	• Pine and mixed timber plantations • Orchards	• Vegetation Mask polygonisation • Manual linework
Waterbodies not associated with a Regional Ecosystem	waterbody	• Drainage lines lacking native vegetation • Farm dams • Reservoirs • Estuaries	• RCC Waterbodies layer • manual linework • Digital elevation model polygonisation • vegetation mask polygonisation (for estuary edges
Beaches	beach	• Beach fronts	• Digital elevation model polygonisation • Manual linework
Intertidal flats that are not a Regional Ecosystem	intertidal_flat	• Marine plains • Intertidal flats • Mud flats	• Digital elevation model polygonisation • Manual linework

The most common habitat captured in the non-RE habitat layer was urban and peri-urban gardens and street or parkland plantings and woody weed-dominated areas. Collectively they are given the designation ‘urban trees’. Where primary or secondary food trees are present in the vegetation matrix, this habitat type is known to be of significance to Koalas in Redland City, and is used in the Koala Habitat Layer (BAAM 2013). This habitat or components of it are likely to be important for a number of other conservation significant animals and also possibly some plant taxa although none are currently associated with it in the model. Semi-natural areas dominated by exotic species are also included in this designation, for example areas dominated by Camphor Laurel *Cinnamomum camphora*. Mapping for this habitat was created in a similar way to the RE mapping, but did not use all of the same datasets to inform it (**Figure 2.2**).

An additional habitat designation for plantation trees is also incorporated into this layer, and was derived in the same manner as urban trees (**Figure 2.2**).

Drains and other artificial waterbodies were primarily captured using the Redland City waterbody mapping, with areas intersecting REs clipped out and with additional manual digitisation assisted by aerial imagery interpretation (**Figure 2.2**).

Beach and intertidal flat polygons were created using the digital elevation model, in the manner described in **Section 2.1.2**.

As noted in **Section 2.3.1**, the non-RE habitat coupled with the two revised RE vegetation layers form the spatial component of the Species Habitat Layer. They have been developed with the eventual aim in mind that together they will capture all habitat types, both natural and anthropogenic, with which conservation significant species are associated.

2.2.3. Species Selection and Habitat Scoring

From a global perspective Redland City is within the larger area recently recognised as the Forests of East Australia Global Biodiversity Hotspot. This hotspot stretches discontinuously from Cooktown to Wollongong, contains 8,257 named native plant species of which 2,144 are endemic and has lost 77% of all native vegetation (Williams *et al.* 2011). To be a global hotspot an area must contain more than 0.5% of the earth's plant species as endemics and have more than 70% of native vegetation cleared. The 35 global hotspots together contain more than 50% of all plant species on earth and 42% of vertebrate animals in only 16% of the Earth's land area, sadly 85% of these areas have been cleared of vegetation and so almost half of the Earth's plants and vertebrate animals survive in only 2.3% of the land area. Conservation of global biodiversity hotspots is critically important to global conservation efforts and money spent conserving these areas is likely to save more species than conservation elsewhere (Mittermeyer *et al*. 2011).

At a regional level Southeast Queensland is a highly biodiverse region (QLD Museum, 2003; Queensland / Commonwealth CRA RFA, 1999) containing many threatened plants and animals (Queensland / Commonwealth CRA RFA, 1999) as well as well as a number of species endemic to the region (DSEWPaC, 2009) some of which are restricted to Redland City (BAAM 2010, L. Weber and C. Spain *unpublished data*).

Understanding and visualising the distribution and habitat associations of conservation significant species is highly important in making prudent land management decisions, however this was previously not captured in the NEDS model (AECOM and BAAM 2012b). To rectify this, all conservation significant species known or likely to occur within the Redland City for which habitat associations could be ascribed were identified. This is with the exception of Koala, which is treated separately (see beginning of this section and BAAM 2013). A total of 47 species were included, incorporating those listed as threatened or near threatened under Queensland or Federal legislation, 'Back on Track' priority framework species, and those species only known from or Endemic to the Redland City (**Table 2.3**). The species comprise of 21 plants, 24 vertebrates and 3 invertebrate species. Using in-house and external expert opinion, plus a literature and data review, habitat associations were derived for each species (**Table 2.3)**. This included compiling the RE associations of all NC Act listed species that have essential habitat within the Redland City. RE associations for all species were then compiled using expert knowledge (**Table 2.4**). Additional species can easily be added to the model in the future as new records or information on habitat associations become available. This research conducted by BAAM indicates that the current significant species list used by Council requires updating. It is recommended that the list presented in **Table 2.3** replace the current list.

Each species was assigned a number. This was to facilitate a shorthand designation in the geodatabase tables (**Section 2.3.5**) and also to track deletion or addition of species from the dataset and to account for changes in taxonomy.

For each species, four numerical scores were attributed, based on NC Act and EPBC Act status, as well as Back on Track framework designation as to whether the species was regarded as endemic to Redland City based on current knowledge (**Table 2.3**). Higher scores were given to species that were classified in higher threat categories at either the State or Federal level. The same score was given to Critical and High priority species under the Back on Track framework, as these categories are regarded as poorly defined. Endemic species were scored highly because Redland City is likely to represent the only known or remaining habitat globally for these species, and so their effective conservation in the Redland City

Table 2.3 Conservation Significant Species occurring in Redland City, excluding Koala

Species ID	Species Number	Family	Scientific Name	Common Name	Type	Status			
						EPBC Act	NC Act	Back On Track	Endemic
484	SP001	Mimosaceae	*Acacia baueri* subsp. *baueri*	Tiny Wattle	flora		V	H	
8	SP002	Accipitridae	*Accipiter novaehollandiae*	Grey/White Goshawk	fauna		NT		
12	SP003	Orchidaceae	*Acrodipsas illidgei*	Illidge's Ant-blue Butterfly	fauna		V	C	
13	SP004	Limnodynastidae	*Adelotus brevis*	Tusked Frog	fauna		V		
611	SP005	Blandfordiaceae	*Blandfordia grandiflora*	Large Christmas Bell	flora		E	H	
66	SP006	Cacatuidae	*Calyptorhynchus lathami*	Glossy Black Cockatoo	fauna	E	V		
2081	SP007	Charopidae	*Charopid* BR38	A Land Snail	fauna				X
723	SP008	Sparrmanniaceae	*Corchorus cunninghamii*	Native Jute or Cunningham's Jute	flora	E	E		
120	SP009	Myobatrachidae	*Crinia tinnula*	Wallum Froglet	fauna		V	H	
846	SP010	Rubiaceae	*Durringtonia paludosa*	Durringtonia	flora		N	C	
861	SP011	Cyperaceae	*Eleocharis difformis*	Submerged Spikerush	flora		E		X
470	SP012	Ciconiidae	*Ephippiorhynchus asiaticus*	Black-necked Stork	fauna		NT		
51	SP013	Burhinidae	*Esacus magnirostris*	Beach Stone Curlew	fauna		V	H	
955	SP014	Orchidaceae	*Genoplesium* sp. (Raby Bay J.Elsol AQ462423)	Raby Bay Midge Orchid	flora				X
2082	SP015	Charopidae	*Gyrocochlea myora*	Myora Springs Snail	fauna				X
203	SP016	Haematopodidae	*Haematopus fuliginosus*	Sooty Oystercatcher	fauna		NT		
393	SP017	Rallidae	*Lewinia pectoralis*	Lewin's Rail	fauna		NT		
2083	SP018	Hylidae	*Litoria cooloolensis*	Cooloola Tree Frog	fauna		NT		
2084	SP019	Hylidae	*Litoria freycineti*	Freycinet's Frog	fauna		V		
2085	SP020	Hylidae	*Litoria olongburensis*	OIlongburra Frog	fauna	V	V		
1861	SP021	Accipitridae	*Lophoictinia isura*	Square-tailed Kite	fauna		NT		
1135	SP022	Proteaceae	*Macadamia integrifolia*	Macadamia	flora	V	V		
1136	SP023	Proteaceae	*Macadamia tetraphylla*	Rough Shelled Macadamia	flora	V	V		
2086	SP024	Apocynaceae	*Marsdenia coronata*	Slender Milk Vine	flora	V	V		
2087	SP025	Apocynaceae	*Marsdenia longiloba*	Clear Milk Vine	flora	V	V		
2088	SP026	Juncaginaceae	*Maundia triglochinoides*	Maundia	flora		V		
1557	SP027	Myrtaceae	*Melaleuca irbyana*	Swamp Tea-tree	flora		E	H	
2089	SP028	Meliphagidae	*Melithreptus gularis*	Black-chinned Honeyeater	fauna		NT		
2090	SP029	Percichthyidae	*Nannoperca oxleyana*	Oxleyan Pygmy Perch	fauna	E	V	C	
2091	SP030	Anatidae	*Nettapus coromandelianus*	Cotton Pigmy Goose	fauna		NT		
1551	SP031	Strigidae	*Ninox strenua*	Powerful Owl	fauna		V		
300	SP032	Scolopacidae	*Numenius madagascariensis*	Eastern Curlew	fauna		NT		
1198	SP033	Asteraceae	*Olearia hygrophila*	Swamp Daisy	flora	E	E		X
2092	SP034	Papilionidae	*Ornithoptera richmondia*	Richmond Birdwing Butterfly	fauna		V	H	
2022	SP035	Polygonaceae	*Persicaria elatior*	Glandular Knotweed	flora	V	V		
1260	SP036	Orchidaceae	*Phaius australis*	Southern Swamp Orchid	flora	E	E	C	
1261	SP037	Orchidaceae	*Phaius bernaysii*	Yellow Swamp Orchid	flora	E	E	C	X
2033	SP039	Orchidaceae	*Prasophyllum exilis*	Thin Leek Orchid	flora		NT		
403	SP040	Rostratulidae	*Rostratula australis*	Australian Painted Snipe	fauna	V	V		

Species ID	Species Number	Family	Scientific Name	Common Name	Type	Status			
						EPBC Act	NC Act	Back On Track	Endemic
1397	SP041	Cyperaceae	*Schoenus scabripes*	Rough Bog Sedge	flora		NT		
418	SP042	Laridae	*Sternula albifrons*	Little Tern	fauna		E	H	
425	SP043	Anatidae	*Stictonetta naevosa*	Freckled Duck	fauna		NT		
1465	SP044	Thelypteridaceae	*Thelypteris confluens*	Marsh Fern	flora		V		
2094	SP045	Santalaceae	*Thesium australe*	Austral Toadflax	flora	V	V		
462	SP046	Tytonidae	*Tyto tenebricosa*	Greater Sooty Owl	fauna		NT		
471	SP047	Muridae	*Xeromys myoides*	False Water rat	fauna	V	V	C	
2095	SP048	Orchidaceae	*Pterostylis chaetophora*	Bug Lipped Greenhood Orchid	flora		E		

Abbreviations: 'EPBC Act'= Environment Protection and Biodiversity Conservation Act 1999, 'NC Act'= Nature Conservation Act 1992, 'Back on Track'= Back on Track species prioritisation framework, 'E' = Endangered, 'V' = Vulnerable, 'NT' = Near Threatened, 'C'= Critical under the Back on Track framework, 'H'= High priority under the Back on Track framework, 'X'= Endemic

Table 2.4 Species Habitat Associations for Conservation Significant Species of Redland City, excluding Koala

Species ID	Species Number	Species	Common Names	Kingdom	RE habitat description	Non-RE habitat description	Non RE	Regional Ecosystems
484	SP001	*Acacia baueri subsp. baueri*	Tiny Wattle	Plant	Low Dry to Moist Wallum Heath			12.2.5, 12.2.9, 12.2.12, 12.2.13, 12.3.13, 12.5.9
8	SP002	*Accipiter novaehollandiae*	The Grey Goshawk	Animal	Wooded habitats, sparse in region - concentrated on Mt Cotton - Sheldon			12.11.10, 12.11.3, 12.3.1, 12.11.23, 12.5.2, 12.2.5, 12.11.5k, 12.11.5e, 12.3.3d, 12.2.6, 12.9-10.19a, 12.11.3, 12.11.5j, 12.9-10.17d, 12.2.8, 12.3.11, 12.5.3, 12.11.3a, 12.11.5a, 12.11.23, 12.9-10.4, 12.3.11a, 12.5.6c,12.9-10.17c
12	SP003	*Acrodipsas illidgei*	Illidge's ant-blue butterfly	Animal	*Casuarina glauca* and adjacent mangrove areas			12.1.1, 12.2.5, 12.2.6, 12.2.7, 12.2.8, 12.2.9, 12.2.10, 12.3.1, 12.3.5, 12.3.6, 12.3.11, 12.5.2, 12.5.3, 12.9-10.4, 12.11.3, 12.11.23, 12.12.14
13	SP004	*Adelotus brevis*	Tusked Frog	Animal	Waterways and temporary and permanent pools		waterbody	12.1.1, 12.2.1, 12.2.2, 12.2.5, 12.2.6, 12.2.7, 12.2.8, 12.2.9, 12.2.10, 12.2.12, 12.2.13, 12.3.1, 12.3.5, 12.3.6, 12.3.11, 12.3.13, 12.5.2, 12.5.3, 12.9-10.4, 12.11.3, 12.11.10, 12.11.23, 12.12.14
611	SP005	*Blandfordia grandiflora*	Large Christmas Bell	Plant	Moist to Wet Wallum Heath			12.2.12, 12.3.13
66	SP006	*Calyptorhynchus lathami*	Glossy Black Cockatoo	Animal	*Allocasuarina* spp. and *C. glauca*			12.1.1, 12.2.5, 12.2.6, 12.2.7, 12.2.8, 12.2.10, 12.3.1, 12.3.5, 12.3.6, 12.3.11, 12.5.2, 12.5.3, 12.9-10.4, 12.11.3, 12.11.23, 12.12.14
2081	SP007	*Charopid BR38*	A Land Snail	Animal	Eucalypt forest to Woodland containing *Eucalyptus racemosa* on Coastal Sands			12.2.10, 12.2.6, 12.2.8, 12.2.1
723	SP008	*Corchorus cunninghamii*	Native Jute	Plant	Margins of Rainforest and Tall Eucalypt Forest			12.11.10, 12.11.3, 12.11.5, 12.11.2
120	SP009	*Crinia tinnula*	Wallum Froglet	Animal	Acid swamps and depressions			12.2.5, 12.2.7, 12.2.9, 12.2.10, 12.2.12, 12.2.15, 12.3.5, 12.3.6, 12.5.10
846	SP010	*Durringtonia paludosa*	Durringtonia	Plant	Wet Wallum Heath and on Margins of Swamp Sclerophyll Forest E. robusta			12.2.5, 12.2.7, 12.2.12, 12.2.15, 12.3.4
861	SP011	*Eleocharis difformis*	Submerged Spikerush	Plant	Submerged aquatic plant in Perched and Window Lakes restricted to Lacustrene wetlands 12.2.15a and			12.2.15, 12.2.15a, 12.2.15f

Species ID	Species Number	Species	Common Names	Kingdom	RE habitat description	Non-RE habitat description	Non RE	Regional Ecosystems
					12.2.15f			
470	SP012	*Ephippiorhynchus asiaticus*	Black-necked Stork	Animal	Wetlands, rare visitor			12.1.1, 12.1.2, 12.1.3, 12.2.12, 12.2.15, 12.2.15f, 12.2.5, 12.2.5a, 12.2.7, 12.3.11, 12.3.13, 12.3.5, 12.3.6, 12.3.8, 12.5.9
51	SP013	*Esacus magnirostris*	Beach Stone Curlew	Animal	Dunes, beaches		beach	12.2.14, 12.2.16, 12.2.9, 12.2.10, 12.2.13, 12.2.7
955	SP014	*Genoplesium sp.* (Raby Bay J.Elsol AQ462423)	Raby Bay Midge Orchid	Plant	Eucalypt forest to Woodland containing *Eucalyptus racemosa*			12.5.3, 12.9-10.4, 12.11.5j, 12.12.14
2082	SP015	*Gyrocochlea myora*	Myora Springs Snail	Animal	Moist Coastal Forests including Littoral Rainforest			12.2.6
203	SP016	*Haematopus fuliginosus*	Sooty Oystercatcher	Animal	Rocky coasts, coarse beaches		beach	12.2.14, 12.12.19
393	SP017	*Lewinia pectoralis*	Lewin's Rail	Animal	Riparian - with cover			12.1.1, 12.1.2, 12.1.3, 12.2.12, 12.2.15, 12.2.15f, 12.2.5, 12.2.5a, 12.2.7, 12.3.11, 12.3.13, 12.3.5, 12.3.6, 12.3.8, 12.5.9, 12.3.1,12.3.11a
2083	SP018	*Litoria cooloolensis*	Cooloola Sedgefrog	Animal	Sandy coastal freshwater lakes and stream - North Stradbroke Island			12.2.1,12.2.7,12.2.15
2084	SP019	*Litoria freycineti*	Freycinet's Frog	Animal	Open, vegetated coastal swamps and depressions			12.2.2, 12.2.5, 12.2.7, 12.2.12, 12.2.13, 12.2.15, 12.3.5, 12.3.6, 12.3.13, 12.5.9, 12.9-10.22
2085	SP020	*Litoria olongburensis*	Wallum Sedgefrog	Animal	Wallum sedgelands subject to inundation			12.2.5, 12.2.7, 12.2.12, 12.2.15
1861	SP021	*Lophoictinia isura*	Square-tailed Kite	Animal	Eucalypt woodland and open forest, rare and breeding in area			12.1.1, 12.2.1, 12.2.2, 12.2.5, 12.2.6, 12.2.7, 12.2.8, 12.2.10, 12.3.1, 12.3.5, 12.3.6, 12.3.11,12.5.2, 12.5.3, 12.9-10.4, 12.11.3, 12.11.10, 12.11.23, 12.12.14
1135	SP022	*Macadamia integrifolia*	Macadamia Nut	Plant	Dry Rainforests and Riparian Forests			12.3.1, 12.11.3, 12.11.10
1136	SP023	*Macadamia tetraphylla*	Rough-Shelled Macadamia	Plant	Rainforests and Riparian Forests			12.11.10, 12.3.1

Species ID	Species Number	Species	Common Names	Kingdom	RE habitat description	Non-RE habitat description	Non RE	Regional Ecosystems
2086	SP024	*Marsdenia coronata*	Slender Milk Vine	Plant	Eucalypt Forests to Woodlands and Rainforest Margins Particularly associated with *Lophostemon confertus* in Whipstick Growth Habit (see BAAM point records at Mt Cotton Quarry)			12.3.11, 12.11.3, 12.11.10, 12.11.5e
2087	SP025	*Marsdenia longiloba*	Clear Milkvine	Plant	Moist Tall Open Forest and rainforest margins (see BAAM point records at Mt Cotton Quarry)			12.11.10, 12.11.3, 12.11.23, 12.3.8, 12.3.2
2088	SP026	*Maundia triglochinoides*	Maundia	Plant	Wetlands including Paperbark Swamps Found At Karawatha and Woodforde	Wetland Mapping including Non Remnant but only good quality so not used in waterbody designation		12.2.5a,12.2.7,12.3.5,12.3.5a,12.3.6
1557	SP027	*Melaleuca irbyana*	Swamp Tea-Tree	Plant	Woodland to Open forests on plains to riparian areas particularly on sedimentary soils LZ 10			12.3.3, 12.3.6, 12.9-10.19a, 12.9-10.17c
2089	SP028	*Melithreptus gularis*	Black-chinned Honeyeater	Animal	Eucalypt woodland and open forest, occasional visitor			12.2.5, 12.2.6, 12.2.8, 12.3.3d, 12.3.11, 12.3.11a, 12.5.2, 12.5.3, 12.5.6c, 12.9-10.4, 12.9-10.17c, 12.9-10.17d, 12.9-10.19, 12.11.3, 12.11.5a, 12.11.5e, 12.11.5h, 12.11.5k, 12.11.23, 12.12.14
2090	SP029	*Nannoperca oxleyana*	Oxleyan Pygmy Perch	Animal	Pristine watercourses in wallum			12.1.1, 12.1.2, 12.1.3, 12.2.12, 12.2.15, 12.2.15f, 12.2.5, 12.2.5a, 12.2.7, 12.3.11, 12.3.13, 12.3.5, 12.3.6, 12.3.8, 12.5.9, 12.3.1, 12.3.11a
2091	SP030	*Nettapus coromandelianus*	Cotton Pygmy Goose	Animal	Wetlands, occasional			12.1.1, 12.1.2, 12.1.3, 12.2.12, 12.2.15, 12.2.15f, 12.2.5, 12.2.5a, 12.2.7, 12.3.11, 12.3.13, 12.3.5, 12.3.6, 12.3.8, 12.5.9
1551	SP031	*Ninox strenua*	Powerful Owl	Animal	Larger bushland areas containing patches of moderately dense			12.1.1, 12.2.1, 12.2.2, 12.2.5, 12.2.7, 12.2.8, 12.3.1,12.3.5, 12.3.11, 12.5.3, 12.9-10.4, 12.11.3, 12.11.10, 12.11.23

Species ID	Species Number	Species	Common Names	Kingdom	RE habitat description	Non-RE habitat description	Non RE	Regional Ecosystems
					cover			
300	SP032	*Numenius madagascariensis*	Far Eastern Curlew	Animal	Mudflats		intertidal_flat	12.1.2, 12.1.3
1198	SP033	*Olearia hygrophila*	Swamp Daisy	Plant	Wet Wallum Heath and on Margins of Swamp Sclerophyll Forest E. robusta			12.2.7, 12.3.4
2092	SP034	*Ornithoptera richmondia*	Richmond Birdwing Butterfly	Animal	Rainforest associated with Pararistolochia praevenosa			12.11.10, 12.3.1
2022	SP035	*Persicaria elatior*	Glandular Knotweed	Plant	Wetlands and Swamp Forests	Wetland Mapping including Non Remnant		12.2.15, 12.3.4, 12.3.5, 12.3.6, 12.3.8
1260	SP036	*Phaius australis*	Southern Swamp Orchid	Plant	Swamp Forests especially those with rainforest elements in understorey where fires are less intense			12.2.5, 12.2.7
1261	SP037	*Phaius bernaysii*	Yellow Swamp Orchid	Plant	Swamp Forests especially those with rainforest elements in understorey where fires are less intense			12.2.7, 12.3.4, 12.3.5
2033	SP039	*Prasophyllum exilis*	Thin Leek Orchid	Plant	Wallum Heath			12.2.12, 12.3.13, 12.2.9, 12.2.10, 12.2.6
403	SP040	*Rostratula australis*	Australian Painted Snipe	Animal	Wetland edges, edge vegetation			12.1.1, 12.1.2, 12.1.3, 12.2.12, 12.2.15, 12.2.15f, 12.2.5, 12.2.5a, 12.2.7, 12.3.11, 12.3.13, 12.3.5, 12.3.6, 12.3.8, 12.5.9
1397	SP041	*Schoenus scabripes*	Rough Bog Rush	Plant	Wallum Heath to Woodland and Wet Wallum			12.2.12, 12.2.15, 12.3.5, 12.3.13
418	SP042	*Sternula albifrons*	Little Turn	Animal	None	Sand banks	sandbank	
425	SP043	*Stictonetta naevosa*	Freckled Duck	Animal	Wetlands, rare visitor			12.1.1, 12.1.2, 12.1.3, 12.2.12, 12.2.15, 12.2.15f, 12.2.5, 12.2.5a, 12.2.7, 12.3.11, 12.3.13,12.3.5, 12.3.6, 12.3.8, 12.5.9
1465	SP044	*Thelypteris confluens*	Marsh Fern	Plant	Swamps and Wetlands in Coastal Dunes			12.2.15

Species ID	Species Number	Species	Common Names	Kingdom	RE habitat description	Non-RE habitat description	Non RE	Regional Ecosystems
2094	SP045	*Thesium australe*	Austral Toadflax	Plant	Grasslands Woodlands and Forests associated with *Themeda triandra* as it parasitises the roots of this grass			12.12.19, 12.3.11, 12.5.2
462	SP046	*Tyto tenebricosa*	Greater Sooty Owl	Animal	Closed forests [debateable whether this should be included]			12.2.1, 12.2.2, 12.3.1, 12.11.10
471	SP047	*Xeromys myoides*	Water Mouse	Animal	Tidal areas away from human habitation			12.1.1, 12.1.2, 12.1.3, 12.2.5, 12.2.6, 12.2.7, 12.2.8, 12.2.9, 12.2.10, 12.2.12, 12.2.13, 12.2.15, 12.3.1, 12.3.5, 12.3.6, 12.3.8, 12.3.11, 12.3.13, 12.5.2, 12.5.3, 12.5.9, 12.9-10.4, 12.11.3, 12.11.23, 12.12.14, 12.12.19
2095	SP048	*Pterostylis chaetophora*	Bug-Lipped Greenhood Orchid	Plant	Grassy and shrubby areas in open forest and woodland known from Cedar Ck Falls Near Mt Tamborine and Coochiemudlo Is			12.5.3

prevents their global extinction in the wild. The inclusion of this category identifies species that may warrant inclusion in threatened species legislation but have been overlooked or not assessed by state or federal governments.

The Raby Bay Midge Orchid is one such example. Known from only a single specimen collected at Raby Bay in 1976 in Scribbly Gum woodland, it is currently not listed as EVNT and it would therefore not be included, except for expert local knowledge indicating it meets the criteria for the Critically Endangered category under international IUCN Red List guidelines suggesting it may already be extinct. Surveys for this species in suitable habitat within the Redland City should therefore be of high priority.

Base species scores were then summed for an overall rating for each species, using the scoring system presented in **Table 2.5**. For each RE vegetation community or non-RE habitat, a habitat suitability score was then attributed to each species. The Species Habitat model allows for two alternative scoring systems, which can be selected by the operator when running the model to generate the Species Habitat Layer. The standard option is a 'straight' scoring framework, which scores all habitat types the same. The alternative option scores remnant vegetation highest, then regrowth, then non-RE habitat (**Table 2.5)**. Either may be applicable depending on the conservation or planning purposes for which an operator is using the Species Habitat Layer. So for maximum flexibility they are both included in the model product. For either scoring system, the final score attributed to a given polygon for each species is an interaction between these two sets of attributes: species status/ significance and RE habitat suitability. All species habitat association scores are summed to provide an overall value for each polygon. To these are added the 'bonus scores' of known habitat, where applicable (**Section 2.3.4**). Finally, the overall score for a polygon is ranked for use in the model.

Table 2.5 Species Scoring Summary

		Status								
		NC			EPBC				BoT	End
		E	V	NT	CE	E	V	CD	C	H	X
Score	Straight	10	8	6	12	10	8	6	4	4	15
	RE	10	8	6	12	10	8	6	4	4	15
	RRE	7.5	6	4.5	9	7.5	6	4.5	3	3	11.3
	NRE	5	4	3	6	5	4	3	2	2	7.5
	Known A	12	9	6	15	12	9	6	3	3	12
	Known P	12	9	6	15	12	9	6	3	3	12

Abbreviations: 'NC Act'= *Nature Conservation Act 1992*, 'EPBC Act'= *Environment Protection and Biodiversity Conservation Act 1999*, 'BoT'= Back on Track species prioritisation framework, 'End'= Endemic, 'E' = Endangered, 'V' = Vulnerable, 'NT' = Near Threatened, 'CE'= Critically Endangered, 'CD'= Conservation Dependent, 'C'= Critical under the Back on Track framework, 'H'= High priority under the Back on Track framework, 'X'= Endemic, 'Straight'=Species Scores that are not graded based on habitat class, 'RE'= Score adjustments made to account for habitat class of Remnant vegetation, 'RRE'= Score adjustments made to account for habitat class of Regrowth Vegetation, 'NRE'= Score adjustments made to account for habitat class of Non-RE Habitat, 'Known A'= Known Animal records, 'Known P'= Known Plant records

The relational database features of ArcGIS geodatabases were utilised for the Species Habitat Layer. This allows users of NEDS to drill down and see which individual species are attributed to a given polygon and the numerical rating each received, which contributed to the overall model rating for that queried polygon.

Some species were considered for incorporation into the model but determined not to be included; for example *Goodenia arenicola* was not incorporated because although it would be considered endemic to the Redland City, it is most probably extinct. In addition, while it may possibly have been associated with dunes or headlands on North Stradbroke Island (Stephens & Sharp 2009) this is highly uncertain (L. Weber *pers. comm.*). Conversely, Sooty owl (*Tyto tenebricosa*) and Rough-Shelled Macadamia (*Macadamia tetraphylla*) were included in the model but may be considered for removal following further review, as the former is poorly known from the area and the latter is known from only a single record which has the potential to be a planted individual. *Streblus pendulinus* (*S. brunonianus*) does have

confirmed records from Mt Cotton. However this species was excluded from the model because it is not of conservation concern on the mainland as the EPBC listing was intended to cover only plants on Norfolk Island. A record of Bug Lipped Greenhood Orchid *Pterostylis chaetophora* from Coochiemudlo Island (located by BAAM staff on Australia's Virtual Herbarium) is notable as this species has not previously been recognised as occurring in Redland City. This specimen has probably been overlooked previously due to taxonomic changes and because the specimen is located in Canberra rather than the Brisbane herbarium. The species was included in the habitat model. However the coordinates and label were not accurate enough to determine a known location within Coochiemudlo Island so the most likely habitat (RE 12.5.3) was assigned as potential habitat for this species.

A small number of goblin spider species were also potentially identified as possibly endemic to Redland City. However accurate location records or habitat types could not be obtained so these species were not included but could be added should better information become available.

Another invertebrate, the Swamp Crayfish *Tenuibranchiurus glypticus,* is also known from the Redland City and is listed as Endangered under the International IUCN Red List. However it was not included in the model as it is not listed under state or federal legislation. Future refinements to the methodology could include adding this and other Red Listed conservation significant species into NEDS if Council choses to do so.

2.2.4. Refinement and integration of the Species Record Layer and known record scoring

In addition to the habitat association aspect of the Species Habitat Model, species records were also utilised, adding a 'bonus score' to areas where a species has been recorded (but only for polygons containing suitable habitats). The aggregate score for each habitat association, plus the aggregate score for known records, result in the final score for each polygon in the Species Habitat Layer. The approach of utilising known species records evolved from the Species Record Layer which it replaces.

The Species Record Layer was one of the primary layers implemented in NEDS Phase 1 and was an amalgamation and synthesis of conservation significant species records from the Queensland Herbarium and Museum as well as RCC. It provided a score for a given area, based on the number of different species recorded and the legislative status of those species. By mapping known conservation significant species occurrence, this value could then contribute to the overall conservation value represented in the model. Similar approaches have been successfully employed in Queensland, in particular the Essential Habitat framework (EPA 2002).

As developed in NEDS Phase 1, the Species Record Layer was a standalone layer. The shape of the polygons in the dataset were the result of two factors: the spatial accuracy of the original records (resulting in a buffered circle), and the topology of resultant polygons once the buffered records are dissolved into a single polygon.

During development of Phase 2 it became clear that while the layer was logically consistent in the way it spatially amalgamated species records, these historical point data could be more effectively used by integrating it into the Habitat Layer. The primary advantage of this approach is that species records are spatially contained within suitable habitat areas rather than incorporating unsuitable areas that were encompassed by a buffered point.

In general terms, the buffered points approach employed for the Species Record Layer was retained for the known species occurrence component of the Habitat Layer. However the approach was extensively refined to make the information more reliable and informative. This included more selective use of records and different geoprocessing approaches for plant versus animal records. All records older than 50 years were excluded. All remaining animal records were retained, but for plants any records with a coordinate precision >100 m were culled. Buffers were then applied to each record. For animals, a buffer equivalent to one 1 arc minute was used, reflecting the precision of the least accurate records (Queensland Museum records). So the precision at one minute level is 0.0166666667 decimal degrees, which is 1645 meters. The animal points were therefore buffered by this amount. This large buffer was also appropriate from an ecological perspective, reflecting the mobility of the majority of these taxa. All flora records were buffered to 100 m, even those records with a higher precision. These buffered points were then integrated into the Habitat Layer in two

different ways depending on whether plant or animal.

Flora buffers essentially represent distinct patches within suitable habitat where a plant is known to grow. As plants distributions can be highly patchy (Gioia and Pigott, 2000) and for threatened taxa, often restricted (Department of Environment and Heritage 2011), the small buffer applied to plants is useful in highlighting patches where a population is located, and excluding areas of habitat which may be suitable but are unoccupied. As with any dataset that represents historical records it is subject to sampling artefacts with undersampling for example leading to a patch of a species appearing more restricted than it actually is. More thorough population sampling of conservation significant plants within the Redland City would alleviate this issue. Ultimately within the model a thoroughly sampled population would be represented by a cluster of merged circles (the buffered points, with actual on the ground distribution of the plants captured within their perimeter). Because point records for plants on the edge of the population would themselves be buffered, this would result in a larger area being mapped than the actual patch of plants. This in effect results in a suitable precautionary approach, as the population may be expanding into the area either within the seed bank or through vegetative spread or may benefit from such a buffer for population persistence (e.g. reduced edge effects etc.). The buffers essentially 'cookie cut' areas of occupied habitat on the Habitat Layer and these can be seen as 'hot spots' on the overall NEDS Map, as they receive a high concentrated score in a relatively small area (**Figure 2.4a**).

Unlike the flora buffers, the fauna buffers do not affect the final topology of the output layer. Rather, the records are used as contingent features to trigger attribution in appropriate habitats using the location based query function in ArcGIS. Essentially the large fauna record buffer works in the 'background' of the Habitat Layer, attributing any suitable habitat polygons they intersect with. The intersecting habitat polygons become 'known habitat' for that species, thus receiving an overall score that is higher than the same habitat type for which there are no records for that species (**Figure 2.4b**).

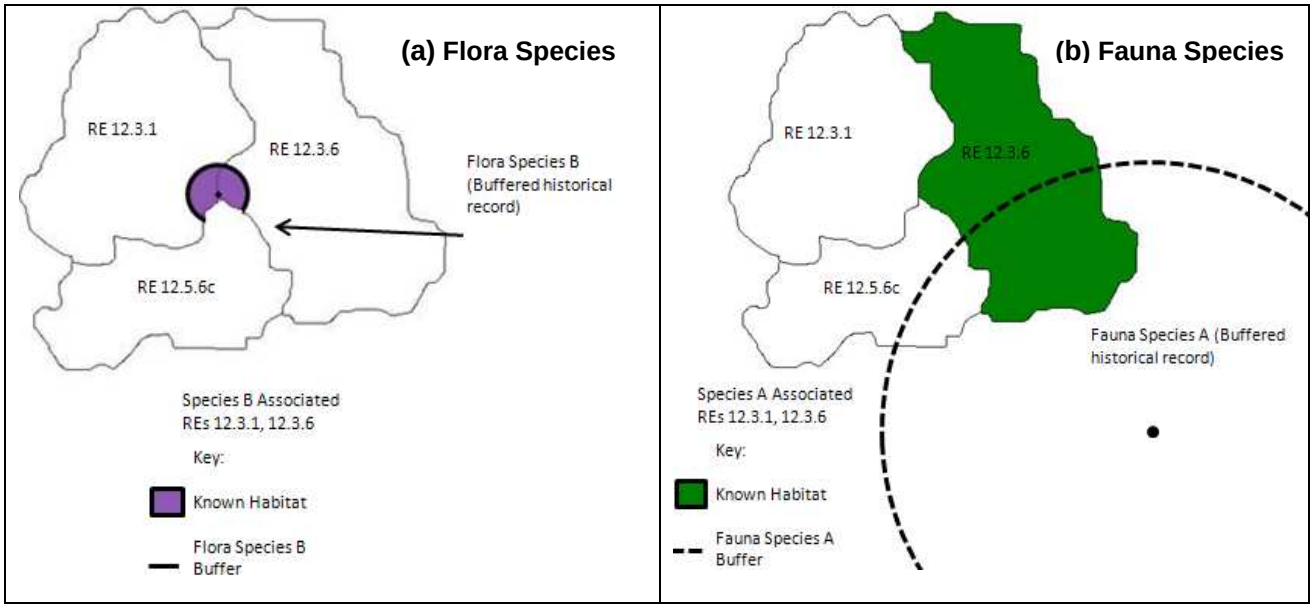


Figure 2.4(a) Flora and (b) Fauna species record buffers.

For both animals and plants, buffers were dissolved such that multiple records of the same species that had overlapping or coincidental topology did not increase the score. For details of this see AECOM and BAAM (2012a).

Because plant records may influence a much smaller area of the NEDS map than animals do, there is flexibility in the model for scoring for the two types of records differently to avoid scenarios where the importance of animal records were not disproportionally elevated in the model. However such differential weighting

in not currently applied in Phase 2 (**Table 2.5**). To make this 'balancing' adjustment, a general multiplication scoring rule may be introduced; for example informed by the polygons size characteristics of the Species Habitat Layer map. This may be recommended because a plant record only affects the portion of a 100 m buffer area intersecting a suitable habitat, as compared with an animal record which affects the whole polygon of suitable habitat it is contingent with. Plant record polygons were upweighted in the model. Further investigation is required to find an appropriate balancing factor. At present, the limited number of points in the species record dataset limits adequate investigation

2.2.5. Habitat model scripting and table relationships

Python scripting was used to integrate habitat associations for each species, the individual species scores and known records scores with the habitat mapping to create the aggregate species habitat map.

The two revised RE vegetation layers and the non-RE habitats form the basis for the Habitat Feature Class (**Figure 2.3**). This forms the primary spatial component of the species habitat model resultant Species Habitat Layer. In addition, buffered points of known records affect the attributes of the layer, and (in the case of plant records), the topology of the final feature class. The model that produces the Species Habitat Layer was created in such a way as to maintain maximum flexibility. Specifically, with updates to data, the layer can be recreated with minimal computer processing time and risk of geoprocessing failures (e.g. system crash). This was achieved by a reliance of geodatabase tables to inform the attribution of values for the final feature class. The advantage of this is easily seen when one considers that the creation of the final feature class requires multiplying the number of categories in the model by the number of features. With 47 species in the model, each with different statuses under four different conservation significance categories, and each with various habitat associations, the numbers in the matrix multiplication quickly become astronomical. This results in very data-heavy calculation if undertaken as a feature class, as computations for the spatial and non-spatial aspects of the data need to be undertaken simultaneously. The elected approach avoids this while allowing for any one of the above variables to be changed with the new output being generated by re-rerunning the scripts. Rerunning the scripts takes approximately 6 minutes (on an Intel Core i7 2700k 3.5ghz Sandy Bridge CPU) verses approximately 1 hour for the feature class approach.

The habitat model uses two non-spatial geodatabase tables to appropriately attribute the spatial data (**Figure 2.3, Appendix 2**). The RE and Species Matching Matrix specifies which REs and other habitats, and the Species Information and Score table specifies the species codes, the kingdom (animal or plant) and ascribes the scores based on the framework described in **Section 2.3.3**.

In order to produce the outputs of the habitat model, python scripting was used in combination with a relational geodatabase.

Figure 2.3 shows the key elements and conceptual framework of the Species Habitat layer, and the relationships between the tables, data and Python scripts which inform it.

For details on the scripting, and a manual on how to re-create the Species Habitat Layer using the model, refer to **Appendix 2**.

3.0 RESULTS

3.1. FIRST REVISION OF REMNANT AND REGROWTH VEGETATION LAYERS

3.1.1. Vegetation Assessments

Twelve (25.5%) of the 47 RE vegetation communities mapped as present within the Redland City were structurally assessed during the field surveys (**Table 2.1**).

Combined secondary and quaternary data show that the State RE dataset was incorrect in its vegetation community designation 57% of the time. This indicates the importance of refined mapping to increase accuracy.

In some instances, field verification did not greatly assist in differentiating polygons mapped as mixed complexes of REs. Mosaics of Land Zone 11 provide an example of this. The state RE datasets often maps REs 12.11.23, 12.11.5j and 12.11.5h as mosaic in the Redland City. The finer scale mapping should in theory allow these units to be split out into homogeneous polygons. However field investigations identified these associations as occurring in highly complex mosaics, with REs 12.11.23 and

12.11.5j sometimes being distributed in a thoroughly mixed pattern of clumps of trees down to a few square meters. The German Church Road Conservation Area is one instance of this, with extensive areas of intermingled *Eucalyptus pilularis* (typical of RE 12.11.23) and *Eucalyptus racemosa* (typical of RE 12.11.5j. Regional ecosystem 12.11.5h could however often be split out from the other two communities, occurring in more discrete patches, often on ridgetops (particularly north and ease aspects), and have a distinct LiDAR signature of low sparse trees and a low shrubby understory less than 2 m high (evidenced by gaps in the vegetation mask—see AECOM and BAAM (2012b).

On the other hand, there were some cases where aerial imagery and LiDAR suggested the presence of different communities, while field assessment confirmed that there was only one community with different vegetation heights. Regional Ecosystem 12.11.23 could look like different communities but was all one with different heights. This RE is a structurally variable community with COVEG sites (*n*=6) being relatively evenly split between woodland (33%) open-forest (33%) tall open-woodland (17%) and tall open-forest (17%) (DSITIA 2012). This variability needed to be taken into account when mapping the community, and field assessments assisted in confirming its structural heterogeneity within Redland City.

These examples serve as indications of the types of mapping and community assessment decisions that were undertaken as part of the mapping process. However a discussion of the field investigation findings in relation to each mapping community is out of scope for the current report, and in any case may give a skewed picture as a result of the low number of sites that were able to be assessed and the low number of communities visited facilitating inter-community comparison.

3.1.2. Remnant and Regrowth Regional Ecosystem mapping

The revised mapping of remnant vegetation undertaken by BAAM delineates 11560 ha comprising 3118 polygons (excluding estuary features) containing 35 RE vegetation communities (**Figure 3.1)**. Similarly, the revised regrowth mapping delineates 2332 ha comprising 3524 polygons (excluding estuary features) consisting of 24 RE vegetation communities (**Figure 3.2)**. **Table 3.1** details these results and compares them to their equivalent state dataset. The newly derived Redland City critically limited REs criteria provide insight into those REs that are anthropogenically or naturally restricted within the Redland City. Twenty-five RE vegetation communities meet the current definition (**Table 3.3**).

Table 3.1 Temporary Species Scoring used to downweight regrowth vegetation habitats

		Status									
		NC			EPBC				BoT		End
		E	V	NT	CE	E	V	CD	C	H	X
Score	RE	10	8	6	12	10	8	6	4	4	15
	RRE	0.5	0.4	0.3	0.6	0.5	0.4	0.3	0.2	0.2	0.75
	NRE	5	4	3	6	5	4	3	2	2	7.5

Abbreviations: 'NC Act'= Nature Conservation Act 1992, 'EPBC Act'= Environment Protection and Biodiversity Conservation Act 1999, 'BoT'= Back on Track species prioritisation framework, 'End'= Endemic, 'E' = Endangered, 'V' = Vulnerable, 'NT' = Near Threatened, 'CE'= Critically Endangered, 'CD'= Conservation Dependent, 'C'= Critical under the Back on Track framework, 'H'= High priority under the Back on Track framework, 'X'= Endemic, 'RE'=Remnant vegetation, 'RRE'= Regrowth Vegetation, 'NRE'=Non-RE Habitat

Four REs meet criterion one, 18 meet criterion 2 and a further 3 REs meet both criteria totalling 25 critically limited REs (**Table 3.2**).

The mapping revision did not identify any vegetation communities not previously found in the State datasets.

As these constitute completely revised layers, they are to be considered as a first draft as delivered for this project. Also, as with most aspects of NEDS, they will need to be subject to a process of continual refinement. In particular, there are very few vegetation structural sites to support the vast majority of the mapping. Future improvements to the accuracy of the mapping, undertaken in later phases of the NEDS Project, would involve progressive fieldwork in areas and REs not ground-truthed, and incorporate existing structural datasets from other sources.

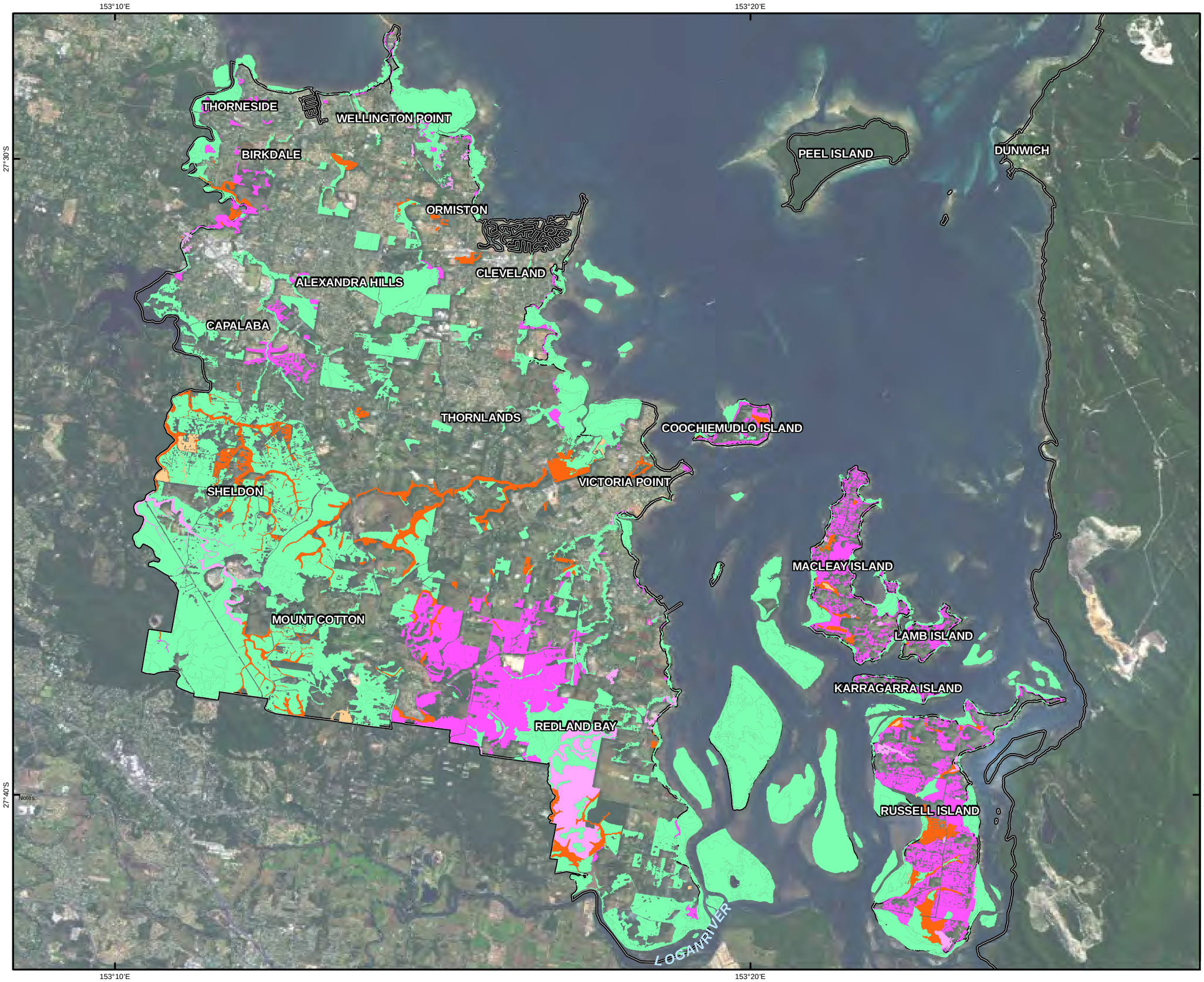


Figure: **3-1**

Title:

Revised Remnant Regional Ecosystem Mapping

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND
Biodiversity Status:

Revised Remnant Regional Ecosystem

- Endangered - Dominant
- Endangered - Sub-dominant
- Of Concern - Dominant
- Of Concern - Sub-dominant
- No concern at present
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:105,000 at A3

0 0.5 1 2 3 4 5
Kilometers

Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°10'E

153°20'E

27°30'S

27°40'S

THORNESIDE
WELLINGTON POINT
BIRKDALE
ORMISTON
CLEVELAND
ALEXANDRA HILLS
CAPALABA
THORNLANDS
SHELDON
MOUNT COTTON
REDLAND BAY
VICTORIA POINT
COOCHIEMUDLO ISLAND
PEEL ISLAND
DUNWICH
MACLEAY ISLAND
LAMB ISLAND
KARRAGARRA ISLAND
RUSSELL ISLAND
LOGAN RIVER

Notes:

Figure: **3-2**

Title: **Revised Regional Ecosystem Mapping - Regrowth Vegetation**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND
Biodiversity Status:

Revised Regional Ecosystem Regrowth

- Endangered - Dominant
- Endangered - Sub-dominant
- Of Concern - Dominant
- Of Concern - Sub-dominant
- No concern at present
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009)
supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:105,000 at A3

0 0.5 1 2 3 4 5
Kilometers

Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

Table 3.2 Extent of Regional Ecosystems in the Redland City under State and BAAM mapping

RE	Short Description (from the REDD)	Biodiversity Status	DEHP Certified RE Mapping extent (including NSI)			Total Area (ha)	DEHP Certified RE Mapping extent (excluding NSI)			Total Area (ha)	BAAM Revised RE Mapping extent (excluding NSI)		Total Area (ha)
			Preclear	Remnant	Regrowth		Preclear	Remnant	Regrowth		Remnant	Regrowth	
Land zone 1: Tidal Flats and Beaches													
12.1.1	*Casuarina glauca* woodland on margins of marine clay plains	Endangered	176.196	97.446	6.169	103.614	151.781	81.537	6.169	87.706	94.123	5.575	99.698
12.1.2	Saltpan vegetation including grassland, herbland and sedgeland on marine clay plains	No Concern	1095.078	583.981	2.780	586.762	597.692	477.846	2.441	480.287	1098.653	2.268	1100.921
12.1.3	Mangrove shrubland to low closed-forest on marine clay plains and estuaries	No Concern	3288.126	1503.895	20.096	1523.991	809.641	717.433	1.953	719.386	2276.662	4.406	2281.068
Land zone 2: Coastal Dunes													
12.2.1	Notophyll vine forest on parabolic high dunes	Of Concern	31.236	31.236	0.000	31.236	0.000	0.000	0.000	0.000	0.000	0.000	0.000
12.2.2	Microphyll/notophyll vine forest on beach ridges	Endangered	1.846	1.171	0.000	1.171	0.456	0.395	0.000	0.395	0.407	0.000	0.407
12.2.5	*C. intermedia +/- L. confertus +/- Banksia spp. +/- Callitris columellaris* open-forest on beach ridges usually in southern half of bioregion	Of Concern	2158.033	1631.569	309.374	1940.943	3.456	0.000	0.000	0.000	5.326	0.723	6.049
12.2.5a	Palustrine wetland (e.g. vegetated swamp). Swales dominated by *M. quinquenervia* often with *Livistona* spp. Occurs of Quaternary coastal dune swales.	Of Concern	312.919	312.921	0.000	312.921	0.000	0.000	0.000	0.000	0.000	0.000	0.000
12.2.6	*E. racemosa* open-forest on dunes and sand plains. Usually deeply leached soils	No Concern	9248.022	6093.849	1515.731	7609.580	26.441	25.940	0.000	25.940	24.347	0.000	24.347
12.2.7	*M. quinquenervia* or rarely *M. dealbata* open-forest on sand plains	Of Concern	1058.241	999.370	10.172	1009.542	93.372	87.008	0.257	87.266	86.361	0.090	86.452
12.2.8	*E. pilularis* open-forest on parabolic high dunes	No Concern	2127.262	1514.597	60.989	1575.586	0.000	0.000	0.000	0.000	0.000	0.000	0.000
12.2.9	*Banksia aemula* low open-woodland on dunes and sand plains. Usually deeply leached soils	No Concern	333.931	232.763	33.095	265.858	0.000	0.000	0.000	0.000	0.000	0.000	0.000
12.2.10	Mallee *E. planchoniana +/- C. gummifera, E. racemosa* subsp. *racemosa*, *Banksia aemula* woodland on dunes and sand plains, especially southern sand mass islands. Usually deeply leached soils	Of Concern	5729.087	4468.828	330.522	4799.351	0.000	0.000	0.000	0.000	0.000	0.000	0.000
12.2.12	Closed-heath on seasonally waterlogged sand plains	No Concern	40.019	28.054	0.000	28.054	0.000	0.000	0.000	0.000	0.000	0.000	0.000
12.2.13	Open or dry heath on dunes & beaches	Endangered	290.837	287.836	0.920	288.756	0.000	0.000	0.000	0.000	0.000	0.000	0.000
12.2.14	Foredune complex	No Concern	937.877	210.191	467.762	677.953	0.000	0.000	0.000	0.000	0.000	0.000	0.000

RE	Short Description (from the REDD)	Biodiversity Status	DEHP Certified RE Mapping extent (including NSI)			Total Area (ha)	DEHP Certified RE Mapping extent (excluding NSI)			Total Area (ha)	BAAM Revised RE Mapping extent (excluding NSI)		Total Area (ha)
			Preclear	Remnant	Regrowth		Preclear	Remnant	Regrowth		Remnant	Regrowth	
12.2.15	*Gahnia sieberiana, Empodisma minus, Gleichenia* spp. closed-sedgeland in coastal swamps	No Concern	3571.753	3444.416	57.251	3501.667	52.636	49.926	0.436	50.362	49.815	0.000	49.815
12.2.15f	Lacustrine wetland (e.g. lake). Permanent and semi-permanent perched lakes. Occurs perched on Quaternary coastal dunes.	No Concern	33.552	33.552	0.000	33.552	0.000	0.000	0.000	0.000	0.000	0.000	0.000
12.2.16	Sand blows largely devoid of vegetation	Of Concern	91.481	91.482	0.000	91.482	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Land zone 3: Alluvial River and Creek Flats													
12.3.1	Gallery rainforest (notophyll vine forest) on alluvial plains	Endangered	36.664	26.866	2.005	28.871	36.664	26.866	2.005	28.871	32.316	2.123	34.439
12.3.3d	Floodplain (other than floodplain wetlands). *Eucalyptus moluccana* woodland. Other frequently occurring species include *Eucalyptus tereticornis, E. crebra, E. siderophloia* and *Corymbia intermedia.* Occurs on margins of Quaternary alluvial plains usually adjacent sedimentary geologies.	Endangered	0.065	0.098	0.000	0.098	0.065	0.098	0.000	0.098	3.454	0.000	3.454
12.3.5	*Melaleuca quinquenervia* open-forest on coastal alluvium	Of Concern	338.957	186.499	48.221	234.720	320.984	170.624	48.079	218.703	165.438	16.112	181.550
12.3.5a	Palustrine wetland (e.g. vegetated swamp). *Melaleuca quinquenervia*, *Casuarina glauca* +/- *Eucalyptus tereticornis* open-forest. Occurs on lowest river terraces of Quaternary alluvial plains in coastal areas.	Of Concern	6.918	598.373	0.721	599.093	6.918	0.00	0.721	0.721	0.000	0.204	0.204
12.3.6	*Melaleuca quinquenervia, Eucalyptus tereticornis, Lophostemon suaveolens* open-forest on coastal alluvial plains	No Concern	2074.348	597.332	556.135	1153.468	2060.901	590.117	555.095	1145.213	665.887	271.282	937.169
12.3.8	Swamps with *Cyperus* spp., *Schoenoplectus* spp. and *Eleocharis* spp.	Of Concern	1.711	1.711	0.000	1.711	1.711	1.711	0.00	1.711	3.185	0.000	3.185
12.3.11	*Eucalyptus tereticornis* +/- *Eucalyptus siderophloia, Corymbia intermedia* open-forest on alluvial plains usually near coast	Of Concern	903.222	390.294	73.755	464.050	904.196	390.294	73.994	464.289	498.346	109.443	607.789
12.3.11a	Open-forest of *Eucalyptus tereticornis* and/or *E. siderophloia* with vine forest understorey. Occurs on sub-coastal Quaternary alluvial plains. Rainfall usually exceeds 1000mm/y.	Of Concern	15.725	13.867	0.342	14.210	15.492	13.867	0.342	14.210	13.760	0.000	13.760

RE	Short Description (from the REDD)	Biodiversity Status	DEHP Certified RE Mapping extent (including NSI)			Total Area (ha)	DEHP Certified RE Mapping extent (excluding NSI)			Total Area (ha)	BAAM Revised RE Mapping extent (excluding NSI)		Total Area (ha)
			Preclear	Remnant	Regrowth		Preclear	Remnant	Regrowth		Remnant	Regrowth	
12.3.13	Closed-heathland on seasonally waterlogged alluvial plains usually near coast	Of Concern	34.639	32.667	0.000	32.667	34.510	32.667		32.667	18.857	0.000	18.857
Land zone 5: old loamy and sandy plains													
12.5.2	*Corymbia intermedia*, *Eucalyptus tereticornis* open-forest on remnant Tertiary surfaces, usually near coast. Usually deep red soils	Endangered	3280.171	332.155	146.777	478.932	2980.732	99.732	128.354	228.086	232.229	127.963	360.192
12.5.3	*Eucalyptus racemosa* woodland on remnant Tertiary surfaces	Endangered	2115.468	300.376	105.874	406.249	2013.551	279.913	94.644	374.557	579.791	101.791	681.582
12.5.6c	*Eucalyptus pilularis* open-forest +/- E. siderophloia, E. propinqua, Corymbia intermedia, E. microcorys, E. acmenoides, E. tereticornis, E. biturbinata, Lophostemon confertus with E. saligna, E. montivaga at higher altitudes. Occurs on remnant Tertiary surfaces. Usually deep red soils.	Endangered	352.632	43.275	0.000	43.275	351.591	43.275	0.000	43.275	222.613	16.057	238.670
12.5.9	Sedgeland to heathland in low lying areas on complex of remnant Tertiary surface and Tertiary sedimentary rocks.	Of Concern	22.533	16.826	0.259	17.085	22.533	16.826	0.259	17.085	22.511	0.000	22.511
Land zone 9-10: undulating country on fine grained sedimentary rocks / sandstone ranges													
12.9-10.17c	Open forest of *Eucalyptus carnea* and/or *Eucalyptus tindaliae* +/- *Corymbia citriodora* subsp. *variegata, Eucalyptus crebra, Eucalyptus major, Corymbia henryi, Angophora woodsiana, C. trachyphloia, E. siderophloia, E. microcorys, E. resinifera* and *E. propinqua. Lophostemon confertus* often present in gullies and as a sub canopy or understorey tree. Occurs on Cainozoic and Mesozoic sediments.	No Concern	4.673	4.687	0.000	4.687	4.694	4.687	0.000	4.687	1.075	0.000	1.075
12.9-10.17d	*Lophostemon confertus, Corymbia intermedia +/- Eucalyptus siderophloia, E. propinqua* open-forest. Other characteristic species include *E. microcorys, E. acmenoides* or *E. portuensis, Eucalyptus tereticornis, E. moluccana, Angophora subvelutina* and occasional vine forest species. Other species that may be present locally include *Corymbia trachyphloia, E. major,*	No Concern	3.702	3.702	0.000	3.702	3.702	3.702	0.000	3.702	5.938	0.000	5.938

RE	Short Description (from the REDD)	Biodiversity Status	DEHP Certified RE Mapping extent (including NSI)			Total Area (ha)	DEHP Certified RE Mapping extent (excluding NSI)			Total Area (ha)	BAAM Revised RE Mapping extent (excluding NSI)		Total Area (ha)
			Preclear	Remnant	Regrowth		Preclear	Remnant	Regrowth		Remnant	Regrowth	
	E. fibrosa subsp. *fibrosa* and *Angophora leiocarpa* Hills and ranges on Cainozoic and Mesozoic sediments.												
12.9-10.19a	Open-forest of *Corymbia henryi* +/- *Eucalyptus fibrosa* subsp. fibrosa, Corymbia citriodora subsp. *variegata, E. siderophloia, E. crebra.* Occurs in coastal areas on Cainozoic and Mesozoic sediments.	No Concern	14.812	14.711	0.000	14.711	14.716	14.711	0.000	14.711	14.848	0.000	14.848
12.9-10.4	*Eucalyptus racemosa* subsp. *racemosa* woodland on sedimentary rocks	No Concern	4894.798	541.146	1382.738	1923.884	4894.775	541.146	1382.738	1923.884	716.878	768.225	716.878
Land zone 11: hills and lowlands on metamorphic rocks													
12.11.3	*Eucalyptus siderophloia, E. propinqua* +/- *E. microcorys, Lophostemon confertus, Corymbia intermedia, E. acmenoides* open-forest on metamorphics +/- interbedded volcanics	No Concern	503.293	137.393	3.719	141.112	503.549	136.097	3.719	139.816	96.888	97.177	194.065
12.11.3a	*Lophostemon confertus* woodland +/- *Eucalyptus microcorys, E. carnea, E. propinqua, E. major, E. siderophloia*. Occurs in gullies and exposed ridges of Palaeozoic and older moderately to strongly deformed and metamorphosed sediments and interbedded volcanics.	No Concern	30.103	21.236	6.026	27.262	30.103	21.236	6.026	27.262	6.982	4.113	11.096
12.11.5	*Corymbia citriodora* subsp. *variegata, Eucalyptus siderophloia, E. major* open-forest on metamorphics +/- interbedded volcanics	No Concern	0.000	0.000	0.605	0.605	0.000	0.000	0.605	0.605	0.000	0.000	0.000
12.11.5a	*Eucalyptus tindaliae, E. carnea, Corymbia intermedia* woodland +/- *E. crebra, Corymbia citriodora* subsp. *variegata, Eucalyptus major, E. helidonica, Corymbia henryi, Angophora woodsiana, C. trachyphloia* (away from the coast) or *E. siderophloia, E. microcorys, E. racemosa* subsp. *racemosa, E. propinqua* (closer to the coast). Occurs on Palaeozoic and older moderately to strongly deformed and metamorphosed sediments and interbedded volcanics.	No Concern	1607.876	907.113	573.409	1480.521	1608.181	906.656	573.382	1480.038	1985.084	142.901	2127.985

RE	Short Description (from the REDD)	Biodiversity Status	DEHP Certified RE Mapping extent (including NSI)			Total Area (ha)	DEHP Certified RE Mapping extent (excluding NSI)			Total Area (ha)	BAAM Revised RE Mapping extent (excluding NSI)		Total Area (ha)
			Preclear	Remnant	Regrowth		Preclear	Remnant	Regrowth		Remnant	Regrowth	
12.11.5e	*Corymbia citriodora* subsp. *variegata* woodland usually including *Eucalyptus siderophloia* or *E. crebra* (sub coastal ranges), *E. propinqua* and *E. acmenoides* or *E. carnea*. Occurs on hills and ranges of Palaeozoic and older moderately to strongly deformed and metamorphosed sediments and interbedded volcanics.	No Concern	61.817	39.806	11.863	51.669	61.965	39.795	12.049	51.844	36.746	3.411	40.157
12.11.5h	Woodland to open forest of *Eucalyptus planchoniana, E. carnea* and *Angophora woodsiana* +/- *E. fibrosa* subsp. *fibrosa, E. racemosa* subsp. *racemosa, Corymbia intermedia, C. trachyphloia, E. tindaliae, E. helidonica* and *E. resinifera*. Occurs on Palaeozoic and older moderately to strongly deformed and metamorphosed sediments and interbedded volcanics.	No Concern	293.466	117.564	80.548	198.112	293.852	117.564	80.427	197.991	278.901	35.321	314.222
12.11.5j	*Eucalyptus racemosa* subsp. *racemosa* and/or *E. seeana* and *Corymbia intermedia* woodland. Other characteristic species include *E. siderophloia, Angophora leiocarpa, C. trachyphloia* subsp. *trachyphloia* and rarely *E. pilularis. Melaleuca quinquenervia* may be present and at times becomes locally co-dominant. Occurs on Palaeozoic and older moderately to strongly deformed and metamorphosed sediments and interbedded volcanics.	No Concern	2326.093	1092.062	603.509	1695.570	2325.577	1092.053	602.585	1694.638	749.441	302.719	1052.293
12.11.5k	Woodland of *Corymbia henryi* and/or *Eucalyptus fibrosa* subsp. *fibrosa* +/- *C. citriodora* subsp. *variegata, Angophora leiocarpa, E. carnea, E. tindaliae, E. acmenoides, E. helidonica, E. propinqua, C. intermedia*. Includes patches of *E. dura*. Occurs on drier ridges and slopes in near coastal areas on Palaeozoic and older moderately to strongly deformed and metamorphosed sediments and interbedded volcanics.	No Concern	1509.498	897.454	363.239	1260.693	1509.483	897.454	363.239	1260.693	749.613	106.434	856.046

RE	Short Description (from the REDD)	Biodiversity Status	DEHP Certified RE Mapping extent (including NSI)			Total Area (ha)	DEHP Certified RE Mapping extent (excluding NSI)			Total Area (ha)	BAAM Revised RE Mapping extent (excluding NSI)		Total Area (ha)
			Preclear	Remnant	Regrowth		Preclear	Remnant	Regrowth		Remnant	Regrowth	
12.11.10	Notophyll vine forest +/- *Araucaria cunninghamii* on metamorphics +/- interbedded volcanics	No Concern	61.754	2.298	13.745	16.043	61.754	2.298	13.745	16.043	1.176	19.167	20.343
12.11.23	*Eucalyptus pilularis* open-forest on coastal metamorphics and interbedded volcanics	Endangered	2153.382	1060.361	1275.289	2335.650	2152.198	1060.361	1274.810	2335.171	796.999	135.300	932.298
Land zone 12: hills and lowlands on granitic rocks													
12.12.14	*Eucalyptus racemosa* subsp. *racemosa, Lophostemon confertus, Eucalyptus acmenoides* open-forest usually on rocky near coastal areas on Mesozoic to Proterozoic igneous rocks	Of Concern	244.558	21.936	154.096	176.032	244.558	21.707	154.096	175.803	25.719	49.097	74.816
12.12.19	Vegetation complex of rocky headlands on Mesozoic to Proterozoic igneous rocks	Of Concern	14.653	14.240	0.000	14.240	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total area (ha)			*53433.026*	*28983.203*	*8217.736*	37200.94	*24194.429*	*7965.544*	*5382.171*	13347.7	*11560.369*	*2321.902*	13882.27

Abbreviations: 'RE'= Regional Ecosystem, 'REDD'= Regional Ecosystem Descriptions Database, 'DEHP'= Queensland Department of Environment and Heritage Protection, 'DSITIA'= Queensland Department of Science, Information, Technology, Innovation and the Arts

Table 3.3 Critically Limited Regional Ecosystems

RE	Preclear extent (ha)	Remnant extent (ha)	Difference (ha)	Percent decline	Criterion
Land zone 1: Tidal Flats and Beaches					
12.1.1	167.7	97.4	70.2	41.9	2
12.2.1	31.2	31.2	0.0	0.0	2
Land zone 2: Coastal Dunes					
12.2.2	1.2	1.2	0.1	4.9	2
12.2.12	40.0	28.1	12.0	29.9	2
12.2.14	909.8	210.2	699.6	76.9	1
12.2.15f	33.6	33.6	0.0	0.0	2
12.2.16	91.5	91.5	0.0	0.0	2
Land zone 3: Alluvial River and Creek Flats					
12.3.1	36.7	26.9	9.8	26.7	2
12.3.3d	0.01	0.01	0.0	0.0	2
12.3.8	1.7	1.7	0.0	0.0	2
12.3.11a	15.5	13.9	1.6	10.5	2
12.3.13	34.5	32.7	1.8	5.3	2
Land zone 5: Tertiary-Early Quaternary Loamy And Sandy Plains And Plateaus					
12.5.2	3223.2	332.2	2891.1	89.7	1
12.5.3	2096.6	300.4	1796.3	85.7	1
12.5.6c	351.6	43.3	308.3	87.7	1 & 2
12.5.9	22.5	16.8	5.7	25.3	2
Land zone 9-10: Fine And Course Grained Sedimentary Rocks					
12.9-10.17c	4.7	4.7	0.0	0.1	2
12.9-10.17d	3.7	3.7	0.0	0.0	2
12.9-10.19a	14.7	14.7	0.0	0.0	2
Land zone 11: Metamorphic Hills and Lowlands					
12.11.3	503.5	137.4	366.2	72.7	1
12.11.3a	30.1	21.2	8.9	29.5	2
12.11.5e	62.0	39.8	22.2	35.8	2
12.11.10	61.8	2.3	59.5	96.3	1 & 2
Land zone 12: Granitic Hills and Lowlands					
12.12.14	244.6	21.9	222.6	91.0	1 & 2
12.12.19	14.6	14.2	0.4	2.6	2

153°10'E

153°20'E

27°30'S

27°40'S

THORNESIDE

WELLINGTON POINT

BIRKDALE

ORMISTON

CLEVELAND

ALEXANDRA HILLS

CAPALABA

THORNLANDS

COOCHIEMUDLO ISLAND

VICTORIA POINT

SHELDON

MOUNT COTTON

REDLAND BAY

PEEL ISLAND

DUNWICH

MACLEAY ISLAND

LAMB ISLAND

KARRAGARRA ISLAND

RUSSELL ISLAND

Notes:

Figure: 3-3

Title: Revised Non-Regional Ecosystem Mapping

Project: NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers

Client: Redland City Council

LEGEND

Non-RE Habitat type:

- Beach
- Intertidal flat
- Plantation
- Urban trees
- Waterbody
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:105,000 at A3

0 0.5 1 2 3 4 5
Kilometers

Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

Document Location: \\BAAM-SERVER\baamdata\BAAM\Operations\BAAM Jobs\Active BAAM Jobs\0015-060 NEDS Phase 2\GIS\MXDs\ReportFigures\Figure 3-3 Habitat Mapping.mxdDate: 30/05/2013 2:06:20 PM

Finally, continual land use and vegetation changes throughout the Redland City means that the vegetation layers become out-dated over time. To provide just two examples: new developments convert remnant vegetation into non-remnant areas, and patches of regrowth vegetation may grow to such a stage that they meet the structural characteristics of remnant vegetation. For these reasons vegetation mapping needs to be progressively updated as new aerial imagery, LiDAR data and approved development plans are made available.

3.2. NON-RE HABITAT MAPPING

The Redland City Non-RE habitat represents a new and detailed dataset derived from an amalgam of primarily newly derived mapping components, as well as pre-existing spatial datasets. It comprises 7059 polygons, containing 681 hectares of urban woody vegetation, as well as areas of plantations (93 ha), beaches (22 ha) and mudflats and sand bars (359 ha). Mapping the non-RE layer has resulted in a detailed dataset capturing a range of habitats not associated with the RE framework (**Figure 3.3)**. This has already proved useful for mapping Koala habitats, the results of which are reported in BAAM (2013).

3.3. SPECIES HABITAT MODEL

The implementation of the methods described in **Section 2.2** resulted in the creation of a new model, which sits outside NEDS, but allows for the creation and re-creation of one of its new Primary Layers—the Species Habitat layer. The model is designed with great inherent flexibility, and can be upgraded as future knowledge and data become available—specifically updates to the spatial layers that are used in the model, adding new species or RE and scoring changes to existing species.

The species habitat model run which is analysed here, used the scoring option which gradates the score depending on the habitat class (remnant, regrowth or non-RE habitat). This is because it is regarded as the most nuanced scoring option, and the habitat quality for each species is likely to vary with these classes). Initial runs of the Species Habitat model using both the 'straight' and varied scoring systems (**Table 2.5**) showed unexpectedly high scores for regrowth vegetation (*data not presented*). This was a result of this draft layer being largely attributed using Python scripting (**Section 2.1.2**). This automated process resulted in a larger number of communities within a polygon mosaic, and consequently more habitats to receive a score in the model. In order to address this, a temporary scoring system was utilised **(Table 3.1)**. The ability of the model to incorporate easily modifiable scoring changes is testament to it flexibility. However it is recommended that the model utilise one of the standard scoring schemes (**Table 2.5**) once the regrowth mapping has been refined.

3.3.1. Species Habitat Layer

The Species Habitat Layer provided as part of Phase 2 features the same basic linework as the combined remnant and regrowth layers, with additional linework for non-RE habitats.

This layer incorporates mapping for 47 priority species, and the mapping for these may be viewed individually, or as the aggregate conservation values of habitat for all of these species. Koala habitat is not included among the habitat mapping for the 47 species. This is because the NEDS Species Habitat Model currently uses only a presence/ absence framework for all species in relation to a given habitat. An additional more nuanced Koala layer has been created, categorising Primary and Secondary habitats, reflecting the importance of this species for the Redland City Planning Scheme (BAAM 2013). The Koala Habitat Layer contains three separate ratings for habitat quality rather than just presence/ absence. The ratings are based on which habitats contain either primary or secondary food species (see BAAM (2013) for more details). For this reason the Koala layer should be used in concert with the Species Habitat Layer when running the NEDS model. Exclusion of Koala from the Species Habitat Layer means that historical records of Koala are not used in NEDS. This is not seen as an issue because spatial analysis revealed that the Koala records dataset (see BAAM 2013) was so large (over 20 000 records) that the buffered points resulted in all areas of suitable habitat becoming known record polygons. Instead, the scoring of Koala in the NEDS should reflect this by appropriately scoring the weighting table that would be the Koala Habitat Layer in the model.

The species record layer, created as part of NEDS Phase 2, contains a comprehensive list of conservation significant species. However it also constitutes a solid platform from which habitat associations for additional species can be added during future phases of the NEDS Project. Where species were not included in the

model, it was because no habitat associations had been confidently attributable because of insufficient species habitat data being available.

The Species Habitat Layer presents a 'heat map' of aggregate habitat values for significant species (**Figure 3.4)**. Habitat polygon scores ranged from 0–699. Overall, the map highlights the importance of riparian areas, coastal fragments, and the vegetation complexes of the Southern Moreton Bay Islands. The Species Habitat Layer results presented here indicate that the model is highly sensitive to mapping accuracy. In particular, areas of regrowth vegetation still show up with disproportionately high value despite the downweighted scoring scheme **(Figure 3.4; Table 3.1**). On this basis, further downweighting should be investigated in future model runs, and regrowth mapping refinements should be made a priority. RE 12.2.7 was the habitat type with the highest score because it had the largest number of species associated with it. Polygon mosaics containing many REs associated with species, and those species having high scores (based on their status—**Table 2.5**) generate high scoring map areas. Overall, the areas of highest conservation significance for species habitat were the upper reaches of Tingalpa Creek, areas of Land Zone 2 on the Southern Moreton Bay islands (particularly the south of Russel Island) and various mosaics of REs 12.3.5, 12.3.6, 12.3.11, 12.5.3 and 12.5.2. Once mapping of North Stradbroke Island is incorporated in the NEDS RE dataset, analyses should be carried out on the Species Habitat Model results for this areas, as some of the highest scores would be expected there. For some areas, particularly those in regrowth vegetation, the current results emphasise the need for refinements to the RE mapping, as large mosaics of vegetation types result in high scores producing a spurius signal of habitat value.

The Species Habitat Model as developed for Phase 2, maps binary presence/absence at the resolution of the RE level within native vegetated habitats (Regrowth and Remnant layers) and basic habitat designations within other habitats (non-RE layer). The designations for each species are presented in **Table 2.2**. For this reason the mapping of the presence of a particular species will be more or less accurate depending on the habitat type or landscape context. For example, although species-RE associations are made at the vegetation community level in the model (the letter suffix after the RE codes, which is more specific than the straight RE description), a species may be associated with a relativity rare floristic element. So while the whole vegetation community is associated as suitable, the habitat may in practice be only in limited portions of the mapped area. Another example is Water Mouse (*Xeromys myoides*). This species is primarily associated with tidal areas away from human habitation. However it can also be found in adjacent areas, as exhibited in its essential habitat factors in land zones such as 5, 9-10, 11 and 12. As the habitat model in its present form does not take into account landscape context (such as proximity to tidal areas), all instances of the applicable RE are currently associated with Water Mouse in the model.

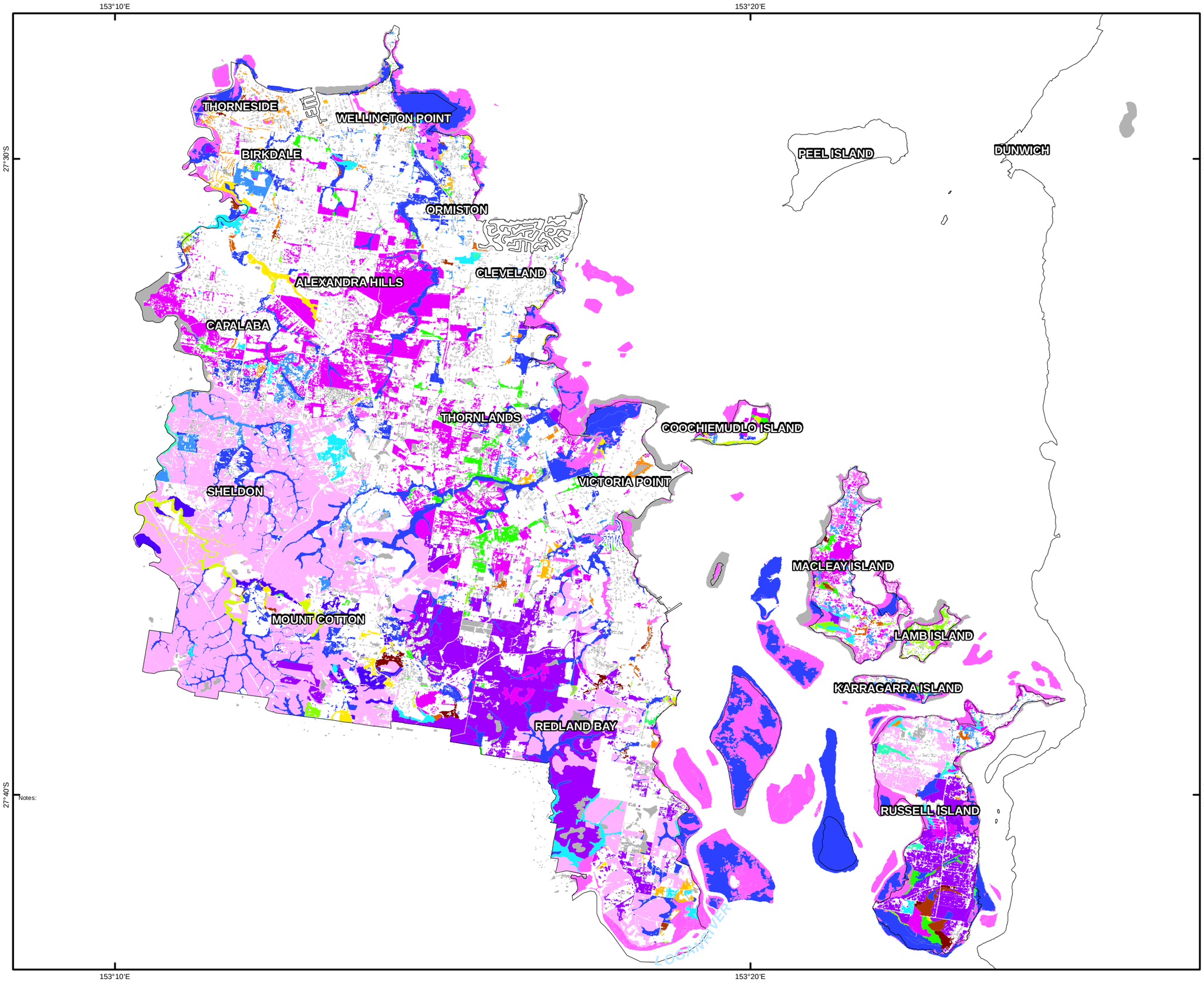
However it should be considered that NEDS is designed, developed and implemented to be an expression of conservation value. In this context, it maps many species and flags potential presence, scoring habitats associated with many species higher than those with less. So while the Species Habitat layer may not currently present highly accurate habitat maps for all species, it does, on aggregate, provide an excellent expression of habitat value at the Redland City scale.

3.3.2. Refinement and integration of the Species Record Layer

The Species Record layer was integrated into the new Species Habitat layer and revised with the addition of data from the field surveys and data vetting to increase record accuracy. A total of 21 plant and 26 animal species records currently inform the species record component of the Species Habitat Layer. A point dataset which removed records associated with North Stradbroke Island was used in the model run analysed here. It contained a total of forty records for plants (seven species) and two records for animals (two species). The lack of fauna records associated with the mainland (apart from Koala) and the Southern Moreton Bay Islands emphasises the need for greater fauna survey activity in these areas.

For plants, the large number of threatened plants at Mt Cotton led to the highest known flora record scores in the layer at that location (with known scores ranging between 18–81).

For animals the highest scoring area was a tributary to Tingalpa Creek in the far southwest of Redland City, triggered by a record for Tusked Frog in that vicinity.



Notes:

Figure: **3-4**

Title:

Species Habitat Score Map

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Species Habitat Score:

0 - 9	248 - 286
10 - 47	287 - 305
48 - 92	306 - 320
93 - 114	321 - 340
115 - 141	341 - 368
142 - 168	369 - 392
169 - 195	393 - 413
196 - 213	414 - 449
214 - 228	450 - 533
229 - 247	534 - 699
	RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:105,000 at A3

0 0.5 1 2 3 4 5
Kilometers

Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

4.0 RECOMMENDATIONS

4.1. FUTURE FIELD ASSESSMENTS

Field assessments should be an ongoing aspect of NEDS refinement and development. A central focus must be vegetation surveys to improve mapping. Additional vegetation surveys are necessary to support current vegetation mapping and refine the mapping in the future. Other important survey activities include searches and (in the case of animals) trapping for conservation significant taxa.

To supplement mapping data, additional activities may be considered. For mapping areas of vegetation along roads where ground truthing has not been carried out, Google Street View could be more extensively used to visually assess dominant species. This approach was only undertaken in a limited way during NEDS Phase 2 and may prove a cost effective supplement to field verification for some areas. Operators for this task would need to be experienced in identifying dominant species from moderate-resolution digital images.

A primary focus of future work would be to ascertain the distribution of significant species. Currently, the new NEDS Species Habitat layer uses historical point records similar to those from the old Species Record Layer. However, many of these records lack temporal and/ or spatial accuracy. The functionality of the model would be enhanced with increased accuracy of records, which could be achieved with additional fieldwork. The accuracy of flora records could be improved using a relatively straightforward approach, comprising locating the original records, revising their coordinates and adding new records. For fauna the same results may be more difficult to achieve as trapping and other field methods may be required. However, the fauna component could potentially be informed by data captured under other project(s).

There are opportunities for synergies between the species recording and vegetation mapping aspects of future surveys, with fieldwork recording significant plant populations and vegetation types in particular being able to be undertaken simultaneously. It is essential that data yielded from further ground truthing be effectively used. For this reason it is recommended that time be allocated to make amendments to the vegetation mapping based on the findings.

Standard templates and pro-forma for future vegetation survey work for NEDS can be found in Neldner *et al*. 2012.

4.2. REFINEMENT AND MAINTENANCE OF COMPONENTS CONSIDERED IN PHASE 2

As per the proposed approach discussed in Aecom and BAAM (2012b) the Phase 2 deliverables reported here constitute completely new layers within NEDS which for the first time are custom-built to inform planning and management at the Redland City scale. However, as noted previously (Aecom and BAAM 2012b) by reason of them being new datasets created for an extensive area in a relatively short period of time, they should be considered a first draft as delivered for NEDS Phase 2. The new layers provide a basis for which refinements can be made and new data added. In addition, there are two more layers in NEDS that were not included in Phase 2 which need revision in order to bring them in line with the vegetation and habitat layers. This section makes recommendations on the processes or actions that need to be undertaken so that all components of NEDS are suitably upgraded and may be continually refined throughout the duration of NEDS's use.

4.2.1. Remnant and Regrowth Vegetation Layers

The new vegetation layers constitute an immense improvement on the State RE datasets they replaced. However they were necessarily based on a limited amount of fieldwork. Further ground-truthing is required to improve the spatial accuracy of boundaries between adjacent regional ecosystems as well as to improve the accuracy of RE designations.

It is considered critical that further refinement of the two revised native vegetation layers be undertaken. In addition, more remote sensing tools could be employed to improve the NEDS mapping. While the linework of the outer boundary of native vegetation (i.e. the remnant–non-remnant interface) has for the most part been captured to a high degree of accuracy, linework delineating the boundaries within blocks of vegetation, and the designations of the blocks themselves, could be improved. Priorities for review of RE designation include those polygons that were auto-attributed from the State Preclear REs (**Section 2.2**), which in particular include a large number of regrowth polygons. Finally, improvements to the distinction between remnant and regrowth could be made. Structural assessments in regrowth

vegetation within the Redland City and comparison to local benchmark analogue sites would assist in this regard, as would use of historical imagery interpretation.

The revised regrowth vegetation layer essentially contains all native vegetation that is not remnant. This is a relatively broad grouping and includes all vegetation from recently regrowing to approaching remnant status. Consideration could be given to splitting the regrowth vegetation mapping into two groups, 'young' and 'mature'. The definition could be structural, or based on age since clearing (e.g. the EHP high value regrowth definition). The latter would require historical aerial photography interpretation.

Vegetation changes may be natural or anthropogenic and may operate at various spatial and temporal scales. NEDS mapping must account for these changes and therefore needs to be updated. An example is regrowth vegetation that grows to meet the structural requirements of remnant vegetation and therefore needs to be moved into that dataset.

Due to data availability (**Section 2.1.2**), NEDS Phase 2 mapping did not include North Stradbroke Island and Peel Island. Revised mapping of this area should be undertaken as a priority to complete the mapping extent to encompass all of Redland City.

The local conservation values of vegetation communities could be incorporated where they are not captured by the current model. At present, the model only integrates biodiversity status at the State level; however, there is opportunity to express the local significance of REs by utilising the critically limited RE designation developed in Phase 2. The scripting in the NEDS Arctoolbox would need to be modified in order to reflect the presence of Redland City critically-limited REs, as well as the biodiversity status of REs. Overall this would result in higher resolution conservation priority data and a more accurate, locally appropriate and useful model.

The Redland City critically-limited RE framework, developed as a value-adding exercise for NEDS Phase 2, was formulated with a view to retaining an adequate sample of each RE type within the Redland City. A dialogue should be initiated as to whether the critically-limited criteria as currently formulated are suitable, or whether a modification of the criteria would assist in prioritising conservation efforts.

Additional vegetation community status components could also be considered for inclusion in the scoring of these layers; in particular threatened ecological communities under the EPBC Act which would add a broader scale national resolution to the conservation priorities.

4.2.2. Non-RE Habitat layer

The non-RE habitat layer offers a detailed map of habitats existing outside the RE framework, of a kind unavailable from any pre-excising dataset. Considerable further work could be done on this layer, in particular spitting or adding attribution categories as necessary. Ultimately, the priorities for refinement of this layer depend on the sorts of uses to which managers wish to apply it. For example, if a conservation significant species is found to use a habitat type not currently captured in the mapping, then effort may be concentrated on incorporating these features.

Of particular note for the non-RE layer is the way it captures fragments of woody vegetation in the built environment matrix. Better characterising the components of these may further increase the utility of the dataset, and could include activities such as estimating the proportion of exotic and native species in a mapped area. Also, currently semi-natural areas dominated by exotic woody species are included in the 'urban trees' designation. Consideration should be given to splitting these areas off into their own designation.

4.2.3. Species Habitat Model

To develop this model BAAM drew upon in-house expert knowledge, in combination with the EHP Essential Habitat Factors, to assign REs and non-RE habitats to each species. Further work could include refining and expanding this list though literature review and field research.

The list of priority species is considered to be comprehensive based on current knowledge and species statuses. However, species should be added where warranted and some species considered for removal (**Section 2.3.3**). This is particularly the case over time as species statuses change (e.g. become de-listed or listed in legislation) or significant taxa are identified. For the species currently in the model, priority

should be given to adding any additional information on the habitat associations, particularly adding or removing associated RE or other habitat associations, based on expert knowledge. This can be done progressively as more information on species-RE associations comes to hand through fieldwork and research.

Many REs associated with a species are only suitable habitat in certain circumstances (e.g. water mouse in non-wetland REs only adjacent to wetlands).

Mapping of habitat associations can be improved by the following methods (or a combination of these):

- Improve mapping detail (e.g. map habitat feature of landscape context);
- Improve habitat association sensitivity (e.g. grade habitat types from high to low association for each species).

Species of plants and animals vary in their sensitivity to changes in habitat quality and characteristics. At present the habitat scoring system can be applied in two ways, but uniformly for all species. To better reflect species habitat preferences, selecting one or the other scoring system for each species within a run of model may better take into account the idiosyncratic effects of habitat quality on different species; selecting which species would best suit which scoring system. This would involve both literature review and fieldwork to assess the quality of different habitats and the associated effects on species. Overall it would result in a more sensitive and effective model.

In addition, as noted in **Section 2.2.4** the scoring of known records may be improved by analysing the different ways flora and fauna records affect the model output and adjusting the scoring or buffer parameters appropriately.

The Species Habitat Model is currently highly sensitive habitat mosaics, scoring polygons with a large number much higher than those with fewer. While this, to some extent, reflects conservation value (where many habitats are packed into a small area) it is also a result of mapping accuracies. Aside from refining the mapping (**Section 4.2.1**), the model itself may be improved in this regard using at least two approaches: (1) scores could be set using the percentage values in the RE mosaic (where the proportion of a habitat contributing to a polygon is thus weighted); or (2) scoring could be modified such that species can only assign a potentiality score only once if it hits an associated RE in a polygon mosaic, with additional aligning REs in the mosaic not adding to the species score. Future refinements to the model should investigate these merits of these ideas in improving the expression of habitat value.

As the Species Habitat layer is a new layer within the NEDS model, scripting in the model will need to be modified to account for it. In addition, a weighting will need to be derived for it relative to the other layers in the model. It is recommended that this layer receives a high ranking in the NEDS model.

4.3. RECOMMENDED ACTIONS FOR COMPONENTS NOT CONSIDERED IN PHASE 2

4.3.1. Replacing State BPA mapping

The BPA dataset was developed by DEHP to assess biodiversity values at the landscape scale in Queensland. The BPA for the Southeast Queensland Bioregion is based primarily on 1:100 000 scale remnant RE mapping (Version 2.0) produced by the Queensland Herbarium. It ranks areas of remnant vegetation into state, regional and local biodiversity significance, using a range of ecological criteria including size, rarity, diversity, fragmentation, habitat condition, resilience, threats, habitat for EVNT species and ecosystem processes. The NEDS model incorporates tract size (i.e. the size of patches of remnant vegetation) from the BPA.

A major drawback with using this layer in NEDS in analogous to the drawbacks with using the State RE layers which are now being surmounted by the creation (and ongoing refinement) of the Redland City RE layers. Specifically, the tract size parameters in the BPA were designed with regional conservation panning in mind. For this reason it only identifies a few larger tracts of vegetation in the set of the Redland City as significant.

A recalibration of what constitutes a significant tract of vegetation for Redland City is warranted and can be achieved in two ways: (1) by replacing the mapping and adjusting the parameters. The new vegetation layers developed in Phase 2 will provide a more accurate and higher resolution mapping product than the State BPA corridor and tract size mapping; (2) size categories will better highlight

the areas of vegetation that are of a size significant to biodiversity in Redland City.

This aspect of NEDS does not need to be limited to tract size. There are a number of landscape ecology metrics which could be incorporated to enhance the expression of conservation values in Redland City. These include connectivity, mean shape index and number of patches. Using an ArcGIS extension or modelling program such as Linkage Mapper, FunConn, FRAGSTATS, or Conefor, the high resolution mapping generated in Phase 2 could be incorporated into a model to be incorporated into the overall NEDS system to optimise corridor and landscape management planning.

4.3.2. Replacement of the State wetlands mapping.

To bring it up to date with the other datasets, composite State wetlands mapping dataset used in the model should be replaced with a new Redland City wetlands dataset, using mapping components from the new vegetation layers and non-RE habitat layer.

The data collected in the course of Phase 2 fieldwork, combined with RCC's existing data will allow for waterways and wetlands to be mapped at a higher spatial resolution and with greater accuracy than is currently available in the State wetlands mapping.

Phase 3 should aim to establish an approach by which to integrate existing data with the new vegetation layer to develop wetlands mapping with greater functionality and local relevance than the State wetlands mapping.

4.3.3. General considerations

General considerations for Phase 3 and beyond include:

- recording and documenting findings and methodologies so that future data collection, manipulation and geoprocessing may be carried out in a consistent manner for future incorporation into, or augmentation of, the NEDS system. This includes the development of standard data templates where applicable; and
- refinements to the weighting tables in NEDS are required to accommodate the new layers and reconsider the parameters already set where necessary. This should be done in consultation with expert opinion, and with due regard for conservation and planning priorities.

5.0 CONCLUSION

Phase 2 of the NEDS project was broad in scope, and established a platform for future detail. Its central achievements were an overall revision of native vegetation mapping, the introduction of a habitat mapping dataset outside the RE system, and the development of a species habitat model featuring an extensive list of significant species. The vegetation mapping now captures the smaller areas of important habitat identified as missing from NEDS during Stage 3 of Phase 1. These products should be refined and improved, completing any areas not covered, increasing mapping accuracy, and adding attributes as necessary. Importantly these layers are key to improving the remaining layers in NEDS not updated in Phase 2 i.e. wetlands and the BPA-derived corridor and tract size mapping (the latter of which may be expanded to encompassing other landscape ecology parameters).

The Species Habitat Model, integrating potential habitat and known species records, captures a critical aspect of conservation value, previously only partially expressed in the Species Record Layer. This model also facilitates the straightforward addition and subtraction of species or species records, as well as changes to species status or habitat associations. These advances allow for the creation of a robust Species Habitat Layer within NEDS—one which is stable and easily updatable.

These developments have significantly enhanced NEDS as a tool for conservation and management planning. Future phases of the NEDS project should build on this progress by enhancing the new layers and using them to replace the remaining layers not updated in Phase 2.

6.0 REFERENCES

AECOM & BAAM (2011). Stage 1 – Review of Literature and Initiatives (Natural Environment Decision System. Unpublished report prepared for Redland City Council.

AECOM & BAAM (2012a). Stage 2 – NEDS Development Report. Report prepared for Redland City Council.

AECOM & BAAM (2012b). Stage 3 – NEDS Ground Truthing Report. Unpublished report prepared for Redland City Council.

BAAM (2010). Redland Invertebrate Study — Eprapah Creek, Redland Bay. Unpublished report prepared for Redland City Council.

BAAM (2012). Proposal—NEDS Phase 2: Revision and enhancement of flora and fauna spatial data layers. For Redland City Council.

BAAM (2013). Koala Habitat Review and Mapping Redland City Urban Areas. Unpublished report prepared for Redland City Council.

Brisbane City Council (2010). Tusked Frog – Conservation Action Statement http://www.brisbane.qld.gov.au/2010%20Library/2009%20PDF%20and%20Docs/4.Environment%20and%20Waste/4.7%20Wildlife/environment_and_waste_tusked_frog_CAS_2010_d4.pdf, Accessed 04/05/13

Bureau Rural Science (BRS) (2002). *Land Use Mapping at Catchment Scale, Principles, Procedures and Definitions*. Edition 2, Bureau of Rural Sciences, Canberra.

Catterall, C. P., & Kingston, M (1993). 'Remnant Bushland of South-east Queensland in the 1990s: It's Distribution, Loss, Ecological Consequences and Future Prospects.' (Griffith University: Brisbane.)

Congdon, B. C., & Catterall, C. P. (1994). Factors influencing the eastern curlew's distribution and choice of foraging sites among tidal flats of Moreton Bay, South eastern Queensland. *Wildlife Research*, *21*(5), 507-517. Retrieved from http://www.publish.csiro.au/paper/WR9940507

Department of the Environment and Heritage (2011). 'Threatened Australian Plants'. http://www.environment.gov.au/biodiversity/threatened/publications/pubs/plants.pdf Accessed 29/04/13

DEHP (2013). Biodiversity Status and Vegetation Management Class. http://www.ehp.qld.gov.au/ecosystems/biodiversity/regional-ecosystems/status.html

DSEWPaC (2009). Australian Natural Resources Atlas – Biodiversity Assessment – SEQ. www.anra.gov.au/topics/vegetation/assessment/qld/ibra-south-eastern-queensland.html

DERM (2011). QLD Biodiversity Offsets Policy. http://www.ehp.qld.gov.au/management/environmental-offsets/pdf/biodiversity-offset-policy.pdf

DSITIA (2012). Regional Ecosystem Technical Descriptions: Southeastern Queensland—Selected REs. http://www.ehp.qld.gov.au/ecosystems/biodiversity/regional-ecosystems/pdf/seq_all_landzones.pdf

EPA (2002). *Biodiversity Assessment and Mapping Methodology.* Queensland Government, Brisbane. http://www.ehp.qld.gov.au/register/p00471aa.pdf

Garden, J. McAlpine, C. Peterson, A. Jones, D. Possingham, H. (2006). Review of the ecology of Australian urban fauna: A focus on spatially explicit processes. *Austral Ecology.* Vol. 31: pp.126-148.

Gioia, P & Pigott, P. (2000). 'Biodiversity assessment: a case study in predicting richness from the potential distributions of plant species in the forests of south-western Australia'. *Journal of Biogeography,* Vol. 27. Pp.1065-1078

Glossy Black Conservancy (2010). Glossy Black Fact Sheets. http://www.glossyblack.org.au/glossy_fact_sheet.html, Accessed 04/05/13

Hamer, A., Smith, P. and McDonnell, M. (2012), 'The Importance of Habitat Design and Aquatic Connectivity in Amphibian Use of Urban Stormwater Retention Ponds', *Urban Ecosystems,* vol. 15, no. 1, pp. 451-471.

Hourigan, C., Catterall, C, Jones, D. and Rhodes, M. (2010), 'The Diversity of Insectivorous Bat Assemblages among Habitats within a Subtropical Urban Landscape', *Austral Ecology*, vol.35, no.1, pp. 849-857

Koala Action Group Inc. (2011), *Every Koala Food Tree is Important* (online), http://www.koalagroup.asn.au/news/21-every-koala-food-tree-is-important, Accessed 04/04/2013

Lawson, B.E. (2007). The utility of site-based datasets and regional ecosystem mapping for biodiversity conservation in the South-east Queensland Bioregion: past, present, future. University of QLD, PhD thesis

Luniak, M. (2004), 'Synurbanisation – adaptation of animal wildlife to urban development', *Proceedings 4th International Urban Wildlife Symposium*, Shaw et al. Eds., May 1-5, 1999, Tucson, Arizona.

Matthews A., Lunney D.,Waples K. & Hardy J. (2004) Brushtail possums: 'Champion of the suburbs' or 'Our tormentors'?. In: *UrbanWildlife: More Than Meets the Eye* (eds D. Lunney & S. Burgin) pp. 159–68. Royal Zoological Society of New SouthWales, Mosman.

Mittermeier R.A., Turner W.R. & Larsen F.W. (2011). Global Biodiversity Conservation: The Critical Role of Hotspots: Chapter 1 **In:** F.E. Zachos and J.C. Habel (eds.), *Biodiversity Hotspots, DOI 10.1007/978-3-642-20992-5_1, #* Springer-Verlag Berlin Heidelberg.

Neldner, V.J., Wilson, B.A., Thompson, E.J. and Dillewaard, H.A. (2012) *Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland*. Version 3.2. Updated August 2012. Queensland Herbarium, Queensland Department of Science, Information Technology, Innovation and the Arts, Brisbane. 124 pp.

Queensland / Commonwealth CRA RFA (1999), 'South-East Queensland Comprehensive Regional Assessment'. Commonwealth of Australia, Indooroopilly, QLD

Queensland Herbarium (2013) Regional Ecosystem Description Database (REDD). Version 7.1 (February 2013) (DSITIA: Brisbane).

Queensland Museum (2003) Wild Plants of Greater Brisbane, South Brisbane, QLD

Stephens K. M., Sharp D (2009). The Flora of North Stradbroke Island. The State of Queensland, Environmental Protection Agency.

Williams K.J., Ford A., Rosauer D. F., De Silva N., Mittermeier R., Bruce C., Larsen F.W., & Margules C. (2011). Forests of East Australia: The 35th Biodiversity Hotspot: Chapter 16 **In:** F.E. Zachos and J.C. Habel (eds.), Biodiversity Hotspots, DOI 10.1007/978-3-642-20992-5_1, # Springer-Verlag Berlin Heidelberg.

7.0 ACKNOWLEDGEMENTS

Thanks go to Fatih Duh for his adept work, including volunteer work, in developing the Species Habitat Model and to Vladimir Wingate for his extensive mapping, in a voluntary capacity, particularly on the Non-RE Layer. Also thanks to Maree Manby for organising property access for fieldwork.

APPENDIX 1
INPUT TABLES FOR SPECIES HABITAT LAYER

Table A1. RE and Species Matching Matrix (TBL_001)

	Species																							
RE	SP001	SP002	SP003	SP004	SP005	SP006	SP007	SP008	SP009	SP010	SP011	SP012	SP013	SP014	SP015	SP016	SP017	SP018	SP019	SP020	SP021	SP022	SP023	SP024
12.1.1		0	1	1		1		0				1					1				1	0	0	0
12.1.2		0	0	0		0		0				1					1				0	0	0	0
12.1.3		0	0	0		0		0				1					1				0	0	0	0
12.11.10		1	0	1		0		1				0					0				1	1	1	1
12.11.2		0	0	0		0		1				0					0				0	0	0	0
12.11.23		1	1	1		1		0				0					0				1	0	0	0
12.11.3		1	1	1		1		1				0					0				1	1	0	1
12.11.3a		1	0	0		0		0				0					0				0	0	0	0
12.11.5		0	0	0		0		1				0					0				0	0	0	0
12.11.5a		1	0	0		0		0				0					0				0	0	0	0
12.11.5e		1	0	0		0		0				0					0				0	0	0	1
12.11.5h		0	0	0		0		0				0					0				0	0	0	0
12.11.5j		1	0	0		0		0				0		1			0				0	0	0	0
12.11.5k		1	0	0		0		0				0					0				0	0	0	0
12.12.14		0	1	1		1		0				0		1			0				1	0	0	0
12.12.19		0	0	0		0		0				0				1	0				0	0	0	0
12.2.1		0	0	1		0	1	0				0					0	1			1	0	0	0
12.2.10		0	1	1		1	1	0	1			0	1				0				1	0	0	0
12.2.12	1	0	0	1	1	0		0	1	1		1					1		1	1	0	0	0	0
12.2.13	1	0	0	1		0		0				0	1				0		1		0	0	0	0
12.2.14		0	0	0		0		0				0	1			1	0				0	0	0	0
12.2.15		0	0	0		0		0	1	1	1	1					1	1	1	1	0	0	0	0
12.2.15a		0	0	0		0		0			1	0					0				0	0	0	0
12.2.15f		0	0	0		0		0			1	1					1				0	0	0	0
12.2.16		0	0	0		0		0				0	1				0				0	0	0	0
12.2.2		0	0	1		0		0				0					0		1		1	0	0	0
12.2.5	1	1	1	1		1		0	1	1		1					1		1	1	1	0	0	0
12.2.5a		0	0	0		0		0				1					1				0	0	0	0
12.2.6		1	1	1		1	1	0				0			1		0				1	0	0	0
12.2.7		0	1	1		1		0	1	1		1	1				1	1	1	1	1	0	0	0
12.2.8		1	1	1		1	1	0				0					0				1	0	0	0
12.2.9	1	0	1	1		0		0	1			0	1				0				0	0	0	0
12.3.1		1	1	1		1		0				0					1				1	1	1	0
12.3.11		1	1	1		1		0				1					1				1	0	0	1
12.3.11a		1	0	0		0		0				0					1				0	0	0	0
12.3.13	1	0	0	1	1	0		0				1					1		1		0	0	0	0
12.3.2		0	0	0		0		0				0					0				0	0	0	0
12.3.3		0	0	0		0		0				0					0				0	0	0	0
12.3.3d		1	0	0		0		0				0					0				0	0	0	0
12.3.4		0	0	0		0		0		1		0					0				0	0	0	0
12.3.5		0	1	1		1		0	1			1					1		1		1	0	0	0
12.3.5a		0	0	0		0		0				0					0				0	0	0	0

	Species																							
RE	SP025	SP026	SP027	SP028	SP029	SP030	SP031	SP032	SP033	SP034	SP035	SP036	SP037	SP038	SP039	SP040	SP041	SP042	SP043	SP044	SP045	SP046	SP047	SP048
12.1.1	0			0	1	1	1	0		0				0		1			1			0	1	
12.1.2	0			0	1	1	0	1		0				0		1			1			0	1	
12.1.3	0			0	1	1	0	1		0				0		1			1			0	1	
12.11.10	1			0	0	0	1	0		1				0		0			0			1	0	
12.11.2	0			0	0	0	0	0		0				0		0			0			0	0	
12.11.23	1			1	0	0	1	0		0				1		0			0			0	1	
12.11.3	1			1	0	0	1	0		0				1		0			0			0	1	
12.11.3a	0			0	0	0	0	0		0				0		0			0			0	0	
12.11.5	0			0	0	0	0	0		0				0		0			0			0	0	
12.11.5a	0			1	0	0	0	0		0				1		0			0			0	0	
12.11.5e	0			1	0	0	0	0		0				1		0			0			0	0	
12.11.5h	0			1	0	0	0	0		0				1		0			0			0	0	
12.11.5j	0			0	0	0	0	0		0				0		0			0			0	0	
12.11.5k	0			1	0	0	0	0		0				1		0			0			0	0	
12.12.14	0			1	0	0	0	0		0				1		0			0			0	1	
12.12.19	0			0	0	0	0	0		0				0		0			0		1	0	1	
12.2.1	0			0	0	0	1	0		0				0		0			0			1	0	
12.2.10	0			0	0	0	0	0		0				0	1	0			0			0	1	
12.2.12	0			0	1	1	0	0		0				0	1	1	1		1			0	1	
12.2.13	0			0	0	0	0	0		0				0		0			0			0	1	
12.2.14	0			0	0	0	0	0		0				0		0			0			0	0	
12.2.15	0			0	1	1	0	0		0	1			0		1	1		1	1		0	1	
12.2.15a	0			0	0	0	0	0		0				0		0			0			0	0	
12.2.15f	0			0	1	1	0	0		0				0		1			1			0	0	
12.2.16	0			0	0	0	0	0		0				0		0			0			0	0	
12.2.2	0			0	0	0	1	0		0				0		0			0			1	0	
12.2.5	0			1	1	1	1	0		0		1		1		1			1			0	1	
12.2.5a	0	1		0	1	1	0	0		0				0		1			1			0	0	
12.2.6	0			1	0	0	0	0		0				1	1	0			0			0	1	
12.2.7	0	1		0	1	1	1	0	1	0		1	1	0		1			1			0	1	
12.2.8	0			1	0	0	1	0		0				1		0			0			0	1	
12.2.9	0			0	0	0	0	0		0				0	1	0			0			0	1	
12.3.1	0			0	1	0	1	0		1				0		0			0			1	1	
12.3.11	0			1	1	1	1	0		0				1		1			1		1	0	1	
12.3.11a	0			1	1	0	0	0		0				1		0			0			0	0	
12.3.13	0			0	1	1	0	0		0				0	1	1	1		1			0	1	
12.3.2	1			0	0	0	0	0		0				0		0			0			0	0	
12.3.3	0		1	0	0	0	0	0		0				0		0			0			0	0	
12.3.3d	0			1	0	0	0	0		0				1		0			0			0	0	
12.3.4	0			0	0	0	0	0	1	0	1		1	0		0			0			0	0	
12.3.5	0	1		0	1	1	1	0		0	1		1	0		1	1		1			0	1	
12.3.5a	0	1		0	0	0	0	0		0				0		0			0			0	0	

	Species																																															
RE	SP001	SP002	SP003	SP004	SP005	SP006	SP007	SP008	SP009	SP010	SP011	SP012	SP013	SP014	SP015	SP016	SP017	SP018	SP019	SP020	SP021	SP022	SP023	SP024	SP025	SP026	SP027	SP028	SP029	SP030	SP031	SP032	SP033	SP034	SP035	SP036	SP037	SP038	SP039	SP040	SP041	SP042	SP043	SP044	SP045	SP046	SP047	SP048
12.3.6		0	1	1		1		0	1			1					1		1		1	0	0	0	0	1	1	0	1	1	0	0		0	1			1		1			1			0	1	
12.3.8		0	0	0		0		0				1					1				0	0	0	0	1			0	1	1	0	0		0	1			0		1			1			0	1	
12.5.10		0	0	0		0		0	1			0					0				0	0	0	0	0			0	0	0	0	0		0				0		0			0			0	0	
12.5.2		1	1	1		1		0				0					0				1	0	0	0	0			1	0	0	0	0		0				1		0			0		1	0	1	
12.5.3		1	1	1		1		0				0		1			0				1	0	0	0	0			1	0	0	1	0		0				1		0			0			0	1	1
12.5.6c		1	0	0		0		0				0					0				0	0	0	0	0			1	0	0	0	0		0				1		0			0			0	0	
12.5.9	1	0	0	0		0		0				1					1		1		0	0	0	0	0			0	1	1	0	0		0				0		1			1			0	1	
12.9-10.17c		1	0	0		0		0				0					0				0	0	0	0	0		1	1	0	0	0	0		0				1		0			0			0	0	
12.9-10.17d		1	0	0		0		0				0					0				0	0	0	0	0			1	0	0	0	0		0				1		0			0			0	0	
12.9-10.19		0	0	0		0		0				0					0				0	0	0	0	0			1	0	0	0	0		0				1		0			0			0	0	
12.9-10.19a		1	0	0		0		0				0					0				0	0	0	0	0		1	0	0	0	0	0		0				0		0			0			0	0	
12.9-10.22		0	0	0		0		0				0					0		1		0	0	0	0	0			0	0	0	0	0		0				0		0			0			0	0	
12.9-10.4		1	1	1		1		0				0		1			0				1	0	0	0	0			1	0	0	1	0		0				1		0			0			0	1	
beach		0	0	0		0		0				0	1			1	0				0	0	0	0	0			0	0	0	0	0		0				0		0			0			0	0	
drainage		0	0	1		0		0				0					0				0	0	0	0	0			0	0	0	0	0		0				0		0			0			0	0	
sand_bank		0	0	0		0		0				0					0				0	0	0	0	0			0	0	0	0	0		0				0		0		1	0			0	0	
urban_trees		0	0	0		0		0				0					0				0	0	0	0	0			0	0	0	0	0		0				1		0			0			0	0	

Table A2. Species Information and Score table (TBL_002)

Common_Name	Type_	EPBC_Status	NC_status	BackOnTrack	Endemic	NC_E	NC_V	NC_NT	EPBC_CE	EPBC_E	EPBC_V	EPBC_CD	BoT_C	BoT_H	End_X	RE_SCORE	RRE_SCORE	NRE_SCORE	A_KNOWN_SCORE
Tiny Wattle	flora	0	V	H	0	0	1	0	0	0	0	0	0	1	0	12	0.6	6	12
Grey/White Goshawk	fauna	0	NT	0	0	0	0	1	0	0	0	0	0	0	0	6	0.3	3	6
Illidge's ant-blue butterfly	fauna	0	V	C	0	0	1	0	0	0	0	0	1	0	0	12	0.6	6	12
Tusked Frog	fauna	0	V	0	0	0	1	0	0	0	0	0	0	0	0	8	0.4	4	9
Christmas Bell	flora	0	E	H	0	1	0	0	0	0	0	0	0	1	0	14	0.7	7	15
Glossy Black Cockatoo	fauna	E	V	0	0	0	1	0	0	1	0	0	0	0	0	18	0.9	9	21
Charopid	fauna	0	0	0	X	0	0	0	0	0	0	0	0	0	1	15	0.75	7.5	12
Native jute or Cunninghams jute	flora	E	E	H	0	1	0	0	0	1	0	0	0	1	0	24	1.2	12	27
Wallum Froglet	fauna	0	V	H	0	0	1	0	0	0	0	0	0	1	0	12	0.6	6	12
Durrigtonia	flora	0	N	C	0	0	0	1	0	0	0	0	1	0	0	10	0.5	5	9
0	flora	0	E	0	0	1	0	0	0	0	0	0	0	0	0	10	0.5	5	12
Black-necked Stork	fauna	0	NT	0	0	0	0	1	0	0	0	0	0	0	0	6	0.3	3	6
Beach Stone Curlew	fauna	0	V	H	0	0	1	0	0	0	0	0	0	1	0	12	0.6	6	12
0	flora	0	0	0	x	0	0	0	0	0	0	0	0	0	1	15	0.75	7.5	12
Charopid	fauna	0	0	0	X	0	0	0	0	0	0	0	0	0	1	15	0.75	7.5	12
Sooty Oystercathcer	fauna	0	NT	0	0	0	0	1	0	0	0	0	0	0	0	6	0.3	3	6
Lewin's Rail	fauna	0	NT	0	0	0	0	1	0	0	0	0	0	0	0	6	0.3	3	6
Cooloola Sedgefrog	fauna	0	NT	0	0	0	0	1	0	0	0	0	0	0	0	6	0.3	3	6
Wallum Rocketfrog	fauna	0	V	0	0	0	1	0	0	0	0	0	0	0	0	8	0.4	4	9
Wallum Sedgefrog	fauna	V	V	0	0	0	1	0	0	0	1	0	0	0	0	16	0.8	8	18
Square-tailed Kite	fauna	0	NT	0	0	0	0	1	0	0	0	0	0	0	0	6	0.3	3	6
Macadamia	flora	V	V	0	0	0	1	0	0	0	1	0	0	0	0	16	0.8	8	18

Common_Name	Type_	EPBC_Status	NC_status	BackOnTrack	Endemic	NC_E	NC_V	NC_NT	EPBC_CE	EPBC_E	EPBC_V	EPBC_CD	BoT_C	BoT_H	End_X	RE_SCORE	RRE_SCORE	NRE_SCORE	A_KNOWN_SCORE
Rough-Shelled Bush Nut	flora	V	V	0	0	0	1	0	0	0	1	0	0	0	0	16	0.8	8	18
Slender Milk Vine	flora	V	V	0	0	0	1	0	0	0	1	0	0	0	0	16	0.8	8	18
Clear Milkvine	flora	V	V	0	0	0	1	0	0	0	1	0	0	0	0	16	0.8	8	18
0	flora	0	V	0	0	0	1	0	0	0	0	0	0	0	0	8	0.4	4	9
Swamp Tea-tree	flora	0	E	H	0	1	0	0	0	0	0	0	0	1	0	14	0.7	7	15
Black-chinned Honeyeater	fauna	0	NT	0	0	0	0	1	0	0	0	0	0	0	0	6	0.3	3	6
Oxleyan Pygmy Perch	fauna	E	V	C	0	0	1	0	0	1	0	0	1	0	0	22	1.1	11	24
Cotton Pygmy Goose	fauna	0	NT	0	0	0	0	1	0	0	0	0	0	0	0	6	0.3	3	6
Powerful Owl	fauna	0	V	0	0	0	1	0	0	0	0	0	0	0	0	8	0.4	4	9
Eastern Curlew	fauna	0	NT	0	0	0	0	1	0	0	0	0	0	0	0	6	0.3	3	6
Swamp Daisy	flora	E	E	0	X	1	0	0	0	1	0	0	0	0	1	35	1.75	17.5	36
Richmond Birdwing Butterfly	fauna	0	V	H	0	0	1	0	0	0	0	0	0	1	0	12	0.6	6	12
Knotweed	flora	V	V	0	0	0	1	0	0	0	1	0	0	0	0	16	0.8	8	18
Swamp Orchid	flora	E	E	C	0	1	0	0	0	1	0	0	1	0	0	24	1.2	12	27
Phaius Orchid	flora	E	E	C	X	1	0	0	0	1	0	0	1	0	1	39	1.95	19.5	39
0	flora	0	N	0	0	0	0	1	0	0	0	0	0	0	0	6	0.3	3	6
Australian Painted Snipe	fauna	V	V	0	0	0	1	0	0	0	1	0	0	0	0	16	0.8	8	18
Rough Bog Rush	flora	0	N	0	0	0	0	1	0	0	0	0	0	0	0	6	0.3	3	6
Little Tern	fauna	0	E	H	0	1	0	0	0	0	0	0	0	1	0	14	0.7	7	15
Freckled Duck	fauna	0	NT	0	0	0	0	1	0	0	0	0	0	0	0	6	0.3	3	6
0	flora	0	V	0	0	0	1	0	0	0	0	0	0	0	0	8	0.4	4	9
Austral Toadflax	flora	V	V	0	0	0	1	0	0	0	1	0	0	0	0	16	0.8	8	18
Greater Sooty Owl	fauna	0	NT	0	0	0	0	1	0	0	0	0	0	0	0	6	0.3	3	6
False water rat	fauna	V	V	C	0	0	1	0	0	0	1	0	1	0	0	20	1	10	21
Greenhood Orchid	flora	0	E	0	0	1	0	0	0	0	0	0	0	0	0	10	0.5	5	12

APPENDIX 2
MANUAL FOR THE PYTHON SCRIPTS TO GENERATE THE NEDS PHASE 2 SPECIES HABITAT LAYER

Manual for the Python Scripts to Generate NEDS Phase 2 Species Habitat Layer

Introduction

This document aims to explain how to apply the scripts developed for the habitat layer of the NEDS system to the newly available datasets. Specifically, it summarises the methodology for the generation of the habitat layer (the remnant RE, regrowth RE and non-RE habitat layers combined), which is the base spatial data for this script, and explains how to set other GIS tables and fields (i.e., parameters of the script) with respect to the adopted methodology. Please be advised that the figures and field names given in the screen snapshots are from a trial dataset and are for representation purposes only.

Methodology used for generation of the Species Habitat layer

The Species Habitat layer is a polygon feature class containing habitats associated with Redland City conservation significant species. It contains three different overarching categories—or evaluation types—and it covers the whole area without any overlap. Here, evaluation type corresponds to general categories used to score polygons considering the area's (i.e., the polygon's) characteristics. There are three categories evaluated in this process, REMNANT RE vegetation areas, REGROWTH RE vegetation areas and NON-RE habitat areas (e.g. anthropogenic and non-vegetated habitats inhabited by some species). In summary, this dataset is a unified version of other three habitat mappings, REMNANT, REGROWTH and Non-RE habitat (**Figure A1**)

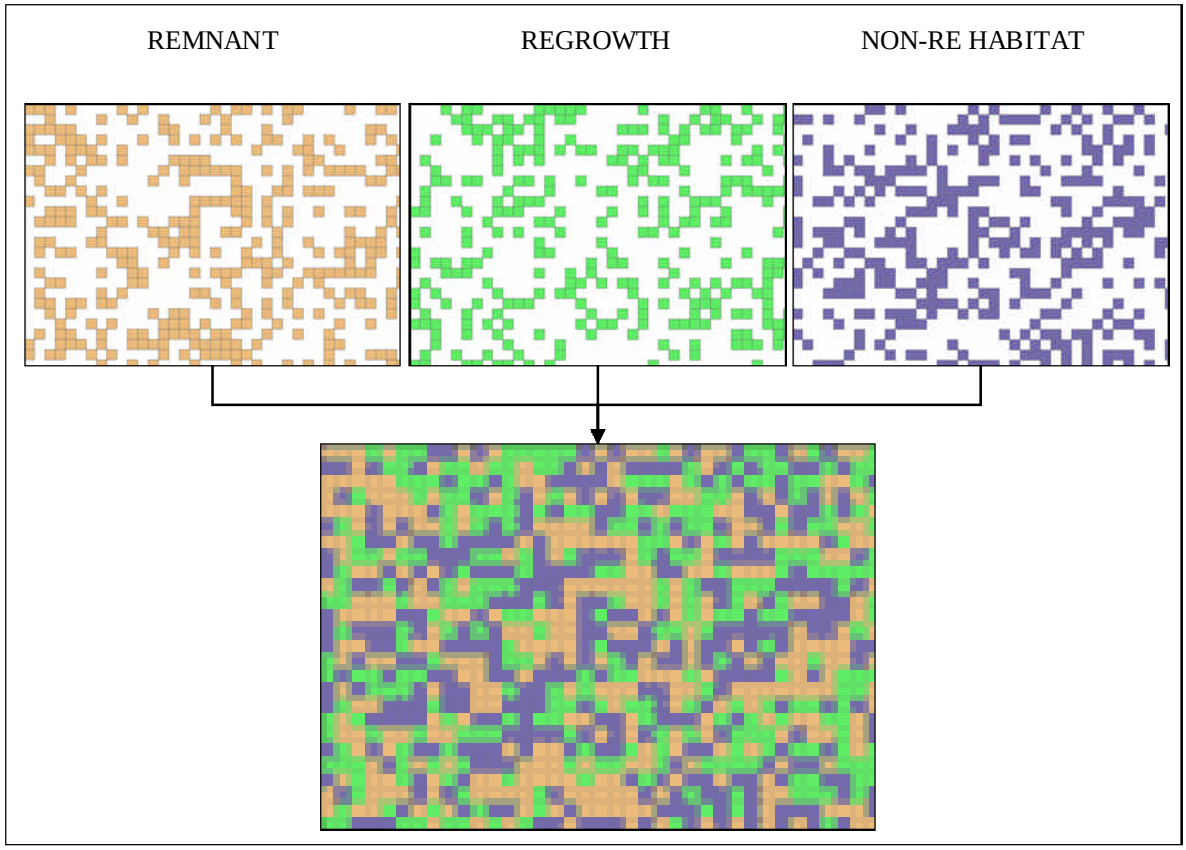


Figure A1. The three source layers making up the spatial component of the Species Habitat layer

Structure of the attribute table

The most important aspect of this dataset is that to use it in the script without any problem, the fields of the attribute table should be set to reflect the categorical separation of evaluation type (i.e., REMNANT, REGROWTH, NON-RE HABITAT, and so on). The script was developed to provide users with flexibility while designating attribute table structure and entering the data. However the considerations listed below should be taken into account before merging individual vegetation evaluation feature classes (i.e., REMNANT, REGROWTH and NON-RE) or should be attended after merging them as a post-process (which is the case in the sample snapshots). Please refer to the sample attribute table snapshot of the final vegetation feature class below for clarification (**Figure A2**).

Table

Vegetaion_MockCopy

OBJECTID *	Shape *	RE	PERCENT	RE1	RE2	RE3	RE4	RE5	RRE1	RRE2	NRE1	EVAL_TYPE	Shap
7	Polygon	12.3.5/12.3.6	80/20	12.3.5	12.3.6				<Null>	<Null>	<Null>	REMNANT	
91	Polygon	12.3.1/12.3.7	60/40	12.3.1	12.3.7				<Null>	<Null>	<Null>	REMNANT	
98	Polygon	12.3.6/12.3.11/12.3.5	40/30/30	12.3.6	12.3.11	12.3.5			<Null>	<Null>	<Null>	REMNANT	
111	Polygon	12.3.1/12.3.7	60/40	12.3.1	12.3.7				<Null>	<Null>	<Null>	REMNANT	
112	Polygon	12.1.3	100	12.1.3					<Null>	<Null>	<Null>	REMNANT	
113	Polygon	12.1.2	100	12.1.2					<Null>	<Null>	<Null>	REMNANT	
2	Polygon	12.1.3	100						12.1.3		<Null>	REGROWTH	2
3	Polygon	12.1.2	100						12.1.2		<Null>	REGROWTH	1
89	Polygon	12.3.6/12.3.11/12.3.5	40/30/30						12.3.6	12.3.11	<Null>	REGROWTH	
90	Polygon	12.3.6/12.3.11/12.3.5	40/30/30						12.3.6	12.3.11	<Null>	REGROWTH	
94	Polygon	12.1.2	100						12.1.2		<Null>	REGROWTH	
1	Polygon	non-rem	100						<Null>	<Null>	non-rem	HABITAT	1192
93	Polygon	canal	100						<Null>	<Null>	canal	HABITAT	
95	Polygon	water	100						<Null>	<Null>	water	HABITAT	

Figure A2 Sample table structure of Species habitat layer

The following should be noted regarding the attributes of the Species Habitat Layer:

- Only the fields marked with red box will be processed in the script for the habitat layer. In order to save space, abbreviations are used in field names, such as RE, RRE and NRE for remnant, regrowth and habitat categories, respectively;
- The field(s) reporting RE codes should have unique names (or abbreviations as advised) followed by one or more digits. For example, if there are three RE definitions for a REMNANT polygon, such as 12.1.1, 12.1.3, 12.3.5a, each should be recorded in a separate field as RE1, RE2, RE3 or REMNANT1, REMNANT2, REMNANT3. Please note the field name pattern here, a vegetation category identifier followed by a digit(s);
- RE information is recorded only in the respective fields (if the polygon is categorised as REMNANT, only RE1, RE2, ...RE5 fields are populated, other fields have either NULL or no value, compare RE assignment to the fields with respect to EVAL_TYPE field entries in the snapshot above).

Details of the GIS processes

Overview

The diagram below (**Figure A3**) shows the process of species dataset and join tables (for potentiality and known species) generation. Basically, by using two GDB tables first (TBL_001 and TBL_002 in **Figure A3**), four auxiliary tables (shown in a red dashed box in **Figure A3**) are generated for each evaluation type and by taking three of them, the potentiality join table is created (TBL_003). Known species score calculation takes into account the kingdom separation. By creating an auxiliary dissolved-unioned plant feature class first, a script processes all relevant information related to known species and generates FINAL vegetation feature class (FC_004) and known species join table (TBL_004). Lastly these two score tables and FINAL vegetation feature class should be joined as explained in the following sections.

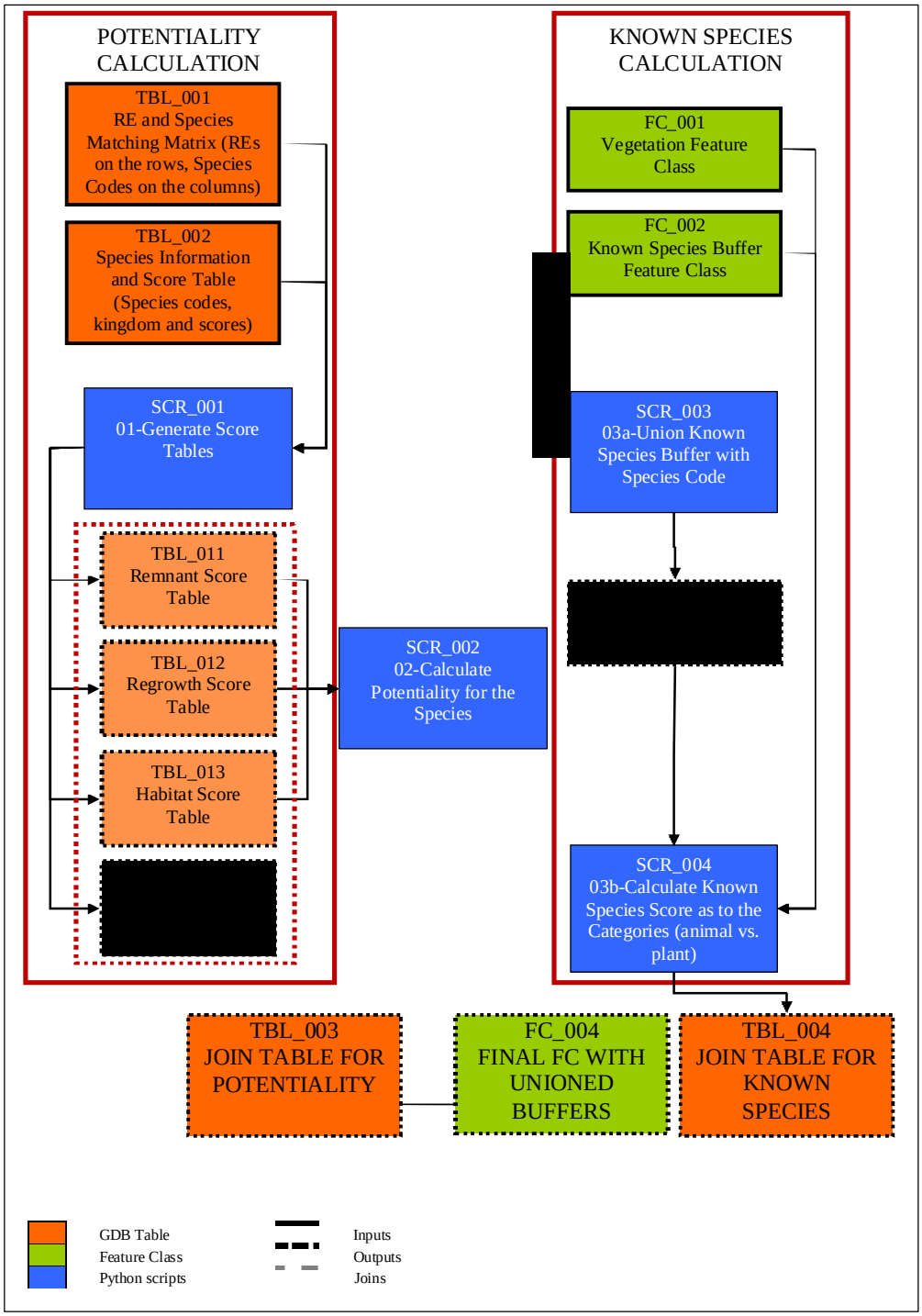


Figure A3 Script overview

It is strongly advised to use feature classes that have a projected coordinate system (e.g., GDA 1994 MGA 56), since one process uses shape length as the dissolve field and using a feature class having only a geographic coordinate system (e.g., GCS_GDA_1994 or GDA 1994) may yield inconsistent results.

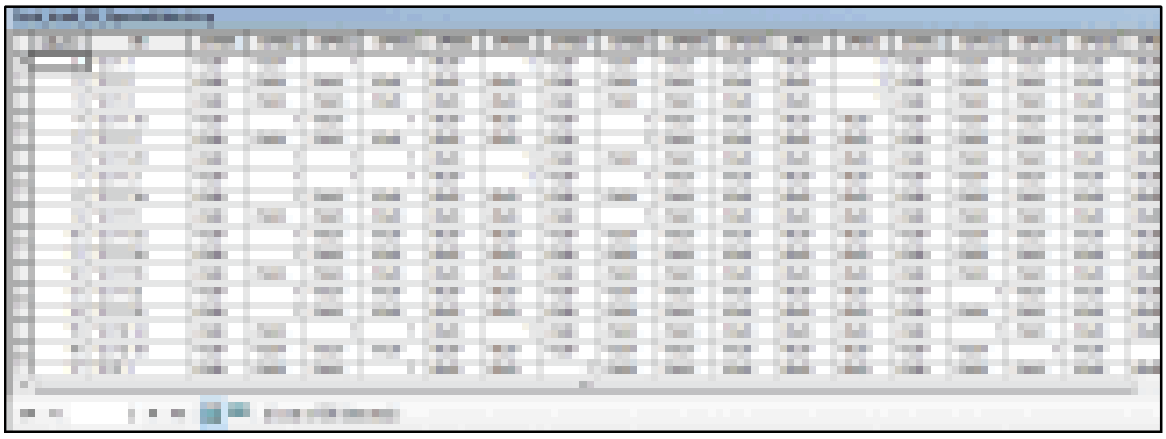


Figure A4 RE and Species Matching Matrix (TBL_001)

Data requirements

- Two GDB tables;
    - RE and Species Matching Matrix (TBL_001 **Figure A4**): It is a matrix of RE codes with respect to species codes used. The values in this matrix are the summary of suitable vegetation for the species listed. Any values other than 0, NULL or a whitespace are considered valid. The snapshot below shows the structure of the table. There are a couple of naming rules that should be followed strictly. Regional ecosystem and non-RE habitat information should be given in a field and it should be named as RE (see below). The other fields reporting the species code should be the same as Species Information Table (TBL_002 **Figure A5**), i.e., if SP001 is used to abbreviate a specific species, the respective field should be named as the same abbreviation, SP001, not as the other variations, such as SP1 or SP_001.

    - Species Information and Scoring Table (TBL_002 **Figure A5**): This is a lookup table of general species information, kingdom information, abbreviation (or codes) used for species and the scores with respect to the different evaluation types (i.e., Remnant, Regrowth, Habitat and Known). The snapshot below shows the structure of a sample table. There are a couple of rules for this table. Kingdom information should be given in a separate field. There is a naming convention to be followed in this field and the values in this field should be 'PLANT', 'plant' or 'Plant' for the plants and 'ANIMAL, 'animal' or 'Animal' for the animals. Even though it is not compulsory, using an abbreviation for each species will save a considerable amount of namespace in each of the join tables. If you prefer to use abbreviation, please do this in a separate field (as in SpeciesCode field in the figure below). In any case please be advised that defined species identifier (full name or abbreviation) should be the same in the previous table (TBL_001, please compare SpeciesCode entries below and species field names above). Finally, there should be score fields with respect to evaluation type(s) that you are employing (REMNANT_SCORE. REGROWTH_SCORE, HABITAT_SCORE and KNOWN_SCORE fields in the figure below). There are no rules governing the naming of these fields.

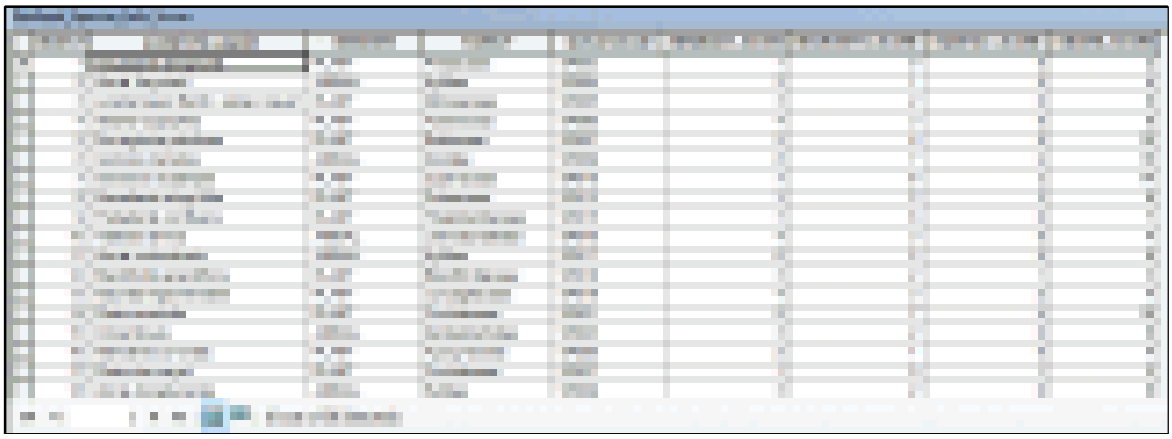


Figure A5 Species Information and Scoring Table (TBL_002)

- Two feature classes;
    - Vegetation Feature Class (FC_001): Please refer to "Methodology used for generation of the Species Habitat " section above (p.i)
    - Known Species Buffer Feature Class (FC_002): This is a (buffer) polygon feature class produced from known species point feature class by using the Precision field as the buffer distance. Two fields will be used by the script, one for the species identifier (name or abbreviation) and kingdom information (i.e., animal or plant). Again, species codes should be consistent with the codes used in previous two GDB tables (TBL_001 and TBL_002), and kingdom naming rules should be applied (i.e., kingdom names can be 'PLANT', 'plant' or 'Plant' for the plants and 'ANIMAL', 'animal' or 'Animal' for the animals).

Four auxiliary score tables

The first step is to multiply the RE and Species Matching Matrix (TBL_001) by each column of evaluation scores in the Species Information and Score table (TBL_002). The applicable Python script is called "01 - Generate Score Tables". Once run, it will yield the same number of tables as the number of evaluation types (according to the data definitions in this manual, they will be REMNANT_SCORE. REGROWTH_SCORE, HABITAT_SCORE and KNOWN_SCORE –see TBL_002 sample snapshot above, and these will be saved in the same workspace as the source tables).

Potentiality calculation

Potentiality calculation is done using the script, "02 - Calculate Potentiality for the Species". To summarise, it checks RE information of each and every vegetation polygon, collects the species codes associated with the respective RE code(s), and finally writes the scores for each evaluation type. The output table name is "JOIN_TABLE_POTENTIAL". The total number of fields of this final potentiality join table equals to the number of species times the number of RE fields defined in the vegetation (for example, sample datasets presented in this manual yield 312 fields, 39 species times 8 RE fields for three categories). The script also saves original OBJECTID records of the vegetation feature class for the join operation and sums all scores in SP_ SCORE_POTENTIAL field.

Scoring for known species (animals, plants)

Known species data is an amalgamation of the Herbarium and Queensland Museum records, as well as BAAM's and Redland City Council's field surveys. The precision of the data depends on the data source and collection date, which is reported in the original dataset. The values recorded in 'Precision' field are used to buffer original point feature class. In this scoring process, the buffer features are processed differently considering their kingdom information. While fauna features are queried by intersecting with the original Vegetation Feature Class (in GIS terms "Selection by location") and scored, the flora features are first unioned using the Union tool and then dissolved to have a planar plant feature class containing species information for each coinciding buffer item. An auxiliary script (which is explained later in this section) was developed to automate the latter process. It should be noted that both processes (for fauna and flora features) check the species and RE matching (as given in TBL_001) first then assigns a score if the match is found.

Known species score calculation is done by "03b - Calculate Known Species Score as to the Categories (animal vs. plant)" script and this produces two outputs, a join table and a feature class (i.e., final vegetation feature class) composed of original vegetation polygons intersected with plant polygons. The name of the output table is "JOIN_TABLE_KNOWN_6d". The total number of fields of this final potentiality join table is equivalent to the number of species. The script also saves original OBJECTID records of the final vegetation feature class for joining operation and sums all scores in SP_ SCORE_KNOWN field. Additionally, OBJECTIDs of original vegetation feature class is stored as COPY_OID in this table.

Union operation for plants buffer and dissolving species information (extra script)

The figure below (**Figure A6**) shows how union and dissolve operations are used to planarise species buffers and populate species information accordingly. It should be noted that this process is applied to flora items only. As seen there are three individual buffer features on the left, and as the expected outcome, these buffer features should be unioned and their intersecting part should be planar and reflect the respective species information of the buffer (as shown on the right in the figure). Unfortunately there is no such a tool to execute this process (i.e., classical union operation generates overlapping features). As an interim step, 03a-Union Known Species Buffer with Species Code script has been developed which unions the buffer features, dissolves them according the shape length field as single part (assuming this field have same values for overlapping features and single part switch of the tool creates spatially separate features if the geometry of the dissolved features are the same) and records species information of the overlapping buffers.

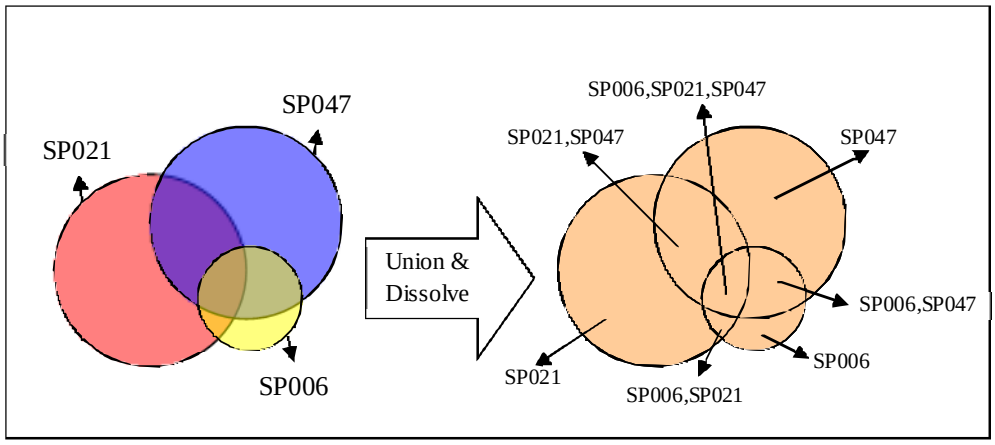


Figure A6 Planarization of various buffer polygons by Union and Dissolve tools

Running the script

All required scripts are populated under the Species Mapping toolbox in the main geodatabase as shown below (**Figure A7**). The functions of the first four scripts were explained previously. Since there are many related tables and feature classes to be processed, a parameter initialisation script is developed to setup all inputs at the outset (see Script Parameter Initialisation script above). Its usage is explained in the next section.

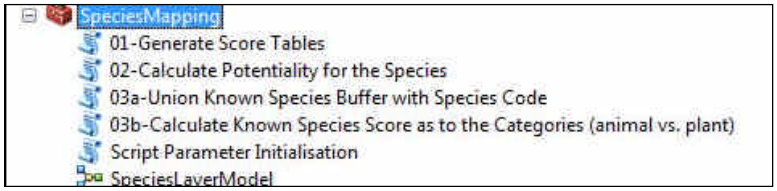


Figure A7 Overview of species mapping toolbox

Script GUI and saving script parameters

The numbered items in the GUI snapshot below (**Figure A8**) correspond to specific data items of the base datasets and they are explained as follows:

MAIN - Locate the main workspace for the datasets. It should be a File or Personal Geodatabase (GDB).

1- Locate the vegetation FC in the main workspace.

2- Mark the fields giving RE information as to the categories defined.

3- Locate the GDB table containing the RE and Species Matching Matrix (please refer to **Appendix 1 Table A1**)

4a- Locate the Locate the GDB table containing the Species Information and Score table (please refer to **Appendix 1 Table A1**)

4b- Select the field reporting species code. The entries should follow the same naming convention in species and RE correspondence table. That means if you coded Macadamia tetraphylla with SP001 (or with any other code/abbreviation), this code (SP001) should be given in the same way in this table (not as SP_001 or SP1).

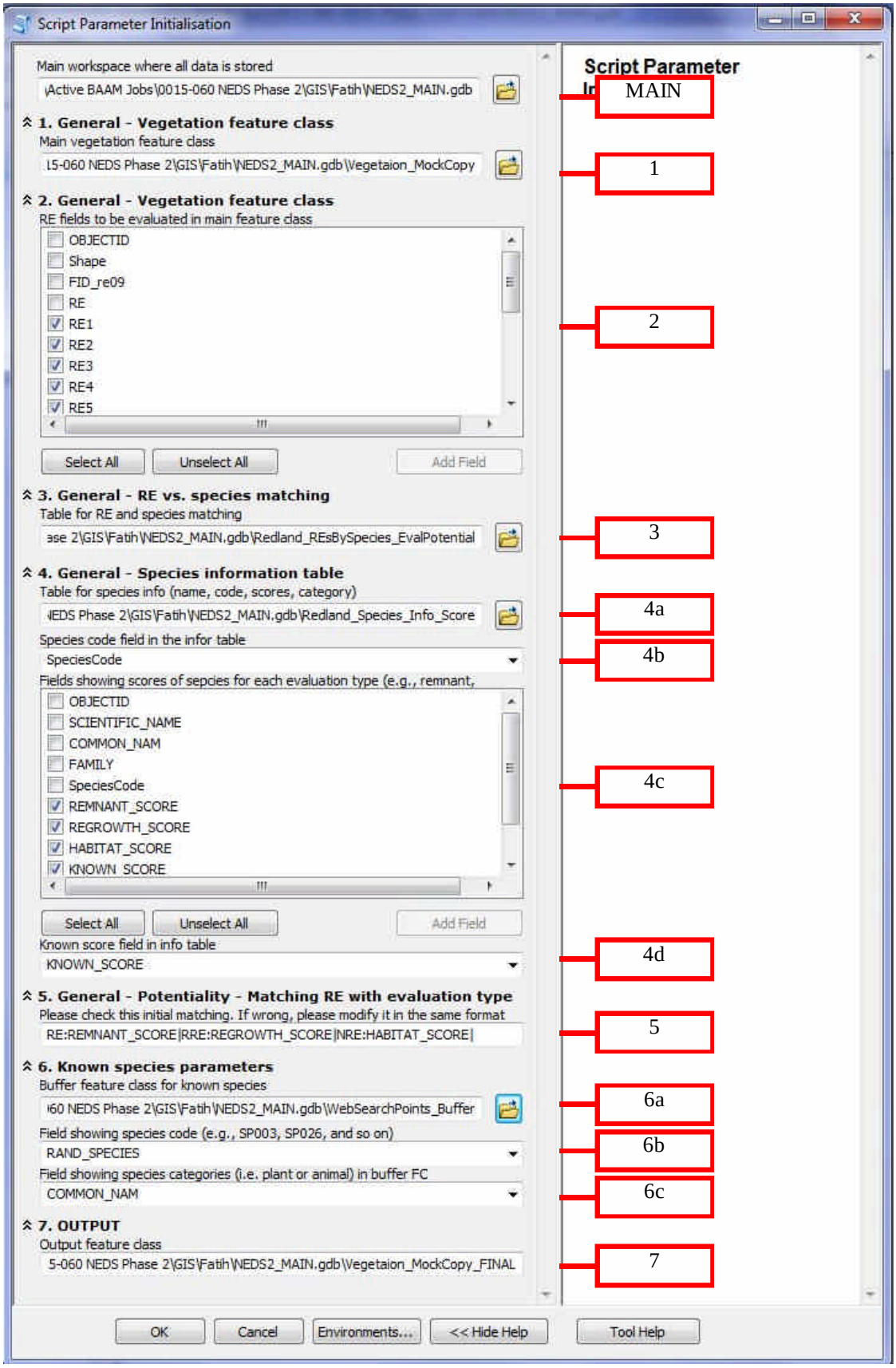


Figure A8 Parameter initialisation GUI

4c- Tick the fields reporting scores for the categories.

4d- Known species scoring is a bit different than the potentiality scoring, so the scores for known species should be defined here to distinguish them from the potentiality calculation scores.

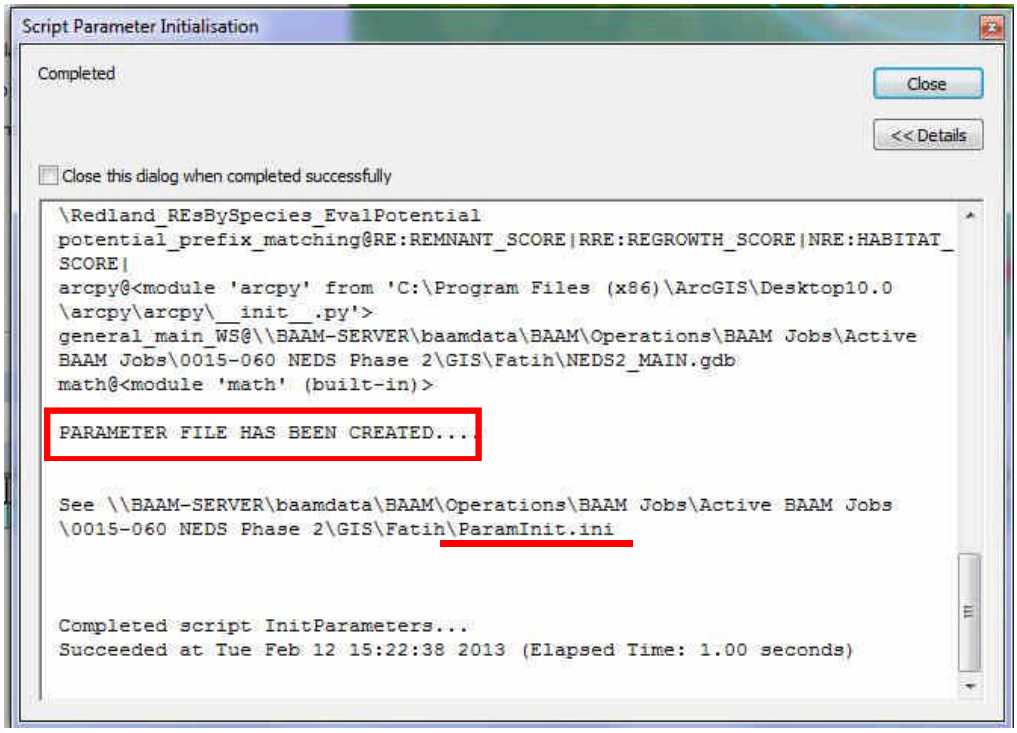
5- **THIS IS THE MOST CRITICAL PARAMETER THAT NEEDS TO BE CHECKED AND, IF NECESSARY, MODIFIED BY THE USER**. When parameters 2, 4c and 4d are filled out the program automatically advises an initial matching of abbreviations used and the score table for categories. For example, in the snapshot above, RE abbreviations are matched with REMNANT_SCORE (please be advised that each RE abbreviation was recorded with a digit suffix such as RE1, RE2, ..., RE5, etc., in the original table). RRE was matched with REGROWTH_SCORE and NRE with HABITAT_SCORE. Abbreviations (RE,RRE,NRE) and score field names (REMNANT_SCORE and so on) come from the vegetation FC and species information table. These will be updated according to the previous steps (for example, you may prefer to use REMN abbreviation for remnant category and Score_For_Remnant_Vege field name for its score. In this case the matching should be REMN:Score_For_Remnant_Vege|). In this case this initial string advice is correct. If the initial matching is not correct, the user needs to modify these field names. The best strategy could be modifying the abbreviation rather than copying and pasting the respective score table name. Please strictly follow the string pattern given as follows: category ABBREVIATION followed by a colon (:) and SCORE TABLE NAME followed by a separator character (|), for example, RE:REMNANT_SCORE|RRE:REGROWTH_SCORE|NRE:HABITAT_SCORE|

6a- Select the buffer layer of the known species dataset. This should be a polygon feature class since the species records are reported with a precision value (which is represented as the buffer distance).

6b- Pick the field showing species code or name. Please be advised that you need to use same species code naming convention throughout this processes (please refer to step 4b for clarification)

6c- For known species, there should be a field showing the kingdom information (i.e., animal or plant). Select this field in this section. There is a naming convention to be followed in this field as well. Allowable kingdom names can be PLANT, plant or Plant for the plants and ANIMAL, animal or Animal for the animals.

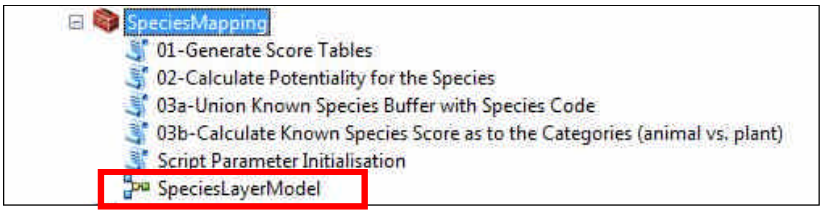
7- Once you select vegetation FC, this field will be filled in automatically by using the vegetation FC name followed by _FINAL suffix. You can change the location and also the feature class name according to your liking. When you click OK, another dialog reports the script progress. As shown in the snapshot below, if all parameters are set correctly, you will be promptly reported that "your parameter file (i.e., ParamInit.ini file **Figure A9**) has been created" followed by the disk location. This file is pivotal for all scripts and is used to locate right data sources, and feed the script with right parameters.



FigureA9 Script parameter initialisation

Model to run all scripts

Instead of running each script individually, a composite model is also developed to run whole process by only defining the location of the parameter file as setup in the previous section. This model is named as SpeciesLayerModel in the SpeciesMapping toolbox as shown below (**Figure A10**).



FigureA10

The figure below shows the model in Editing mode to show components and their connections (**Figure A11**) Four scripts (01-Generate Score Tables, 02-Calculate Potentiality for the Species, 03a-Union Known Species Buffer with Species Code and 03b-Calculate Known Species Score as to the Categories (animal vs. plant)) get the parameter file as the input and run consecutively as defined by the preconditions.

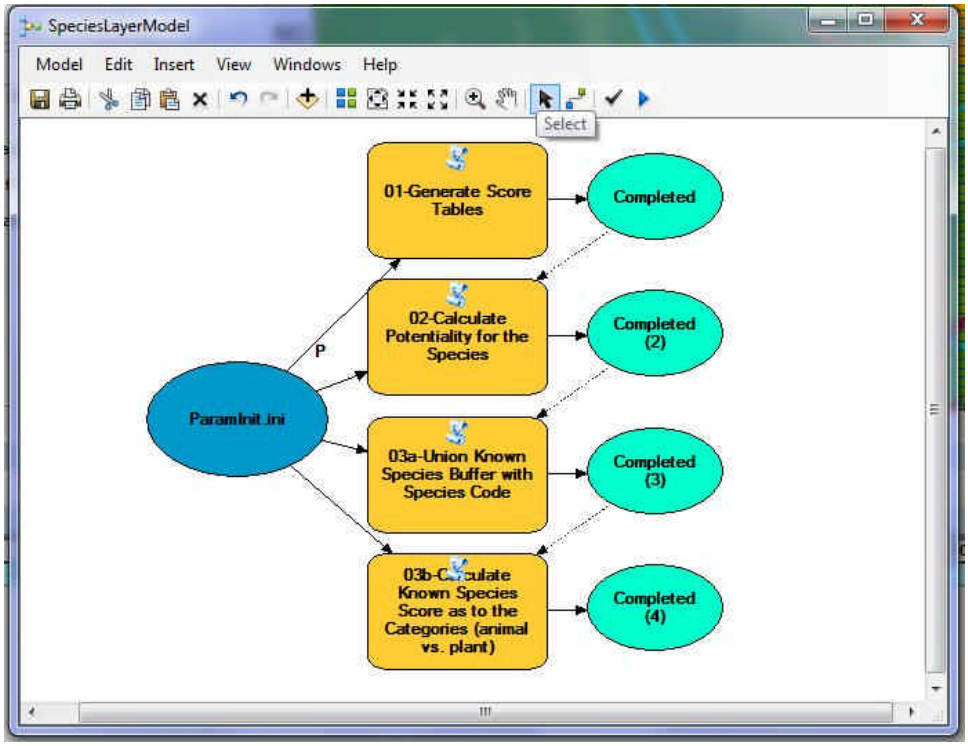


Figure A11 Composite model to run all scripts (in ModelBuilder's editing mode)

Once it is run from the toolbox, it produces the dialog as shown below (**Figure A12**). The user needs to locate the parameter initialisation file which was created previously (refer to p. vi). Once clicked on OK button, the scripts will run.

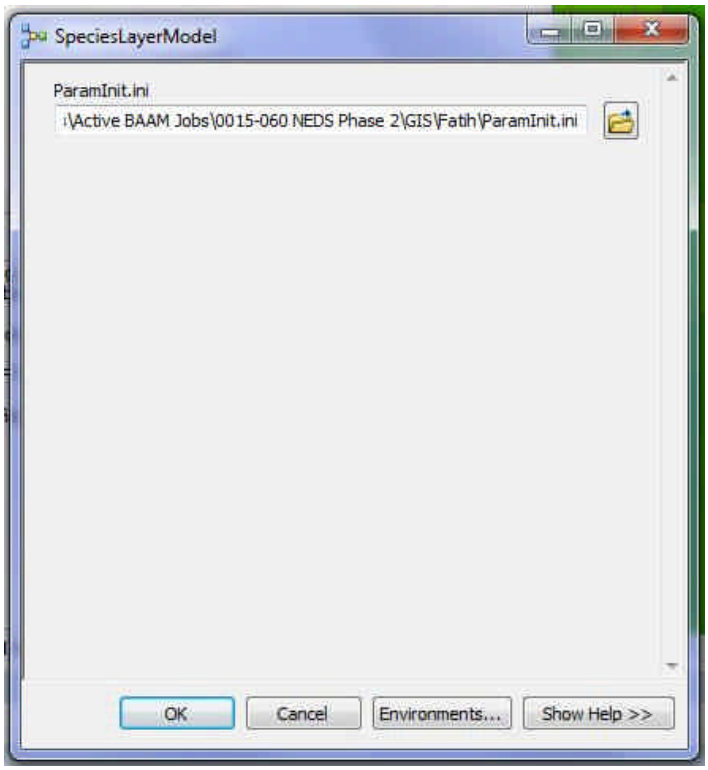


Figure 1 Composite model (SpeciesLayerModel) dialog

Final remarks

The script produces a FINAL vegetation feature class and two GDB tables to be joined with the FINAL vegetation data (containing the flora buffers as intersected with the original vegetation layer), one for species potentiality score and another for known species score (JOIN_TABLE_POTENTIAL and JOIN_TABLE_KNOWN_6d, respectively). The main motivation of generating two tables instead of creating new fields in the vegetation dataset is to shorten processing time, since the number of fields to be added is vast and adding a new field to a feature class is one of the lengthy operations in ArcGIS.

While joining;

- COPY_OID field (which is added to keep track of the original object IDs of the vegetation FC) of the final vegetation FC (i.e., containing known species buffer features as unioned with main vegetation FC) should be used for the potentiality table's (i.e., JOIN_TABLE_POTENTIAL table in the main GDB) OBJECTID field;
- OBJECTID field of the final vegetation FC (i.e., containing known species buffer features as unioned) should be used for known species table's (i.e., JOIN_TABLE_KNOWN_6d) OBJECTID field;

since the former table is produced by using the original vegetation FC's Object IDs whereas the latter is calculated by using Object IDs of the unioned version.

Lastly, if the aim of the user is to sum up potentiality and known species scores, he or she needs to add a new field and calculate this field's value as summation of potential and known species scores (i.e., SP_SCORE_POTENTIAL+SP_SCORE_KNOWN. Of course, the name of the tables will be given automatically before these field names).

After joining to tables, the user can export this dataset as a new feature class which will yield the same output as adding many fields to the vegetation dataset.

Checklist

- ☐ All base data items are in a geodatabase and you have read and write access to this location
- ☐ Feature classes have a projected coordinate system,
- ☐ Regional Ecosystem information is given under "RE" field name in the RE and Species Matching Table
- ☐ Abbreviation or codes used for species are consistent in two base GDB tables and the Known Species Buffer Feature Class
- ☐ RE information is unconcatenated in separate fields in the Vegetation Feature Class and this separation is made according to the evaluation type (e.g., RE1, RE2 and RE3 fields for Remnant vegetation, RRE1, RRE2 and RRE3 for Regrowth areas and NRE1 for Habitat areas)
- ☐ Considering the previous item, all evaluation type RE fields end with a digit (e.g., RE1, RE2, RE3, RRE1, RRE2,RRE3,NRE1) even though it may reported only one field
- ☐ Buffer Feature Class and RE Information and Score Table have a field showing kingdom information (i.e., animal or plant) and advised data entry rules are followed (e.g., Animal, ANIMAL, animal)

APPENDIX 3
SPATIAL LAYER METADATA

Metadata of NEDS Vegetation Field Survey Points

Custodian
Principal Ecologist (Botany)
Biodiversity Assessment and Management
233 Middle Street, Cleveland Q 4163
PO Box 1376 Cleveland Q 4163

Abstract
NEDS Field Survey Points map the location s of flora and vegetation assessment sites and species records within the Redlands City Council project areas for the NEDS project as at 31/05/2013.

Version History
Version 1.1 – Incorporates all post-fieldwork edits as at 31/05/2013.

ANZLIC Search Words
ECOLOGY Models
ECOLOGY Planning
ECOLOGY Landscape
ECOLOGY Ecosystem
ECOLOGY Habitat
ECOLOGY Community
ECOLOGY Biodiversity
ECOLOGY Classification
ECOLOGY Conservation
ECOLOGY Mapping
ECOLOGY Inventory
VEGETATION Mapping
VEGETATION Planning
VEGETATION Inventory
FLORA Native
FLORA Exotic
FAUNA Native
FAUNA Exotic
VEGETATION Floristic
VEGETATION Structural

Dataset Status
Progress: Finalised.
Release Date: 23/05/2012
Maintenance and Update Frequency: As required

Access
Datum: MGA94 Zone 56 -
Stored Data Format: Digital ArcInfo
Available Format Type: Digital ArcInfo

Positional Accuracy
<10m

Attribute Descriptions:

Field Name	Data Type	Description	Values
FEATURE	Text	Geometry data type.	Point
ID	Double	Generated by ArcPAD. Guarantees a unique ID for each row in the table being edited on the field device.	1–∞
DESCRIPTIO	Text	Identifies the type of intimation in the table.	
DATUM	Text	Coordinate system.	
LONGITUDE	Double	East-west position.	
LATITUDE	Double	North-south position.	
SOURCE	Text	Author/custodian.	
DATE_	Date	Generated by ArcPAD. Specifies the date and time as day, month, year, hours, minutes, seconds, AM/PM.	
STATE	Text	Australian State in which the project area occurs.	
PROJECT	Text	Project name.	
LOCALITY	Text	Project locality name.	
RECORD	Text	The type data the point is recording.	sr = 'species record', vas = 'vegetation assessment site'
SITE_TYPE	Text	For 'vas' points, the type of vegetation assessment site.	Primary, secondary, tertiary, quaternary

Field Name	Data Type	Description	Values
SITE_NAME	Text	For primary, secondary, tertiary, sites, the name of the site. Consists of first three letters of project, a number, the RE and the transect position.	
RE	Text	The regional ecosystem in which the point occurs.	
HABITAT_D1	Text	A description the habitat. Dominant or conspicuous species in each strata are identified using a shorthand that employs parentheses "([{<>}])" and the hyphen character "-". Height of each stratum and additional geological and landscape features may also be recorded. Scientific name of each species is usually recorded in shorthand as described in "SP_SCI".	'-*-' = emergent E. '*' = tree canopy T2, '(*)' tree subcanopy T2, '[*]' = tall shrub S1, '{*}' = low shrub S2, '<*>' = ground G, where '*' represents a species or multiple species.
HABITAT_D2	Text	Multiple fields split for habitat description entries that exceed 254 characters.	
LABEL	Text	Used for a variety of purposes including recording the label on a plant specimen or picket, or to be used as an alternative label for a site in GIS.	
DEVICE	Text	The field device used to record the point.	
PHOTO_NUM	Text	The file name of the photo(s) associated with the point.	
PHOTO_DEV	Text	The device used to take the photo(s)	
SP_GROUP	Text	Any super-species taxonomic designation.	
SP_SCI	Text	The scientific name of the species. Usually recorded in shorthand where the first four letters of the genus name and species epithet are entered, separated by a space. Species that cannot be identified to species level are recorded using the full generic name followed by the abbreviation "sp." and optionally, a number. Uncertain identification are labelled with a "?".	
SP_COM	Text	Species common name. Uncertain identification are labelled with a "?".	
HABIT	Text	Description of the general appearance, growth form, or architecture of a plant	
HEIGHT	Text	Height of the plant in meters unless otherwise specified.	
FLOWER	Text	Presence/absence or salient features of the flower.	
FRUIT	Text	Presence/absence or salient features of the fruit.	
BARK	Text	Salient features of the bark.	
ABUNDANCE	Text	Abundance designation using DAFOR score.	Abundant, frequent, occasional, rare.
COUNT_	Integer	The number of individuals present at/in the vicinity of the point.	
SUB_CODE	Text	The submission code ascribed to a plant sample for the purposes of identification or verification.	
NOTES	Text	Miscellaneous notes relating to the point, e.g. the position of a point within an RE polygon or a record of when a plant sample is collected.	
INTRODUCED	Text	Designates when a plant is not native to the location.	"y" = yes
STATUS_NCA	Text	Status of a plant under the *Nature Conservation Act 1992*.	Endangered, Vulnerable, Near Threatened, Least Concern, Type A
STATUS_VMA	Text	Status of a community under the *Vegetation Management Act 1999*.	Endangered, Of Concern, Least Concern
STATUS_BD	Text	Biodiversity Status	Endangered, Of Concern, No Concern at Present
STATUS_EPB	Text	Status of a plant or community under the *Environment Protection and Biodiversity Act 1999*.	Critically Endangered, Endangered, Vulnerable, Conservation Dependent

Field Name	Data Type	Description	Values
STATUS_LPA	Text	Status of a plant *Land Protection (Pest and Stock Route Management) Act 2002*	Class 1, Class 2, Class 3
ARCHIVE1	Text	Field to which entries from another field can be migrated when it is determined that an entry to be changed during the post-fieldwork stage, e.g., when it is determined that an RE designation needs to be altered.	
ARCHIVE2	Text	Field to which entries from another field can be migrated when a second entry needs to be changed.	
HAB_FRATUR	Text	Type of Vegetation Feature	VP=vegetation path L= linkage WW=waterway
FAUNA_VAL	Text	Value of vegetation feature to fauna	Low, Moderate, high.
HAB_COND		Habitat condition for fauna	
WATERBODY	Text	Description of the waterbody (where applicable)	
KOALA_FEED	Text	Assessment of the presence/absence of koala food trees	Absent, Present, Abundant, Primary food trees present, Secondary food trees present.
KOALA_LIKE	Text	Assessment of the likelihood of koalas being present.	Unlikely, Potential, Definite.
SIGN_FAUNA	Text	Significant fauna potentially utilising the area.	
NEDS_COM	Text	Assessment as to the validity of the NEDS model.	

Contact Information

Contact Organisation: Biodiversity Assessment and Management
Contact Position: Principal Ecologist (Botany)
Postal Address: PO Box 1376
City: Cleveland
State: QLD
Country: Australia
Postcode: 4163
Electronic Mail Address: chris@baamecology.com

Metadata of NEDS Remnant and Regrowth Regional Ecosystem Mapping

Custodian
Principal Ecologist (Botany)
Biodiversity Assessment and Management
Suite 11 (Basement Level), 233 Middle Street, Cleveland Q 4163
PO Box 1376 Cleveland Q 4163

Abstract
NEDS vegetation maps designating Regional Ecosystems within the Redlands City Council project areas for the NEDS project as at 31/05/2013.

Version History
Version 1.1 – Incorporates all post-fieldwork edits as at 31/05/2013.

ANZLIC Search Words
ECOLOGY Planning
ECOLOGY Landscape
ECOLOGY Ecosystem
ECOLOGY Habitat
ECOLOGY Community
ECOLOGY Biodiversity
ECOLOGY Classification
ECOLOGY Conservation
ECOLOGY Mapping
ECOLOGY Inventory
VEGETATION Mapping
VEGETATION Planning
VEGETATION Inventory
FLORA Native
FLORA Exotic
VEGETATION Floristic
VEGETATION Structural

Dataset Status
Progress: Finalised.
Release Date: 29/05/2013
Maintenance and Update Frequency: As required

Access
Datum: MGA94 Zone 56 -
Stored Data Format: Digital ArcInfo
Available Format Type: Digital ArcInfo

Positional Accuracy
1:5000

Attribute Descriptions:

Field name	Description	Example
RE	Regional ecosystem mosaic, ordered by precent contribution	12.11.5k/12.11.5a/12.11.23/12.11.3/12.11.10
RE1	Dominant RE	12.11.5k
RE2	First Subdominant RE	12.11.5a
RE3	Second Subdominant RE	12.11.23
RE4	Third Subdominant RE	12.11.3
RE5	Fourth Subdominant RE	12.11.10
PERCENT	Precent contribution of each RE in the mosaic, descending	40/25/15/15/5
PC1	Percentage of dominant RE	40
PC2	Percentage of Subdominant RE	25
PC3	Percentage of second Subdominant RE	15
PC4	Percentage of third Subdominant RE	15
PC5	Percentage of fourth Subdominant RE	5
LANDZONE	Categories that describe the major geologies and associated landforms and geomorphic processes	11
BD_STATUS	Biodiversity status: N = No concern at present, OC = Of concern, E = Endangered	
BD_SYMBOL	254 = "Endangered (dominant)", 50 = "Endangered (sub-dominant)",	0

Field name	Description	Example
	143 = "Of Concern (dominant)", 142 = "Of Concern (sub-dominant)", 170 = "Not of Concern", 1 = "non-remnant", 253 = "water", 249 = “hoop” or “plant” or “sand”	
LineAcc	Linework accuracy rating 1-3: 1 = created using preclear shapes, 2 = visually assessed or manually edited, 3 = contains a field assessment point within	1
AttribAcc	Attribute accuracy rating 1-3: = created using preclear attributes, 2 = visually assessed and manually entered, 3 = contains a field assessment point within	2
RLGA_CL	Redlands local government area critically limited REs	1 = 100%; 2 = Present in Mixed Polys

Contact Information

Contact Organisation: Biodiversity Assessment and Management
Contact Position: Principal Ecologist (Botany)
Postal Address: PO Box 1376
City: Cleveland
State: QLD
Country: Australia
Postcode: 4163
Electronic Mail Address: chris@baamecology.com

Metadata of NEDS Non-RE Habitat Mapping

Custodian
Principal Ecologist (Botany)
Biodiversity Assessment and Management
233 Middle Street, Cleveland Q 4163
PO Box 1376 Cleveland Q 4163

Abstract
NEDS vegetation maps designating flora and fauna habitats that are not Regional Ecosystems within the Redlands City Council project areas for the NEDS project as at 31/05/2013.

Version History
Version 1.1 – Incorporates all post-fieldwork edits as at 31/05/2013.

ANZLIC Search Words
ECOLOGY Planning
ECOLOGY Landscape
ECOLOGY Ecosystem
ECOLOGY Habitat
ECOLOGY Community
ECOLOGY Biodiversity
ECOLOGY Classification
ECOLOGY Conservation
ECOLOGY Mapping
ECOLOGY Inventory
VEGETATION Mapping
VEGETATION Planning
VEGETATION Inventory
FLORA Native
FLORA Exotic
VEGETATION Floristic
VEGETATION Structural

Dataset Status
Progress: Finalised.
Release Date: 29/05/2013.
Maintenance and Update Frequency: As required

Access
Datum: MGA94 Zone 56 -
Stored Data Format: Digital ArcInfo
Available Format Type: Digital ArcInfo

Positional Accuracy
1:5000

Attribute Descriptions:

Field name	Description	Example
SHAPE	Geometry type	polygon
NRE	Description of conservation significant flora or fauna habitat that is not a regrowth or remnant Regional Ecosystem:	beach intertidal_flat plant (plantation) waterbody urban_trees
Shape_Length	Length of the boundary of the polygon	1257 (meters)
Shape_Area	Area of the polygon	2376 (meters squared)
Area_Ha	Area of the polygon	0.2376 (hectares)

Contact Information
Contact Organisation: Biodiversity Assessment and Management
Contact Position: Principal Ecologist (Botany)
Postal Address: PO Box 1376
City: Cleveland
State: QLD
Country: Australia
Postcode: 4163
Electronic Mail Address: chris@baamecology.com

Metadata of NEDS Species Habitat Scores

Custodian
Principal Ecologist (Botany)
Biodiversity Assessment and Management
233 Middle Street, Cleveland Q 4163
PO Box 1376 Cleveland Q 4163

Abstract
NEDS vegetation maps containing weighted scores for flora and fauna habitats within the Redlands City Council project areas for the NEDS project as at 31/05/2013.

Version History
Version 1.1 – Incorporates all post-fieldwork edits as at 31/05/2013.

ANZLIC Search Words
ECOLOGY Planning
ECOLOGY Landscape
ECOLOGY Ecosystem
ECOLOGY Habitat
ECOLOGY Community
ECOLOGY Biodiversity
ECOLOGY Classification
ECOLOGY Conservation
ECOLOGY Mapping
ECOLOGY Inventory
VEGETATION Mapping
VEGETATION Planning
VEGETATION Inventory
FLORA Native
FAUNA Native
VEGETATION Floristic
VEGETATION Structural

Dataset Status
Progress: Finalised.
Release Date: 29/05/2013.
Maintenance and Update Frequency: As required

Access
Datum: MGA94 Zone 56 -
Stored Data Format: Digital ArcInfo
Available Format Type: Digital ArcInfo

Positional Accuracy
1:5000

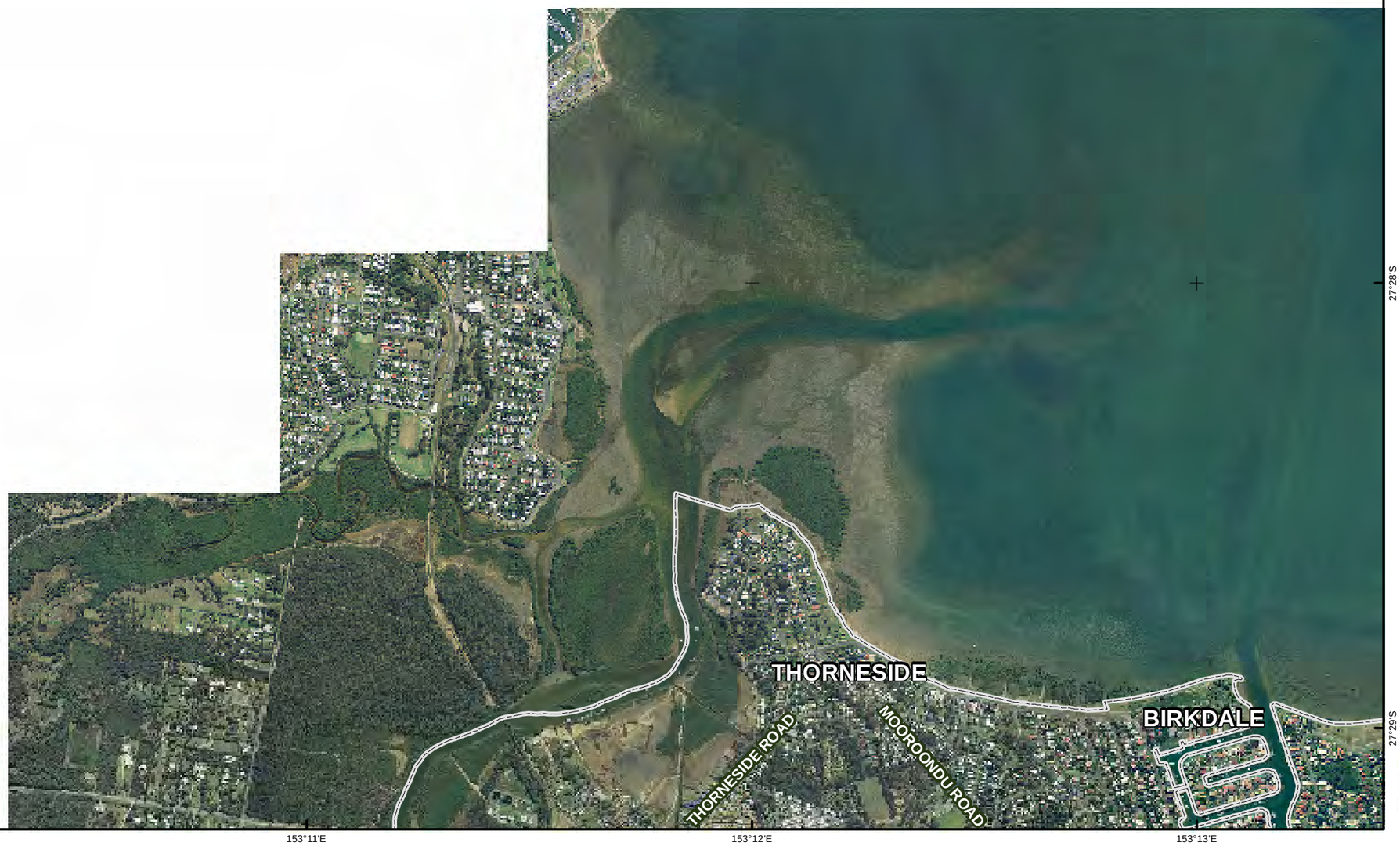
Attribute Descriptions:

Field name	Description	Example
SHAPE	Geometry type	polygon
MapSymbol	Numerical score for conservation significant flora or fauna habitat. Scores are derived by summing known and potential conservation significant flora and fauna species for that mapped polygon of remnant or regrowth regional ecosystem or non-RE habitat.	699
Shape_Length	Length of the boundary of the polygon	1257 (meters)
Shape_Area	Area of the polygon	2376 (meters squared)
Area_Ha	Area of the polygon	0.2376 (hectares)

Contact Information
Contact Organisation: Biodiversity Assessment and Management
Contact Position: Principal Ecologist (Botany)
Postal Address: PO Box 1376
City: Cleveland
State: QLD
Country: Australia
Postcode: 4163
Electronic Mail Address: chris@baamecology.com

APPENDIX 4
MAP SERIES: VEGETATION ASSESSMENT SITES

153°10'E
153°11'E
153°12'E
153°13'E
27°27'S
27°28'S
27°29'S



Notes:

Document Location: \\BAAM-SERVER\baamdata\BAAM\Operations\BAAM Jobs\Active BAAM Jobs\0015-060 NEDS Phase 2\GIS\MXDs\ReportFigures\Appendix_MapSeries\Appendix 4 Vegetation Assessment Sites.mxdDate: 30/05/2013 12:56:27 PM

Appendix 4

Map 1 of 23

Title: **Vegetation Assessment Sites**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Assessment level

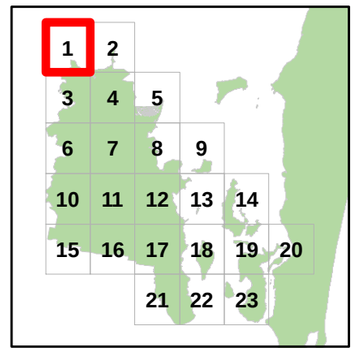
- Tertiary
- Quaternary
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009)
supplied by Redland City Council
Imagery Sourced from RCC
North Stradbroke Island is not included in the study area.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°13'E 153°14'E 153°15'E 153°16'E

27°27'S

27°28'S

27°29'S

WELLINGTON POINT

BIRKDALE

THORNESIDE

Notes:

Appendix 4

Map 2 of 23

Title: **Vegetation Assessment Sites**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Assessment level

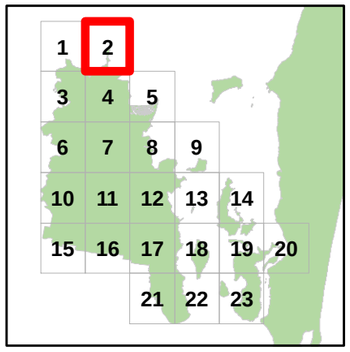
- Tertiary
- Quaternary
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
North Stradbroke Island is not included in the study area.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°10'E 153°11'E 153°12'E 153°13'E

27°30'S

27°31'S

THORNESIDE

RICKERTT ROAD

THORNESIDE ROAD

MOOROONDU ROAD

QUARRY ROAD

BIRKDALE

BAILEY ROAD

BARRON ROAD

RANDALL ROAD

BLUEBELL STREET

ABELIA STREET

ALEXANDRA HILLS

CAPALABA

MORETON BAY ROAD

REDLAND BAY ROAD

CROTONA ROAD

CROTONA ROAD EAST

CUMBERLAND DRIV

Notes:

Appendix 4

Map 3 of 23

Title: **Vegetation Assessment Sites**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Assessment level

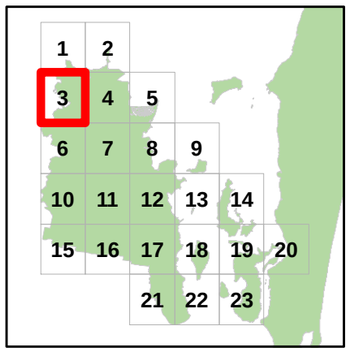
- Tertiary
- Quaternary
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
North Stradbroke Island is not included in the study area.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

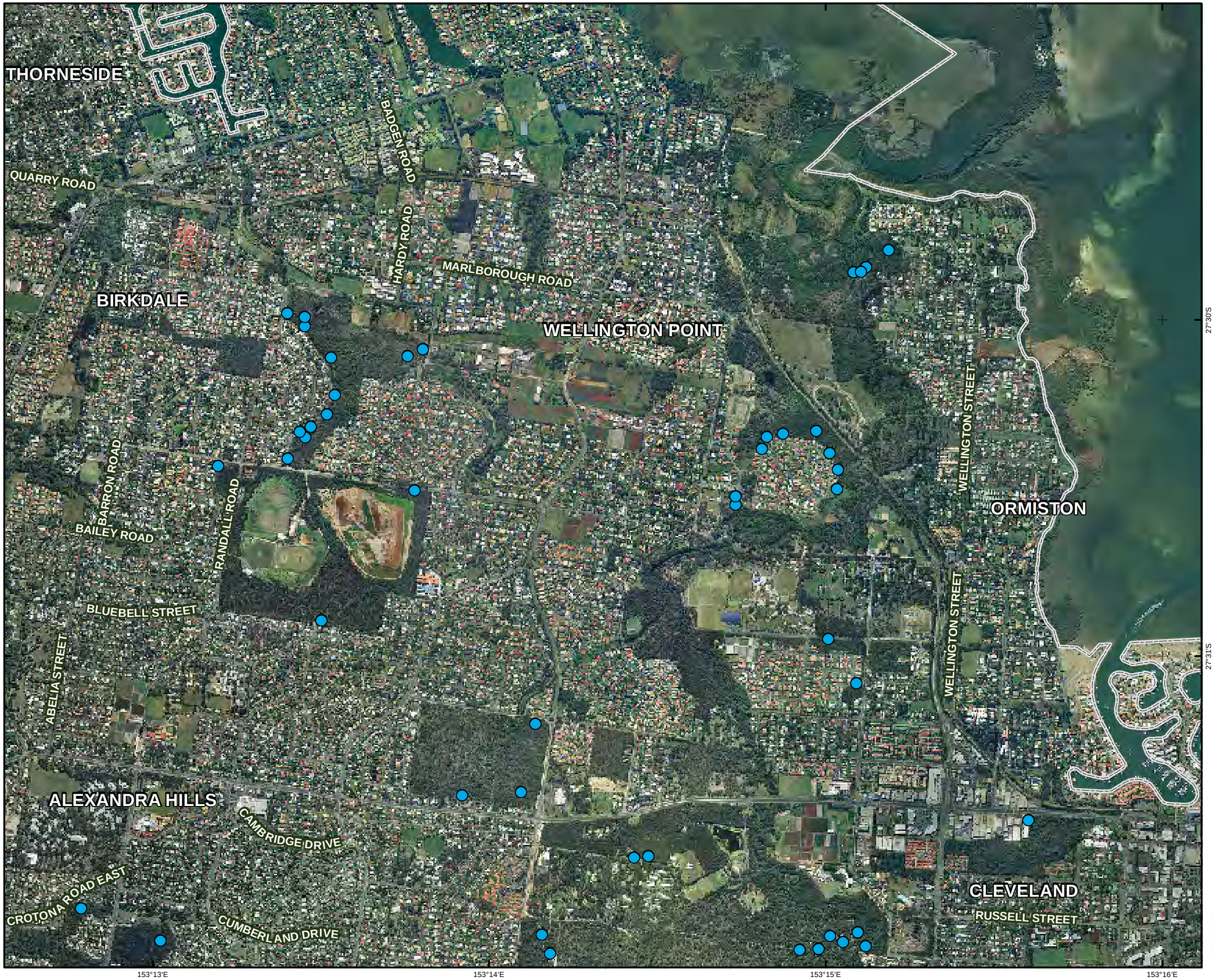
1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS



Appendix 4

Map 4 of 23

Title: **Vegetation Assessment Sites**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Assessment level

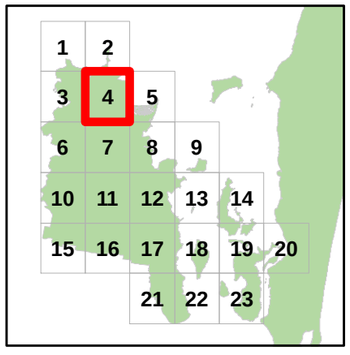
- Tertiary
- Quaternary
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
North Stradbroke Island is not included in the study area.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

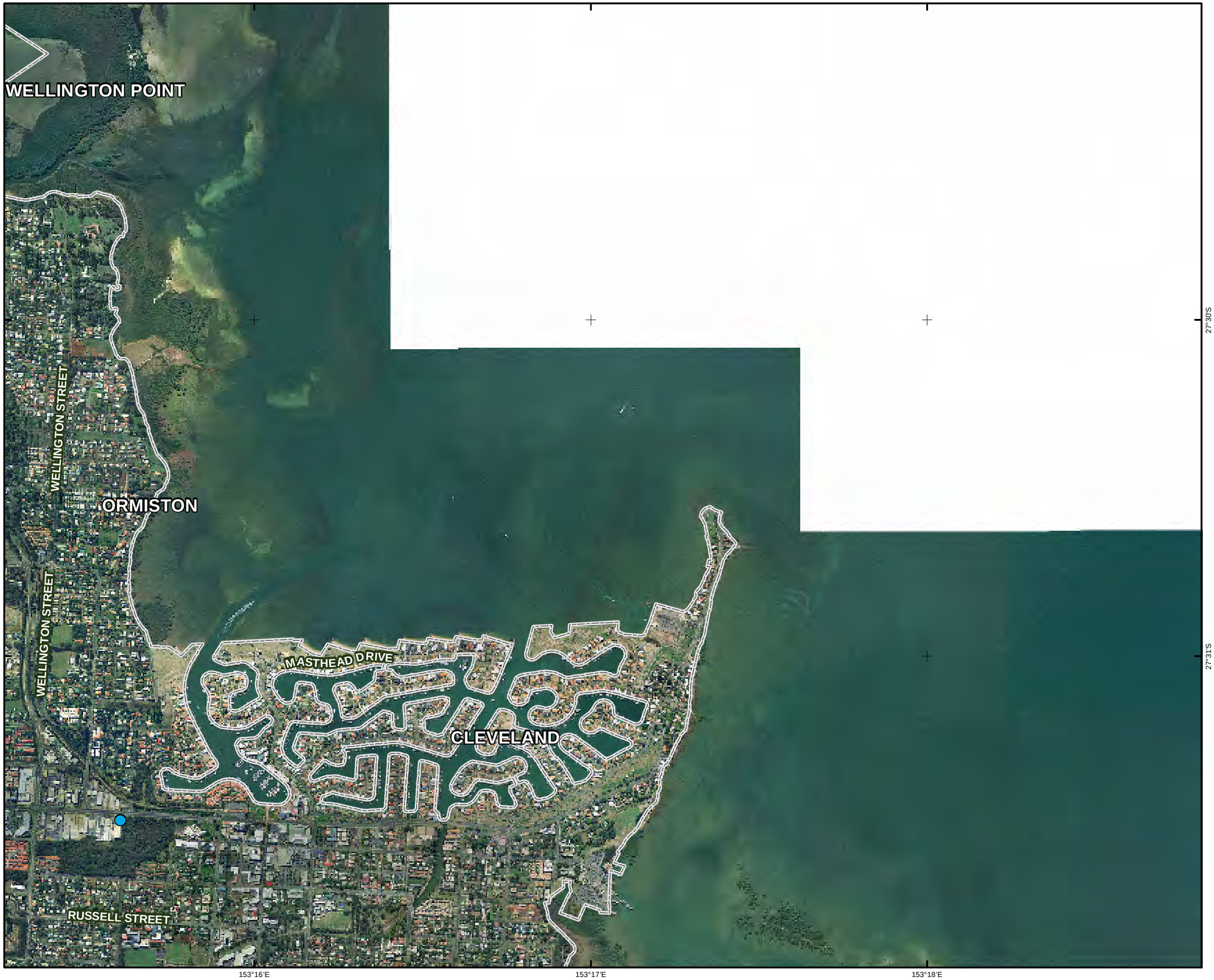
1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS



Appendix 4

Map 5 of 23

Title: **Vegetation Assessment Sites**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Assessment level

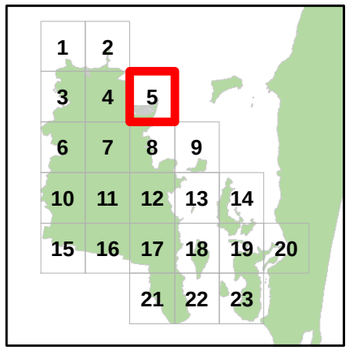
- Tertiary
- Quaternary
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
North Stradbroke Island is not included in the study area.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°10'E 153°11'E 153°12'E 153°13'E

27°32'S

27°33'S

27°34'S

SCHOOL ROAD

ALEXANDRA HILLS

WENTWORTH DRIVE

MACQUARIE STREET

CALLAGHAN WAY

REDLAND BAY ROAD

CAPALABA

FROST STREET

MOUNT COTTON ROAD

DUNCAN ROAD

SHELDON

MOUNT COTTON ROAD

Appendix 4

Map 6 of 23

Title: **Vegetation Assessment Sites**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Assessment level

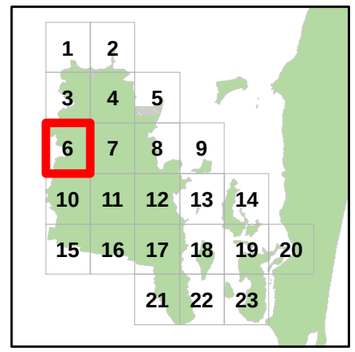
- Tertiary
- Quaternary
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
North Stradbroke Island is not included in the study area.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

Appendix 4

Map 7 of 23

Title: **Vegetation Assessment Sites**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Assessment level

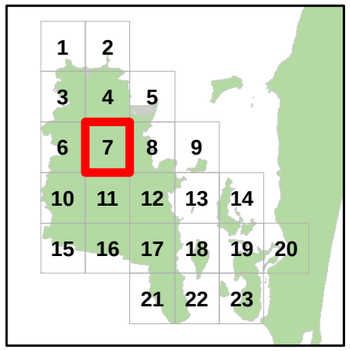
- Tertiary
- Quaternary
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
North Stradbroke Island is not included in the study area.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°16'E
153°17'E
153°18'E
27°32'S
27°33'S
27°34'S
RUSSELL STREET
WELLINGTON STREET
SMITH STREET
LONG STREET
BAY STREET
CLEVELAND
PANORAMA DRIVE
THORNLANDS
ZIEGENFUSZ ROAD
BOUNDARY ROAD
VICTORIA POINT
COOCHIEMUDLO ISLAND

Appendix 4

Map 8 of 23

Title: **Vegetation Assessment Sites**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Assessment level

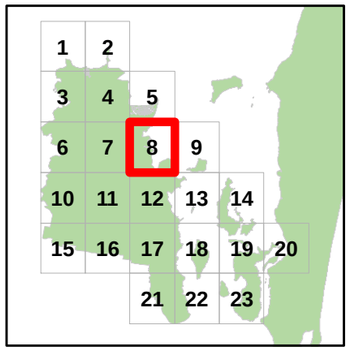
- Tertiary
- Quaternary
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
North Stradbroke Island is not included in the study area.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°18'E
153°19'E
153°20'E
153°21'E
27°32'S
27°33'S
27°34'S

VICTORIA POINT
COOCHIEMUDLO ISLAND
MACLEAY ISLAND

Notes:

Appendix 4

Map 9 of 23

Title: **Vegetation Assessment Sites**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Assessment level

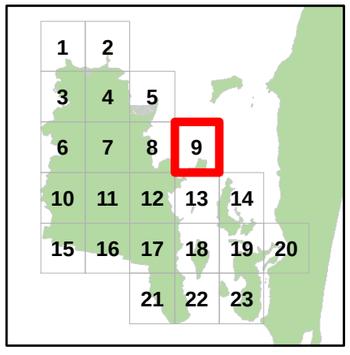
- Tertiary
- Quaternary
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
North Stradbroke Island is not included in the study area.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°10'E 153°11'E 153°12'E 153°13'E

27°35'S 27°36'S 27°37'S

SHELDON

MOUNT COTTON ROAD

FORD ROAD

MOUNT COTTON

Notes:

153°10'E 153°11'E 153°12'E 153°13'E

Document Location: \\BAAM-SERVER\baamdata\BAAM\Operations\BAAM Jobs\Active BAAM Jobs\0015-060 NEDS Phase 2\GIS\MXDS\ReportFigures\Appendix_MapSeries\Appendix 4 Vegetation Assessment Sites.mxdDate: 30/05/2013 12:56:27 PM

Appendix 4

Map 10 of 23

Title: **Vegetation Assessment Sites**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Assessment level

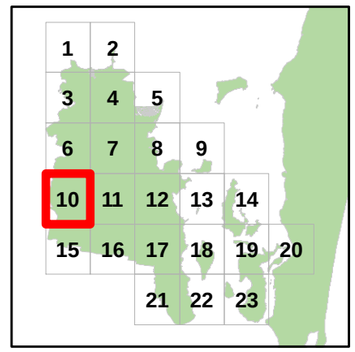
- Tertiary
- Quaternary
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
North Stradbroke Island is not included in the study area.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800
Meters



Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°13'E 153°14'E 153°15'E 153°16'E

27°35'S 27°36'S 27°37'S

SHELDON
THORNLANDS
WOODLANDS DRIVE
VICTORIA POINT
MOUNT COTTON
MOUNT COTTON ROAD
REDLAND BAY

Appendix 4

Map 11 of 23

Title: **Vegetation Assessment Sites**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Assessment level

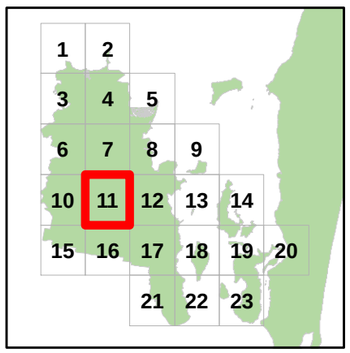
- Tertiary
- Quaternary
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
North Stradbroke Island is not included in the study area.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°16'E 153°17'E 153°18'E

27°35'S 27°36'S 27°37'S

THORNLANDS
VICTORIA POINT
MOUNT COTTON
REDLAND BAY
COOCHIEMUDLO ISLAND
BOUNDARY ROAD
SCHOOL ROAD
LINK ROAD
SYCAMORE PARADE
REDLAND BAY ROAD

Appendix 4

Map 12 of 23

Title: **Vegetation Assessment Sites**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Assessment level

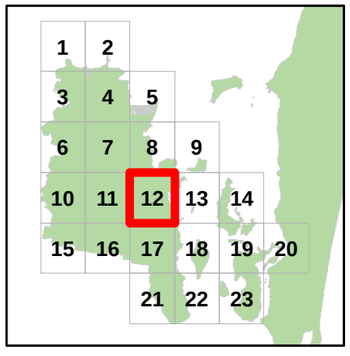
- Tertiary
- Quaternary
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
North Stradbroke Island is not included in the study area.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°18'E
153°19'E
153°20'E
153°21'E
27°35'S
27°36'S
27°37'S

COOCHIEMUDLO ISLAND
VICTORIA POINT
MACLEAY ISLAND
REDLAND BAY

Appendix 4

Map 13 of 23

Title: **Vegetation Assessment Sites**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Assessment level

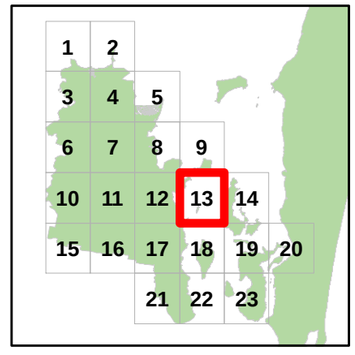
- Tertiary
- Quaternary
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
North Stradbroke Island is not included in the study area.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°21'E 153°22'E 153°23'E 153°24'E

27°35'S

27°36'S

27°37'S

MACLEAY ISLAND

LAMB ISLAND

Notes:

Appendix 4

Map 14 of 23

Title: **Vegetation Assessment Sites**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Assessment level

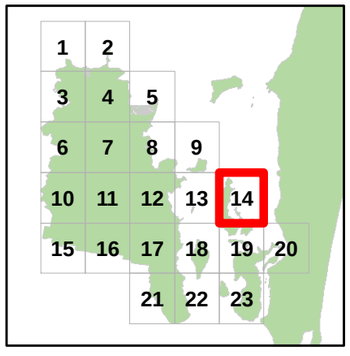
- Tertiary
- Quaternary
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009)
supplied by Redland City Council
Imagery Sourced from RCC
North Stradbroke Island is not included in the study area.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°10'E 153°11'E 153°12'E 153°13'E

27°38'S

27°39'S

27°40'S

MOUNT COTTON

Notes:

Appendix 4

Map 15 of 23

Title: **Vegetation Assessment Sites**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Assessment level

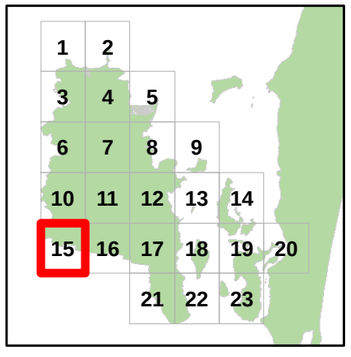
- Tertiary
- Quaternary
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
North Stradbroke Island is not included in the study area.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°13'E 153°14'E 153°15'E 153°16'E

27°38'S

27°39'S

27°40'S

MOUNT COTTON

MOUNT COTTON ROAD

REDLAND BAY

Notes:

Appendix 4

Map 16 of 23

Title: **Vegetation Assessment Sites**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Assessment level

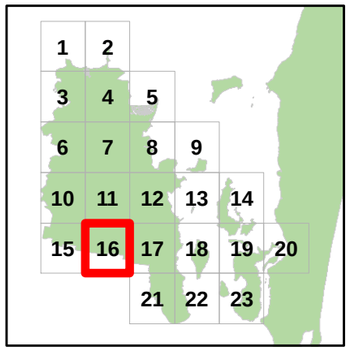
- Tertiary
- Quaternary
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
North Stradbroke Island is not included in the study area.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°16'E
153°17'E
153°18'E
27°38'S
27°39'S
27°40'S

MOUNT COTTON
REDLAND BAY
CYPRESS STREET
BANKSWOOD DRIVE
CLEVELAND REDLAND BAY ROAD
SERPENTINE CREEK ROAD

Appendix 4

Map 17 of 23

Title: **Vegetation Assessment Sites**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Assessment level

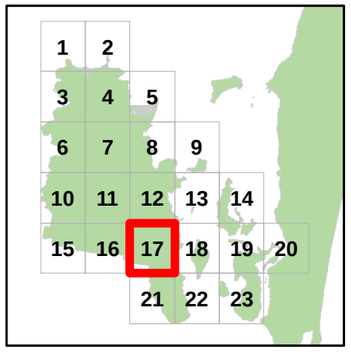
- Tertiary
- Quaternary
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
North Stradbroke Island is not included in the study area.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

Appendix 4

Map 18 of 23

Title: **Vegetation Assessment Sites**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Assessment level

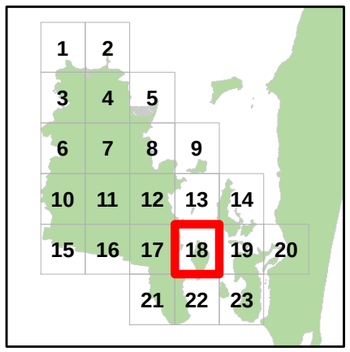
- Tertiary
- Quaternary
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
North Stradbroke Island is not included in the study area.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°21'E 153°22'E 153°23'E 153°24'E

27°38'S

27°39'S

27°40'S

MACLEAY ISLAND

LAMB ISLAND

KARRAGARRA ISLAND

RUSSELL ISLAND

Notes:

Appendix 4

Map 19 of 23

Title: **Vegetation Assessment Sites**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Assessment level

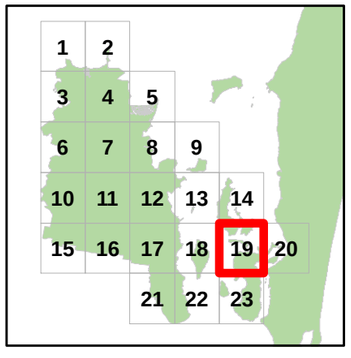
- Tertiary
- Quaternary
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
North Stradbroke Island is not included in the study area.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°24'E
153°25'E
153°26'E
27°38'S
27°39'S
27°40'S

LAMB ISLAND

RUSSELL ISLAND

Notes:

Document Location: \\BAAM-SERVER\baamdata\BAAM\Operations\BAAM Jobs\Active BAAM Jobs\0015-060 NEDS Phase 2\GIS\MXDs\ReportFigures\Appendix_MapSeries\Appendix 4 Vegetation Assessment Sites.mxdDate: 30/05/2013 12:56:27 PM

Appendix 4

Map 20 of 23

Title: **Vegetation Assessment Sites**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Assessment level

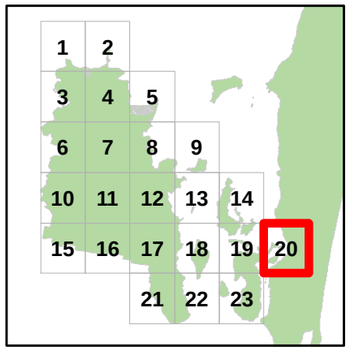
- Tertiary
- Quaternary
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009)
supplied by Redland City Council
Imagery Sourced from RCC
North Stradbroke Island is not included in the study area.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°16'E 153°17'E 153°18'E

27°40'S 27°41'S 27°42'S

REDLAND BAY

SERPENTINE CREEK ROAD

LONGLAND ROAD

LOGAN RIVER

Notes:

Appendix 4

Map 21 of 23

Title: **Vegetation Assessment Sites**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Assessment level

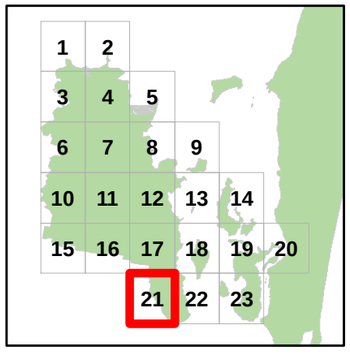
- Tertiary
- Quaternary
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
North Stradbroke Island is not included in the study area.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°18'E 153°19'E 153°20'E 153°21'E

27°40'S

27°41'S

27°42'S

SERPENTINE CREEK ROAD

REDLAND BAY

LOGAN RIVER

Appendix 4

Map 22 of 23

Title: **Vegetation Assessment Sites**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Assessment level

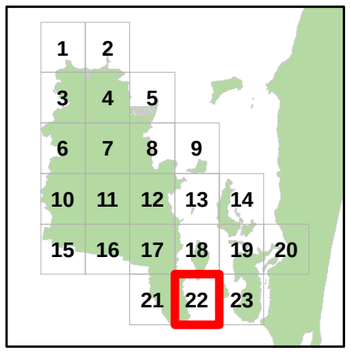
- Tertiary
- Quaternary
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
North Stradbroke Island is not included in the study area.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°21'E
153°22'E
153°23'E
153°24'E
27°40'S
27°41'S
27°42'S

RUSSELL ISLAND

Notes:

Appendix 4

Map 23 of 23

Title: **Vegetation Assessment Sites**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Assessment level

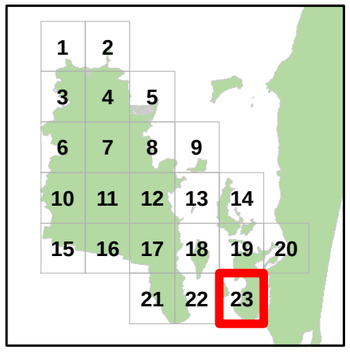
- Tertiary
- Quaternary
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
North Stradbroke Island is not included in the study area.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

APPENDIX 5
MAP SERIES: REVISED REMNANT REGIONAL ECOSYSTEM MAPPING

153°10'E
153°11'E
153°12'E
153°13'E
27°27'S
27°28'S
27°29'S

THORNESIDE
BIRKDALE
THORNESIDE ROAD
MOOROONDU ROAD

Notes:

Appendix 5

Map 1 of 23

Title: **Revised Regional Ecosystem Mapping - Remnant Vegetation**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Revised Remnant Regional Ecosystem:

LAND ZONE

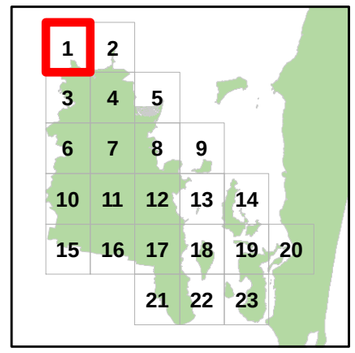
- 1
- 2
- 3
- 5
- 9-10
- 11
- 12
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°13'E 153°14'E 153°15'E 153°16'E

27°27'S

27°28'S

27°29'S

WELLINGTON POINT

BIRKDALE

THORNESIDE

Notes:

Appendix 5

Map 2 of 23

Title: **Revised Regional Ecosystem Mapping - Remnant Vegetation**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Revised Remnant Regional Ecosystem:

LAND ZONE

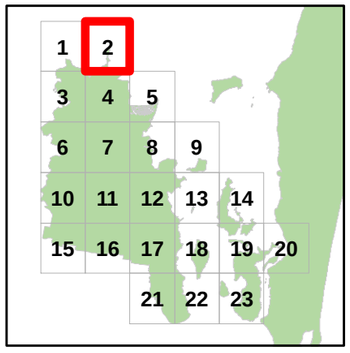
- 1
- 2
- 3
- 5
- 9-10
- 11
- 12
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

Appendix 5

Map 3 of 23

Title: **Revised Regional Ecosystem Mapping - Remnant Vegetation**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Revised Remnant Regional Ecosystem:

LAND ZONE

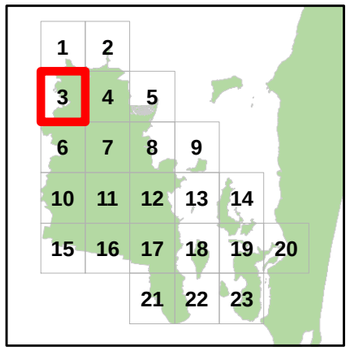
- 1
- 2
- 3
- 5
- 9-10
- 11
- 12
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°13'E 153°14'E 153°15'E 153°16'E

27°30'S

27°31'S

THORNESIDE
QUARRY ROAD
BADGEN ROAD
HARDY ROAD
MARLBOROUGH ROAD
BIRKDALE
WELLINGTON POINT
BARRON ROAD
BAILEY ROAD
RANDALL ROAD
BLUEBELL STREET
ABELIA STREET
WELLINGTON STREET
ORMISTON
ALEXANDRA HILLS
CAMBRIDGE DRIVE
CROTONA ROAD EAST
CUMBERLAND DRIVE
CLEVELAND
RUSSELL STREET

153°13'E 153°14'E 153°15'E 153°16'E

Document Location: \\BAAM-SERVER\baamdata\BAAM\Operations\BAAM Jobs\Active BAAM Jobs\0015-060 NEDS Phase 2\GIS\MXDs\ReportFigures\Appendix_MapSeries\Appendix 5 Revised REgional Ecosystem Mapping - Remnant.mxdDate: 30/05/2013 12:46:13 PM

Appendix 5

Map 4 of 23

Title: **Revised Regional Ecosystem Mapping - Remnant Vegetation**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Revised Remnant Regional Ecosystem:

LAND ZONE

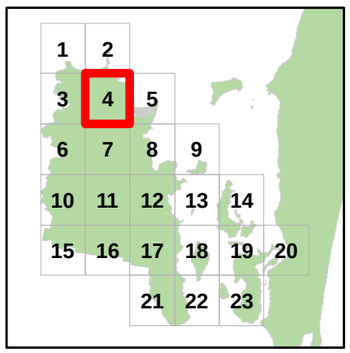
- 1
- 2
- 3
- 5
- 9-10
- 11
- 12
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°16'E 153°17'E 153°18'E

27°30'S 27°31'S

WELLINGTON POINT

WELLINGTON STREET

ORMISTON

MASTHEAD DRIVE

CLEVELAND

RUSSELL STREET

Miles

Appendix 5

Map 5 of 23

Title: **Revised Regional Ecosystem Mapping - Remnant Vegetation**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Revised Remnant Regional Ecosystem:

LAND ZONE

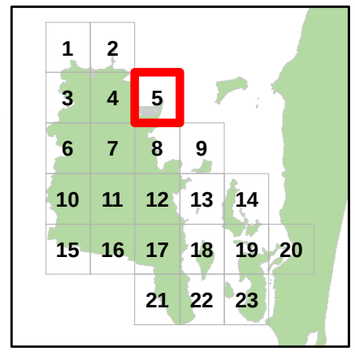
- 1
- 2
- 3
- 5
- 9-10
- 11
- 12
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°10'E 153°11'E 153°12'E 153°13'E

27°32'S

27°33'S

27°34'S

SCHOOL ROAD

ALEXANDRA HILLS

WENTWORTH DRIVE

MACQUARIE STREET

CALLAGHAN WAY

REDLAND BAY ROAD

CAPALABA

FROST STREET

MOUNT COTTON ROAD

DUNCAN ROAD

SHELDON

MOUNT COTTON ROAD

153°10'E 153°11'E 153°12'E 153°13'E

Document Location: \\BAAM-SERVER\baamdata\BAAM\Operations\BAAM Jobs\Active BAAM Jobs\0015-060 NEDS Phase 2\GIS\MXDs\ReportFigures\Appendix_MapSeries\Appendix 5 Revised REgional Ecosystem Mapping - Remnant.mxdDate: 30/05/2013 12:46:13 PM

Appendix 5

Map 6 of 23

Title: **Revised Regional Ecosystem Mapping - Remnant Vegetation**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Revised Remnant Regional Ecosystem:

LAND ZONE

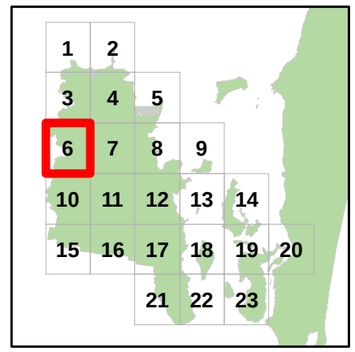
- 1
- 2
- 3
- 5
- 9-10
- 11
- 12
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°13'E 153°14'E 153°15'E 153°16'E

27°32'S 27°33'S 27°34'S

CUMBERLAND DRIVE
RUSSELL STREET
SMITH STREET
LONG STREET
WELLINGTON STREET
BAY STREET
ALEXANDRA HILLS
ALEXANDRA CIRCUIT
CLEVELAND
REDLAND BAY ROAD
CAPALABA
THORNLANDS
ZIEGENFUSZ ROAD
PANORAMA DRIVE
BOUNDARY ROAD
DUNCAN ROAD
MOUNT COTTON ROAD
MOUNT COTTON ROAD
SHELDON
WOODLANDS DRIVE

Notes:

153°13'E 153°14'E 153°15'E 153°16'E

Document Location: \\BAAM-SERVER\baamdata\BAAM\Operations\BAAM Jobs\Active BAAM Jobs\0015-060 NEDS Phase 2\GIS\MXDs\ReportFigures\Appendix_MapSeries\Appendix 5 Revised REgional Ecosystem Mapping - Remnant.mxdDate: 30/05/2013 12:46:13 PM

Appendix 5

Map 7 of 23

Title: **Revised Regional Ecosystem Mapping - Remnant Vegetation**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Revised Remnant Regional Ecosystem:

LAND ZONE

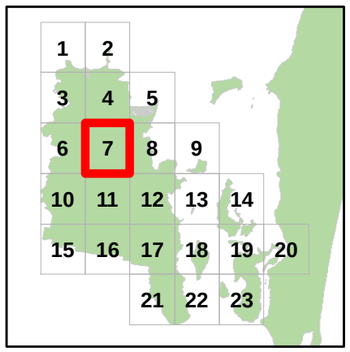
- 1
- 2
- 3
- 5
- 9-10
- 11
- 12
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°16'E
153°17'E
153°18'E
27°32'S
27°33'S
27°34'S
RUSSELL STREET
WELLINGTON STREET
SMITH STREET
LONG STREET
BAY STREET
CLEVELAND
PANORAMA DRIVE
THORNLANDS
ZIEGENFUSZ ROAD
DOULL PLACE
BOUNDARY ROAD
VICTORIA POINT
COOCHIEMUDLO ISLAND

Appendix 5

Map 8 of 23

Title: **Revised Regional Ecosystem Mapping - Remnant Vegetation**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Revised Remnant Regional Ecosystem:

LAND ZONE

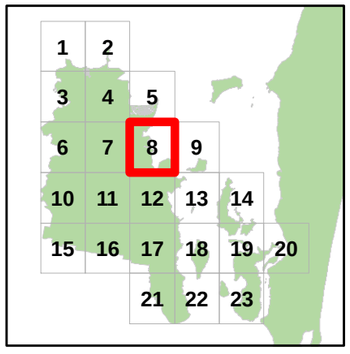
- 1
- 2
- 3
- 5
- 9-10
- 11
- 12
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°18'E
153°19'E
153°20'E
153°21'E
27°32'S
27°33'S
27°34'S

VICTORIA POINT

COOCHIEMUDLO ISLAND

MACLEAY ISLAND

Notes:

Appendix 5

Map 9 of 23

Title: **Revised Regional Ecosystem Mapping - Remnant Vegetation**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Revised Remnant Regional Ecosystem:

LAND ZONE

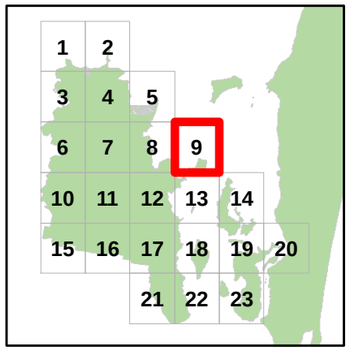
- 1
- 2
- 3
- 5
- 9-10
- 11
- 12
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009)
supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°10'E 153°11'E 153°12'E 153°13'E

27°35'S 27°36'S 27°37'S

SHELDON

MOUNT COTTON ROAD

FORD ROAD

MOUNT COTTON

Notes:

153°10'E 153°11'E 153°12'E 153°13'E

Document Location: \\BAAM-SERVER\baamdata\BAAM\Operations\BAAM Jobs\Active BAAM Jobs\0015-060 NEDS Phase 2\GIS\MXDs\ReportFigures\Appendix_MapSeries\Appendix 5 Revised REgional Ecosystem Mapping - Remnant.mxdDate: 30/05/2013 12:46:13 PM

Appendix 5

Map 10 of 23

Title: **Revised Regional Ecosystem Mapping - Remnant Vegetation**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Revised Remnant Regional Ecosystem:

LAND ZONE

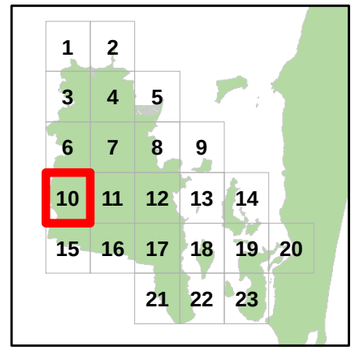
- 1
- 2
- 3
- 5
- 9-10
- 11
- 12
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°13'E 153°14'E 153°15'E 153°16'E

27°35'S 27°36'S 27°37'S

SHELDON
THORNLANDS
WOODLANDS DRIVE
VICTORIA POINT
MOUNT COTTON
MOUNT COTTON ROAD
REDLAND BAY

Notes:

Document Location: \\BAAM-SERVER\baamdata\BAAM\Operations\BAAM Jobs\Active BAAM Jobs\0015-060 NEDS Phase 2\GIS\MXDs\ReportFigures\Appendix_MapSeries\Appendix 5 Revised REgional Ecosystem Mapping - Remnant.mxdDate: 30/05/2013 12:46:13 PM

Appendix 5

Map 11 of 23

Title: **Revised Regional Ecosystem Mapping - Remnant Vegetation**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Revised Remnant Regional Ecosystem:

LAND ZONE

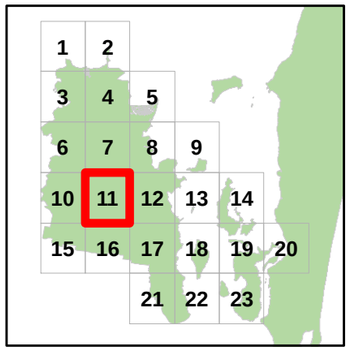
- 1
- 2
- 3
- 5
- 9-10
- 11
- 12
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°16'E 153°17'E 153°18'E

27°35'S 27°36'S 27°37'S

BOUNDARY ROAD
THORNLANDS
COOCHIEMUDLO ISLAND
SCHOOL ROAD
SYCAMORE PARADE
LINK ROAD
REDLAND BAY ROAD
VICTORIA POINT
MOUNT COTTON
REDLAND BAY
GORDON ROAD
CLEVELAND REDLAND BAY ROAD

Appendix 5

Map 12 of 23

Title: **Revised Regional Ecosystem Mapping - Remnant Vegetation**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Revised Remnant Regional Ecosystem:

LAND ZONE

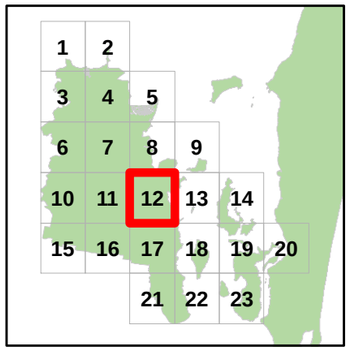
- 1
- 2
- 3
- 5
- 9-10
- 11
- 12
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°18'E 153°19'E 153°20'E 153°21'E

27°35'S

27°36'S

27°37'S

COOCHIEMUDLO ISLAND

VICTORIA POINT

MACLEAY ISLAND

REDLAND BAY

Appendix 5

Map 13 of 23

Title: **Revised Regional Ecosystem Mapping - Remnant Vegetation**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Revised Remnant Regional Ecosystem:

LAND ZONE

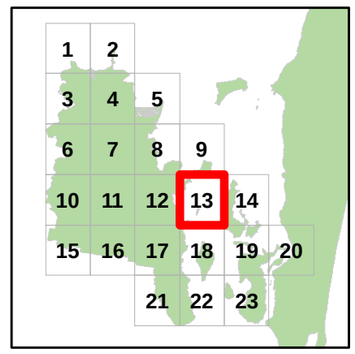
- 1
- 2
- 3
- 5
- 9-10
- 11
- 12
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°21'E 153°22'E 153°23'E 153°24'E

27°35'S

27°36'S

27°37'S

MACLEAY ISLAND

LAMB ISLAND

Notes:

Appendix 5

Map 14 of 23

Title: **Revised Regional Ecosystem Mapping - Remnant Vegetation**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Revised Remnant Regional Ecosystem:

LAND ZONE

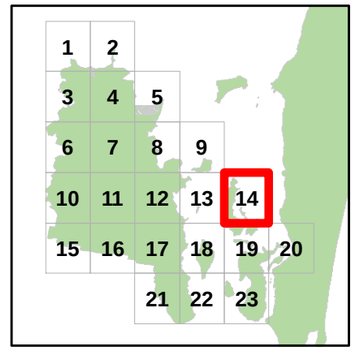
- 1
- 2
- 3
- 5
- 9-10
- 11
- 12
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009)
supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°10'E 153°11'E 153°12'E 153°13'E

27°38'S

MOUNT COTTON

27°39'S

27°40'S

Notes:

Appendix 5

Map 15 of 23

Title: **Revised Regional Ecosystem Mapping - Remnant Vegetation**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Revised Remnant Regional Ecosystem:

LAND ZONE

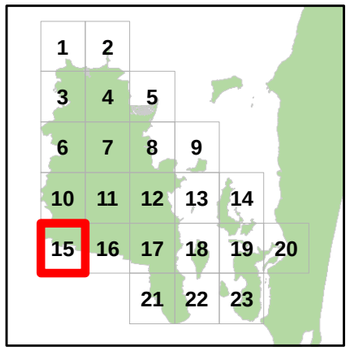
- 1
- 2
- 3
- 5
- 9-10
- 11
- 12
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°13'E 153°14'E 153°15'E 153°16'E

27°38'S 27°39'S 27°40'S

MOUNT COTTON

MOUNT COTTON ROAD

REDLAND BAY

Notes:

153°13'E 153°14'E 153°15'E 153°16'E

Document Location: \\BAAM-SERVER\baamdata\BAAM\Operations\BAAM Jobs\Active BAAM Jobs\0015-060 NEDS Phase 2\GIS\MXDs\ReportFigures\Appendix_MapSeries\Appendix 5 Revised REgional Ecosystem Mapping - Remnant.mxdDate: 30/05/2013 12:46:13 PM

Appendix 5

Map 16 of 23

Title: **Revised Regional Ecosystem Mapping - Remnant Vegetation**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Revised Remnant Regional Ecosystem:

LAND ZONE

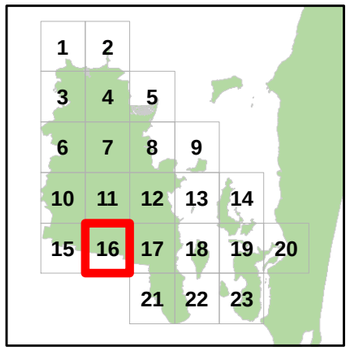
- 1
- 2
- 3
- 5
- 9-10
- 11
- 12
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°16'E 153°17'E 153°18'E

27°38'S

27°39'S

27°40'S

MOUNT COTTON

REDLAND BAY

CYPRESS STREET

BANKSWOOD DRIVE

CLEVELAND REDLAND BAY ROAD

SERPENTINE CREEK ROAD

Appendix 5

Map 17 of 23

Title: **Revised Regional Ecosystem Mapping - Remnant Vegetation**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Revised Remnant Regional Ecosystem:

LAND ZONE

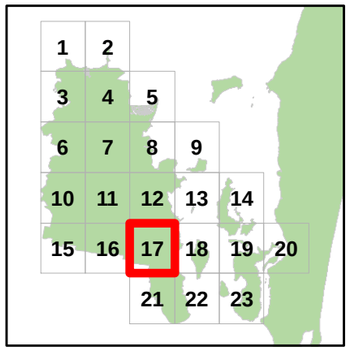
- 1
- 2
- 3
- 5
- 9-10
- 11
- 12
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°18'E 153°19'E 153°20'E 153°21'E

27°38'S 27°39'S 27°40'S

MACLEAY ISLAND

KARRAGARRA ISLAND

BANKSWOOD DRIVE

REDLAND BAY

SERPENTINE CREEK ROAD

Appendix 5

Map 18 of 23

Title: **Revised Regional Ecosystem Mapping - Remnant Vegetation**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Revised Remnant Regional Ecosystem:

LAND ZONE

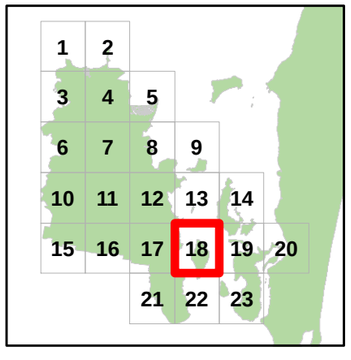
- 1
- 2
- 3
- 5
- 9-10
- 11
- 12
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°21'E 153°22'E 153°23'E 153°24'E

27°38'S

27°39'S

27°40'S

MACLEAY ISLAND

LAMB ISLAND

KARRAGARRA ISLAND

RUSSELL ISLAND

Notes:

Document Location: \\BAAM-SERVER\baamdata\BAAM\Operations\BAAM Jobs\Active BAAM Jobs\0015-060 NEDS Phase 2\GIS\MXDs\ReportFigures\Appendix_MapSeries\Appendix 5 Revised REgional Ecosystem Mapping - Remnant.mxdDate: 30/05/2013 12:46:13 PM

Appendix 5

Map 19 of 23

Title: **Revised Regional Ecosystem Mapping - Remnant Vegetation**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Revised Remnant Regional Ecosystem:

LAND ZONE

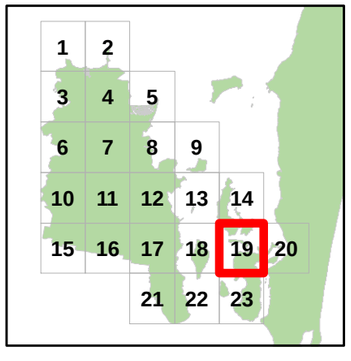
- 1
- 2
- 3
- 5
- 9-10
- 11
- 12
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°24'E 153°25'E 153°26'E

27°38'S

27°39'S

27°40'S

LAMB ISLAND

RUSSELL ISLAND

Notes:

Document Location: \\BAAM-SERVER\baamdata\BAAM\Operations\BAAM Jobs\Active BAAM Jobs\0015-060 NEDS Phase 2\GIS\MXDs\ReportFigures\Appendix_MapSeries\Appendix 5 Revised REgional Ecosystem Mapping - Remnant.mxdDate: 30/05/2013 12:46:13 PM

Appendix 5

Map 20 of 23

Title: **Revised Regional Ecosystem Mapping - Remnant Vegetation**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Revised Remnant Regional Ecosystem:

LAND ZONE

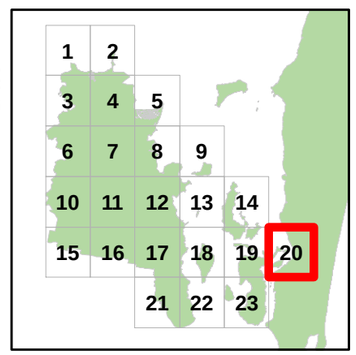
- 1
- 2
- 3
- 5
- 9-10
- 11
- 12
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009)
supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800
Meters



Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°16'E 153°17'E 153°18'E

27°40'S

27°41'S

27°42'S

REDLAND BAY

LONGLAND ROAD

SERPENTINE CREEK ROAD

LOGAN RIVER

Notes:

Appendix 5

Map 21 of 23

Title: **Revised Regional Ecosystem Mapping - Remnant Vegetation**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Revised Remnant Regional Ecosystem:

LAND ZONE

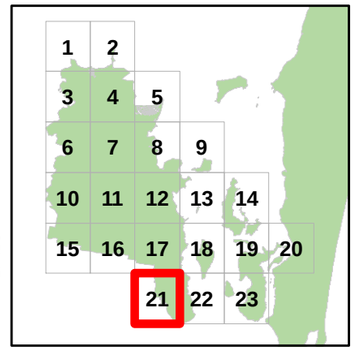
- 1
- 2
- 3
- 5
- 9-10
- 11
- 12
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°18'E 153°19'E 153°20'E 153°21'E

27°40'S

27°41'S

27°42'S

SERPENTINE CREEK ROAD

REDLAND BAY

LOGAN RIVER

Notes:

Appendix 5

Map 22 of 23

Title: **Revised Regional Ecosystem Mapping - Remnant Vegetation**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Revised Remnant Regional Ecosystem:

LAND ZONE

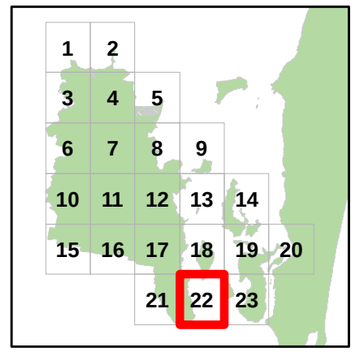
- 1
- 2
- 3
- 5
- 9-10
- 11
- 12
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009)
supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°21'E 153°22'E 153°23'E 153°24'E

27°40'S

27°41'S

27°42'S

RUSSELL ISLAND

Notes:

Appendix 5

Map 23 of 23

Title: **Revised Regional Ecosystem Mapping - Remnant Vegetation**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Revised Remnant Regional Ecosystem:

LAND ZONE

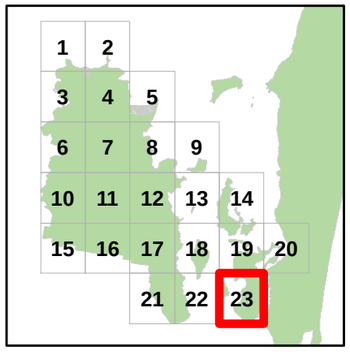
- 1
- 2
- 3
- 5
- 9-10
- 11
- 12
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters

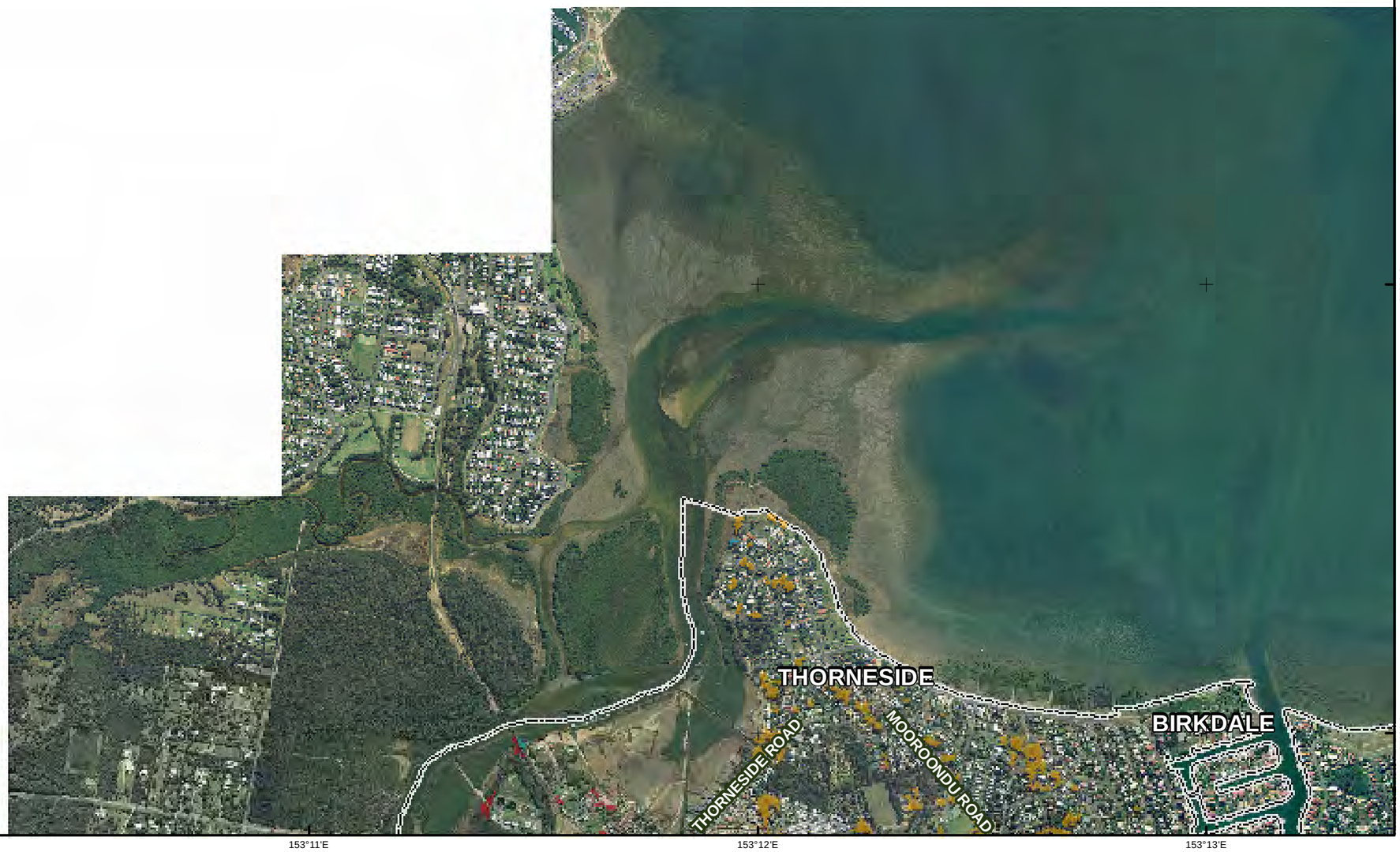


Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

APPENDIX 6
MAP SERIES: REVISED REGROWTH REGIONAL ECOSYSTEM MAPPING

153°10'E
153°11'E
153°12'E
153°13'E
27°27'S
27°28'S
27°29'S



Notes:

Appendix 6

Map 1 of 23

Title: **Revised Regional Ecosystem Mapping - Regrowth Vegetation**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Revised RE Regrowth:

LAND ZONE

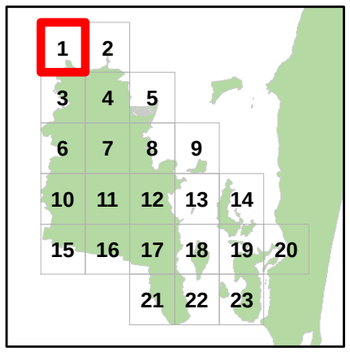
- 1
- 2
- 3
- 5
- 9-10
- 11
- 12
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°13'E
153°14'E
153°15'E
153°16'E
27°27'S
27°28'S
27°29'S

WELLINGTON POINT
BIRKDALE
THORNESIDE

Notes:

Appendix 6

Map 2 of 23

Title: **Revised Regional Ecosystem Mapping - Regrowth Vegetation**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Revised RE Regrowth:

LAND ZONE

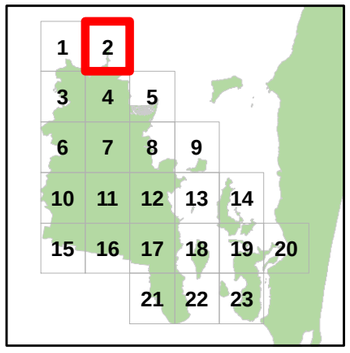
- 1
- 2
- 3
- 5
- 9-10
- 11
- 12
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°10'E 153°11'E 153°12'E 153°13'E

27°30'S

27°31'S

THORNESIDE

RICKERT ROAD

THORNESIDE ROAD

MOOROONDU ROAD

QUARRY ROAD

BIRKDALE

BAILEY ROAD

BARRON ROAD

RANDALL ROAD

BLUEBELL STREET

ABELIA STREET

ALEXANDRA HILLS

CAPALABA

MORETON BAY ROAD

REDLAND BAY ROAD

CROTONA ROAD

CROTONA ROAD EAST

CUMBERLAND DRIV

Notes:

153°10'E 153°11'E 153°12'E 153°13'E

Document Location: \\BAAM-SERVER\baamdata\BAAM\Operations\BAAM Jobs\Active BAAM Jobs\0015-060 NEDS Phase 2\GIS\MXDS\ReportFigures\Appendix_MapSeries\Appendix 6 Revised REgional Ecosystem Mapping - Regrowth.mxdDate: 30/05/2013 12:09:58 PM

Appendix 6

Map 3 of 23

Title: **Revised Regional Ecosystem Mapping - Regrowth Vegetation**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Revised RE Regrowth:

LAND ZONE

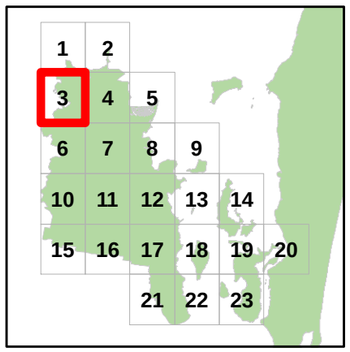
- 1
- 2
- 3
- 5
- 9-10
- 11
- 12
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

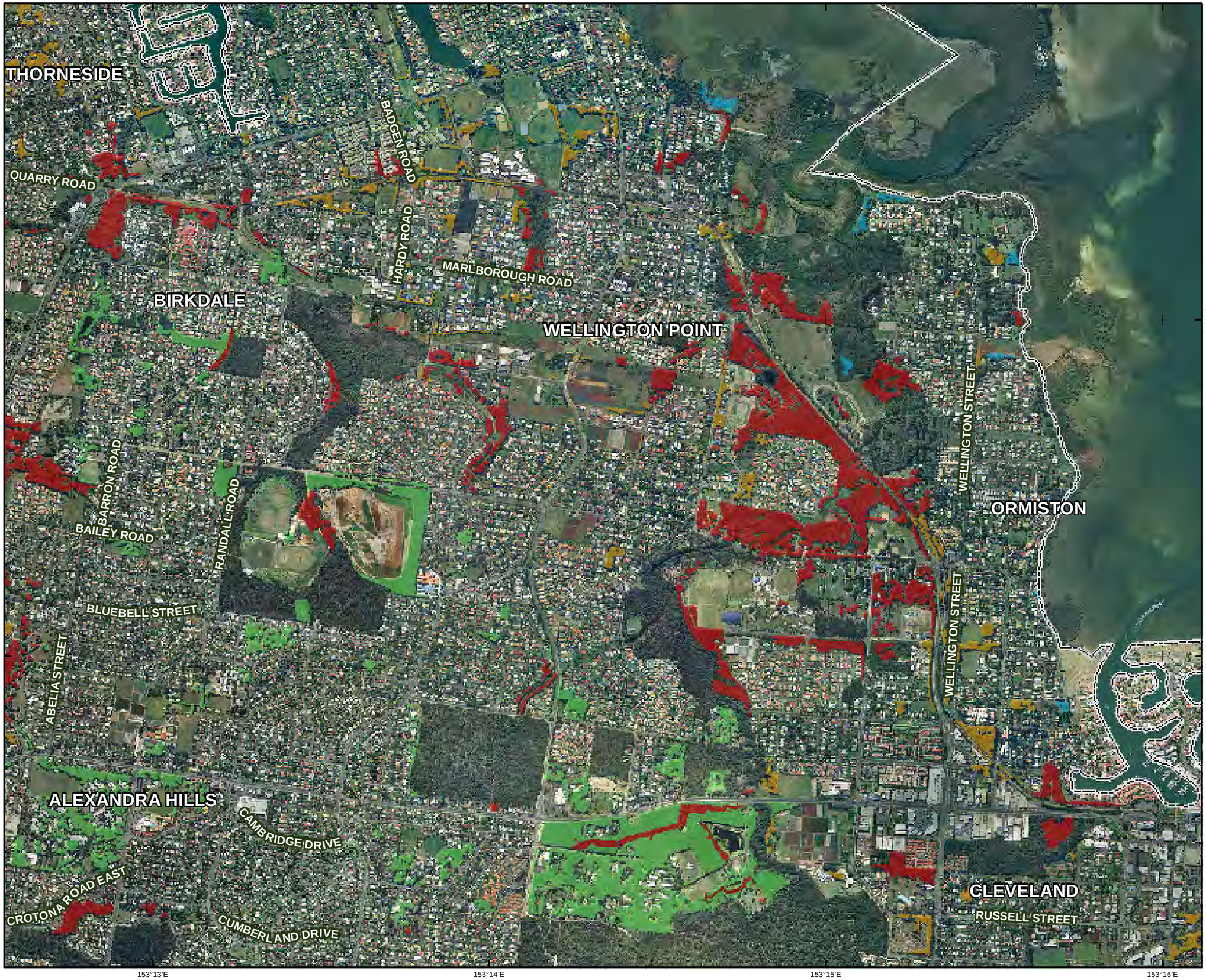
1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS



Appendix 6

Map 4 of 23

Title: **Revised Regional Ecosystem Mapping - Regrowth Vegetation**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Revised RE Regrowth:

LAND ZONE

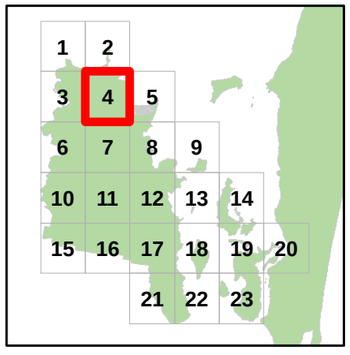
- 1
- 2
- 3
- 5
- 9-10
- 11
- 12
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

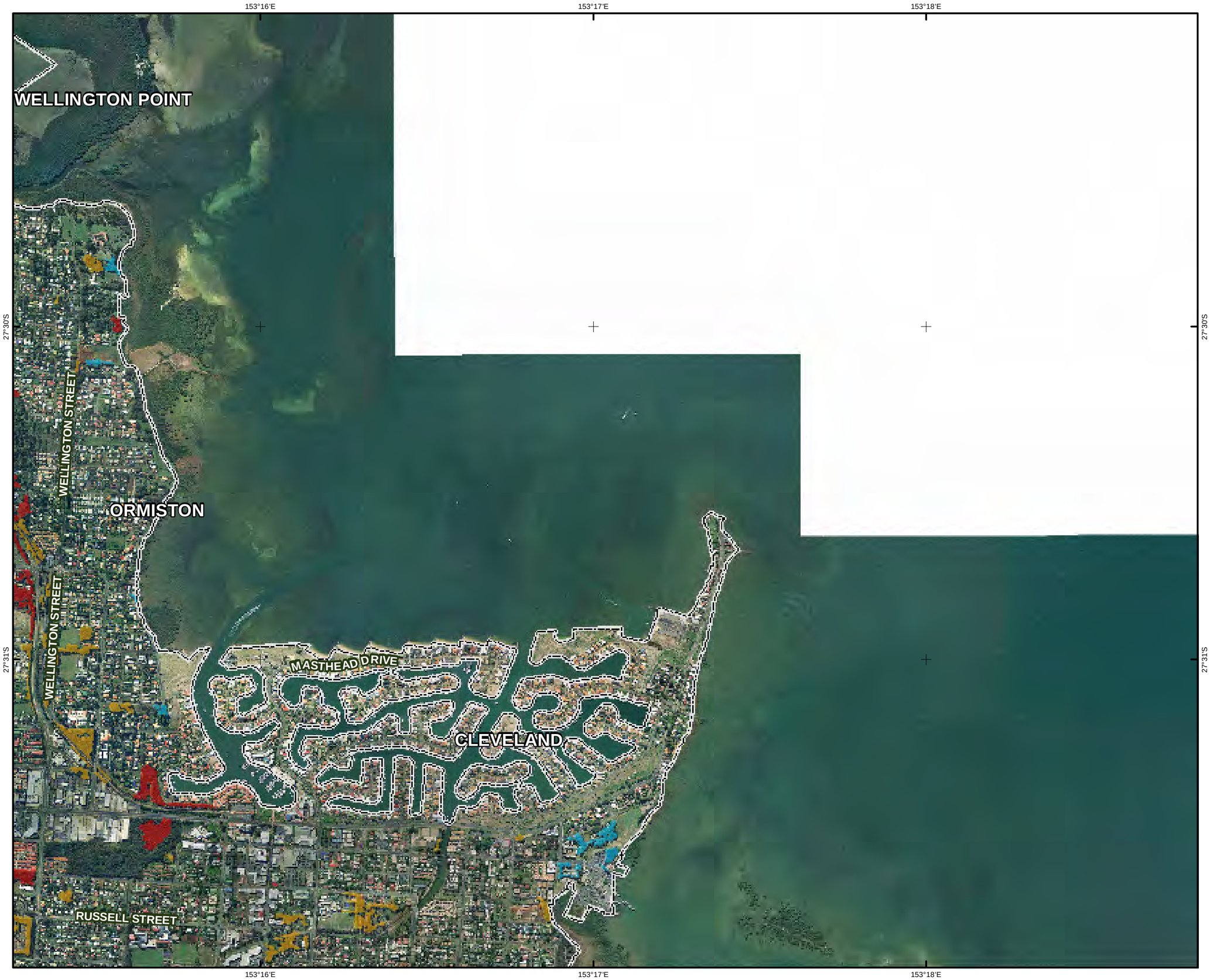
1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS



Appendix 6

Map 5 of 23

Title: **Revised Regional Ecosystem Mapping - Regrowth Vegetation**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Revised RE Regrowth:

LAND ZONE

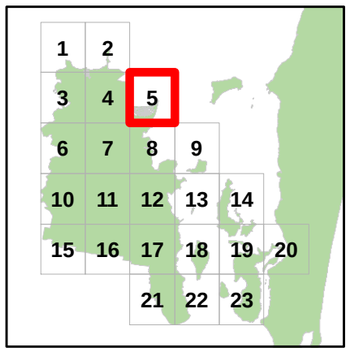
- 1
- 2
- 3
- 5
- 9-10
- 11
- 12
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°10'E 153°11'E 153°12'E 153°13'E

27°32'S

27°33'S

27°34'S

SCHOOL ROAD

ALEXANDRA HILLS

WENTWORTH DRIVE

MACQUARIE STREET

CALLAGHAN WAY

REDLAND BAY ROAD

CAPALABA

FROST STREET

MOUNT COTTON ROAD

SHELDON

DUNCAN ROAD

MOUNT COTTON ROAD

Appendix 6

Map 6 of 23

Title: **Revised Regional Ecosystem Mapping - Regrowth Vegetation**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Revised RE Regrowth:

LAND ZONE

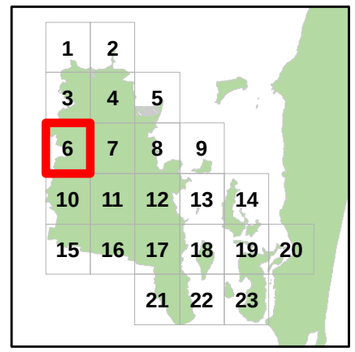
- 1
- 2
- 3
- 5
- 9-10
- 11
- 12
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°13'E 153°14'E 153°15'E 153°16'E

27°32'S 27°33'S 27°34'S

CUMBERLAND DRIVE
RUSSELL STREET
SMITH STREET
LONG STREET
WELLINGTON STREET
BAY STREET
ALEXANDRA HILLS
ALEXANDRA CIRCUIT
CLEVELAND
REDLAND BAY ROAD
CAPALABA
THORNLANDS
ZIEGENFUSZ ROAD
PANORAMA DRIVE
BOUNDARY ROAD
DUNCAN ROAD
MOUNT COTTON ROAD
SHELDON
MOUNT COTTON ROAD
WOODLANDS DRIVE

153°13'E 153°14'E 153°15'E 153°16'E

Document Location: \\BAAM-SERVER\baamdata\BAAM\Operations\BAAM Jobs\Active BAAM Jobs\0015-060 NEDS Phase 2\GIS\MXDs\ReportFigures\Appendix_MapSeries\Appendix 6 Revised REgional Ecosystem Mapping - Regrowth.mxdDate: 30/05/2013 12:09:58 PM

Appendix 6

Map 7 of 23

Title: **Revised Regional Ecosystem Mapping - Regrowth Vegetation**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Revised RE Regrowth:

LAND ZONE

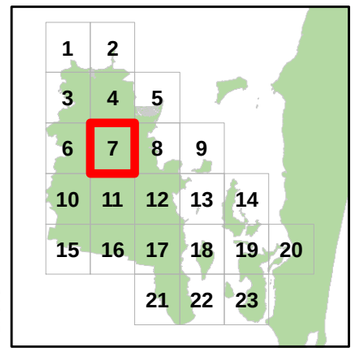
- 1
- 2
- 3
- 5
- 9-10
- 11
- 12
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°16'E 153°17'E 153°18'E

27°32'S 27°33'S 27°34'S

RUSSELL STREET
WELLINGTON STREET
SMITH STREET
LONG STREET
BAY STREET
CLEVELAND
PANORAMA DRIVE
THORNLANDS
ZIEGENFUSZ ROAD
DOULL PLACE
BOUNDARY ROAD
VICTORIA POINT
COOCHIEMUDLO ISLAND

Appendix 6
Map 8 of 23

Title: Revised Regional Ecosystem Mapping - Regrowth Vegetation

Project: NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers

Client: Redland City Council

LEGEND

Revised RE Regrowth:

LAND ZONE

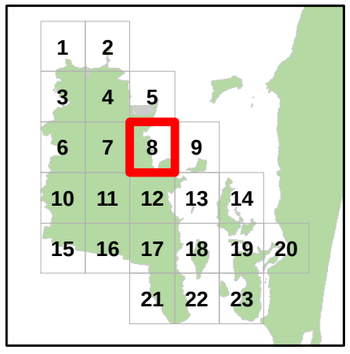
- 1
- 2
- 3
- 5
- 9-10
- 11
- 12
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°18'E
153°19'E
153°20'E
153°21'E
27°32'S
27°33'S
27°34'S

VICTORIA POINT

COOCHIEMUDLO ISLAND

MACLEAY ISLAND

Notes:

Appendix 6

Map 9 of 23

Title: **Revised Regional Ecosystem Mapping - Regrowth Vegetation**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Revised RE Regrowth:

LAND ZONE

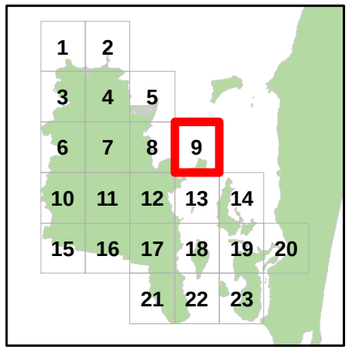
- 1
- 2
- 3
- 5
- 9-10
- 11
- 12
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009)
supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°10'E 153°11'E 153°12'E 153°13'E

27°35'S 27°36'S 27°37'S

SHELDON

MOUNT COTTON ROAD

FORD ROAD

MOUNT COTTON

Notes

Appendix 6

Map 10 of 23

Title: Revised Regional Ecosystem Mapping - Regrowth Vegetation

Project: NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers

Client: Redland City Council

LEGEND

Revised RE Regrowth:

LAND ZONE

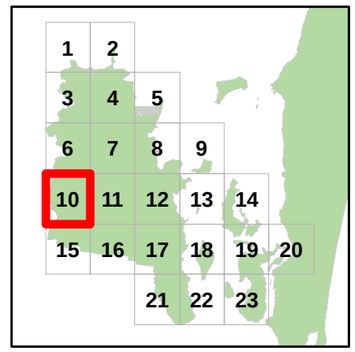
- 1
- 2
- 3
- 5
- 9-10
- 11
- 12
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 30/05/2013 Drawn By: MG Reviewed by: CS

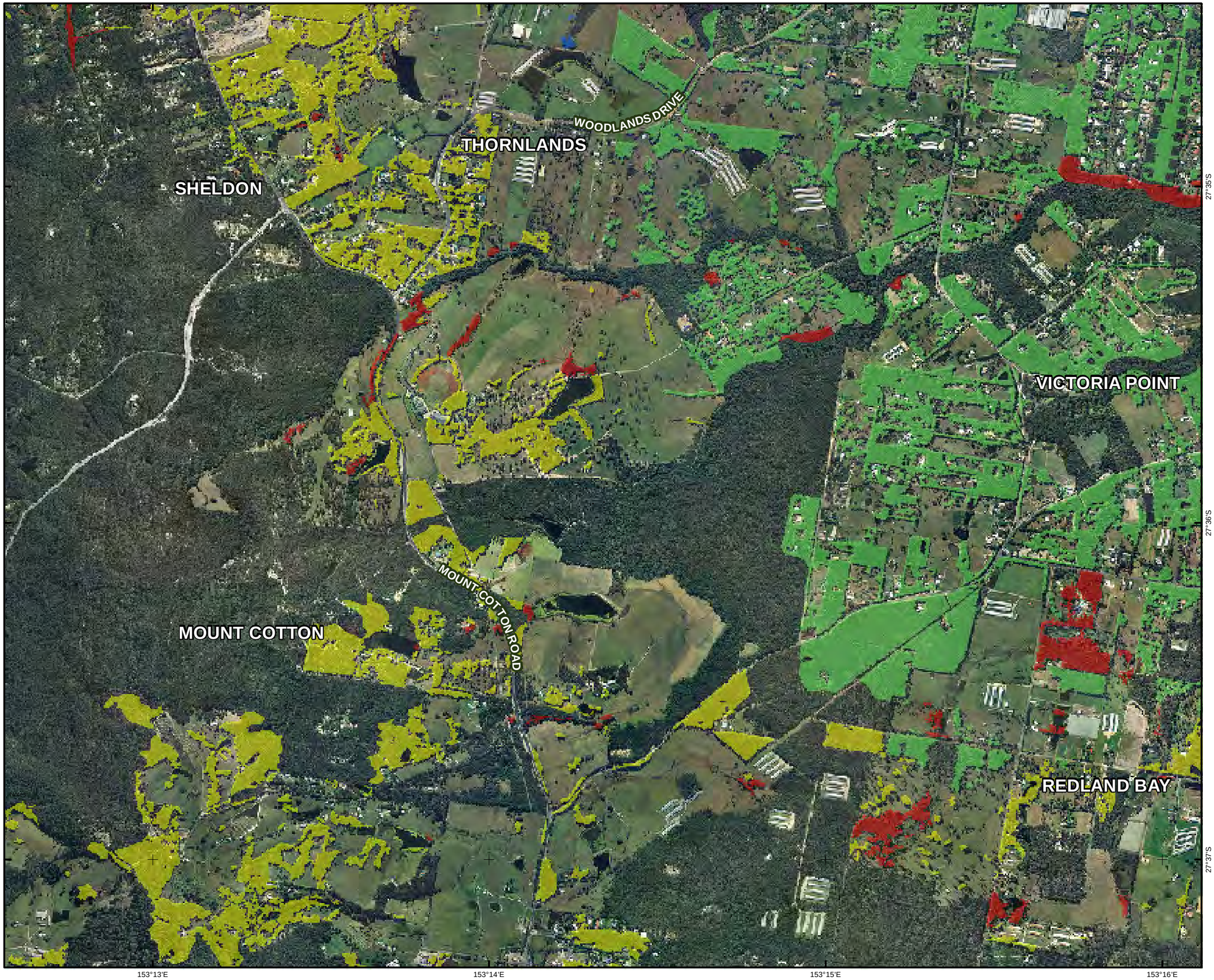
BAAM ECOLOGICAL CONSULTANTS

153°13'E 153°14'E 153°15'E 153°16'E

27°35'S

27°36'S

27°37'S



Appendix 6

Map 11 of 23

Title: **Revised Regional Ecosystem Mapping - Regrowth Vegetation**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Revised RE Regrowth:

LAND ZONE

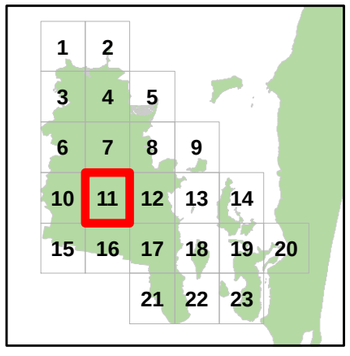
- 1
- 2
- 3
- 5
- 9-10
- 11
- 12
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°16'E 153°17'E 153°18'E

27°35'S 27°36'S 27°37'S

THORNLANDS
VICTORIA POINT
MOUNT COTTON
REDLAND BAY
COOCHIEMUDLO ISLAND

BOUNDARY ROAD
SCHOOL ROAD
LINK ROAD
SYCAMORE PARADE
REDLAND BAY ROAD
GORDON ROAD
CLEVELAND REDLAND BAY ROAD

Appendix 6

Map 12 of 23

Title: **Revised Regional Ecosystem Mapping - Regrowth Vegetation**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Revised RE Regrowth:

LAND ZONE

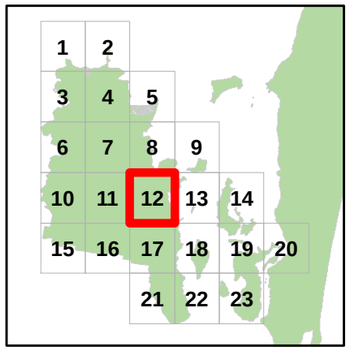
- 1
- 2
- 3
- 5
- 9-10
- 11
- 12
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°18'E 153°19'E 153°20'E 153°21'E

27°35'S

27°36'S

27°37'S

COOCHIEMUDLO ISLAND

VICTORIA POINT

MACLEAY ISLAND

REDLAND BAY

Appendix 6

Map 13 of 23

Title: **Revised Regional Ecosystem Mapping - Regrowth Vegetation**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Revised RE Regrowth:

LAND ZONE

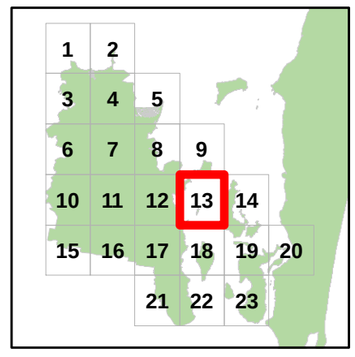
- 1
- 2
- 3
- 5
- 9-10
- 11
- 12
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°21'E 153°22'E 153°23'E 153°24'E

27°35'S

27°36'S

27°37'S

MACLEAY ISLAND

LAMB ISLAND

Notes:

153°21'E 153°22'E 153°23'E 153°24'E

Document Location: \\BAAM-SERVER\baamdata\BAAM\Operations\BAAM Jobs\Active BAAM Jobs\0015-060 NEDS Phase 2\GIS\MXDs\ReportFigures\Appendix_MapSeries\Appendix 6 Revised REgional Ecosystem Mapping - Regrowth.mxdDate: 30/05/2013 12:09:58 PM

Appendix 6

Map 14 of 23

Title: **Revised Regional Ecosystem Mapping - Regrowth Vegetation**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Revised RE Regrowth:

LAND ZONE

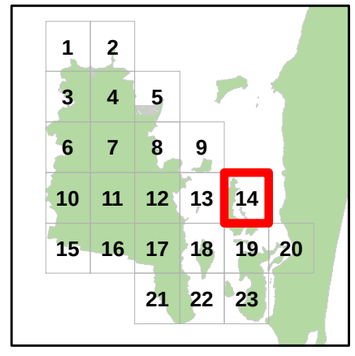
- 1
- 2
- 3
- 5
- 9-10
- 11
- 12
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009)
supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°10'E 153°11'E 153°12'E 153°13'E

27°38'S

27°39'S

27°40'S

MOUNT COTTON

Notes:

Document Location: \\BAAM-SERVER\baamdata\BAAM\Operations\BAAM Jobs\Active BAAM Jobs\0015-060 NEDS Phase 2\GIS\MXDS\ReportFigures\Appendix_MapSeries\Appendix 6 Revised REgional Ecosystem Mapping - Regrowth.mxdDate: 30/05/2013 12:09:58 PM

Appendix 6

Map 15 of 23

Title: **Revised Regional Ecosystem Mapping - Regrowth Vegetation**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Revised RE Regrowth:

LAND ZONE

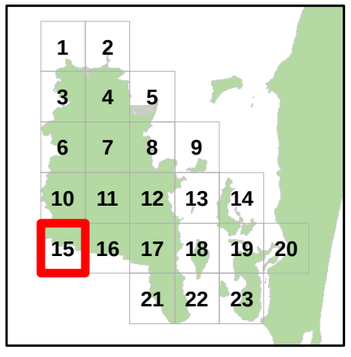
- 1
- 2
- 3
- 5
- 9-10
- 11
- 12
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

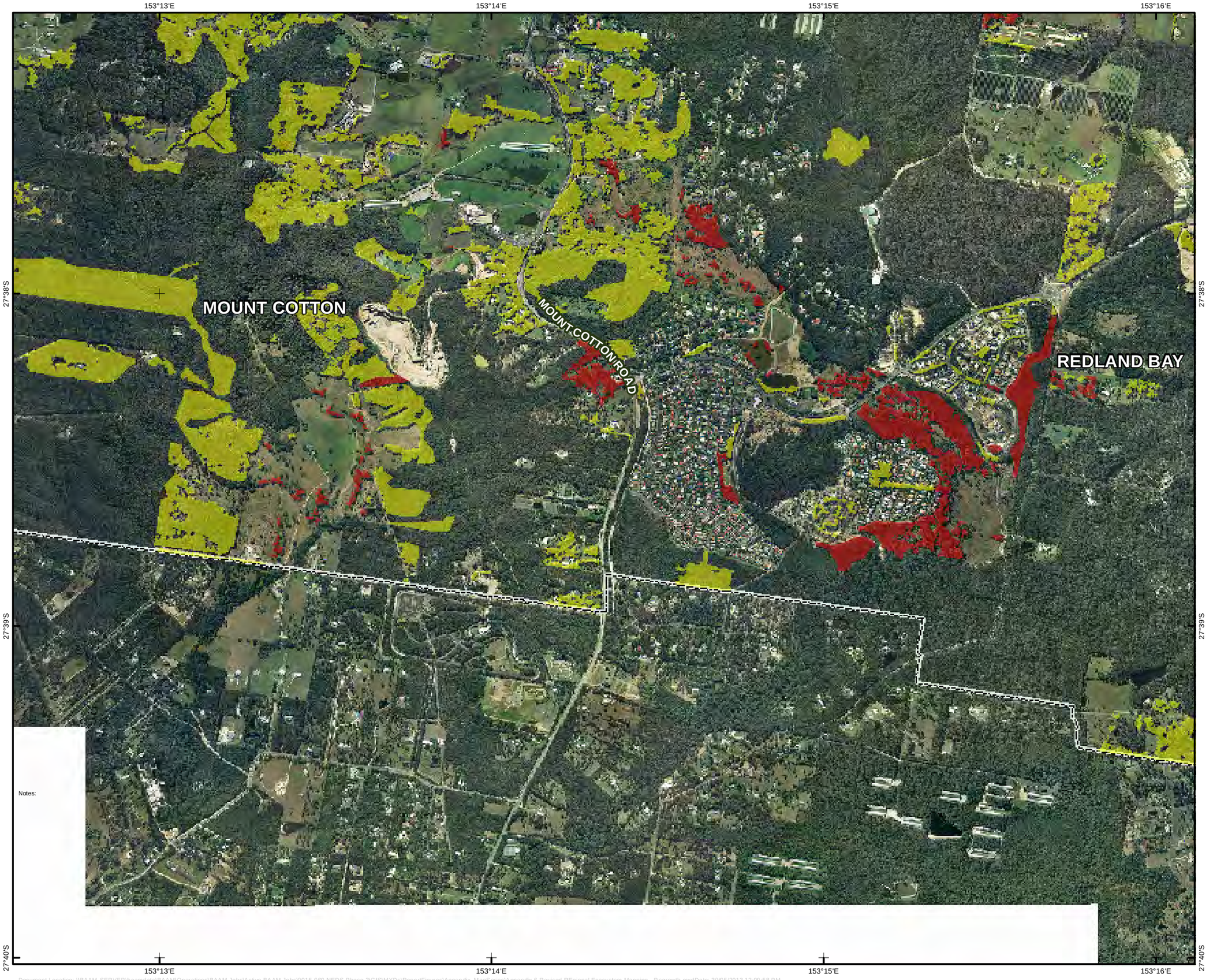
1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS



Notes:

Appendix 6

Map 16 of 23

Title: **Revised Regional Ecosystem Mapping - Regrowth Vegetation**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Revised RE Regrowth:

LAND ZONE

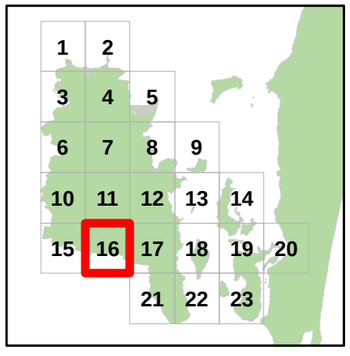
- 1
- 2
- 3
- 5
- 9-10
- 11
- 12
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009)
supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°16'E 153°17'E 153°18'E

27°38'S

27°39'S

27°40'S

MOUNT COTTON

REDLAND BAY

CYPRESS STREET

BANKSWOOD DRIVE

CLEVELAND REDLAND BAY ROAD

SERPENTINE CREEK ROAD

Appendix 6

Map 17 of 23

Title: Revised Regional Ecosystem Mapping - Regrowth Vegetation

Project: NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers

Client: Redland City Council

LEGEND

Revised RE Regrowth:

LAND ZONE

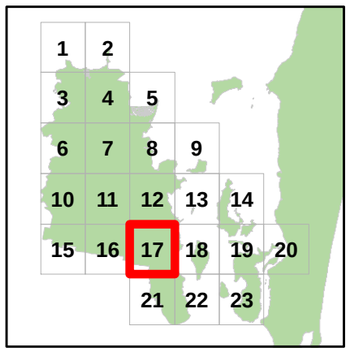
- 1
- 2
- 3
- 5
- 9-10
- 11
- 12
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°18'E 153°19'E 153°20'E 153°21'E

27°38'S

27°39'S

27°40'S

MACLEAY ISLAND

KARRAGARRA ISLAND

REDLAND BAY

BANKSWOOD DRIVE

SERPENTINE CREEK ROAD

Appendix 6

Map 18 of 23

Title: **Revised Regional Ecosystem Mapping - Regrowth Vegetation**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Revised RE Regrowth:

LAND ZONE

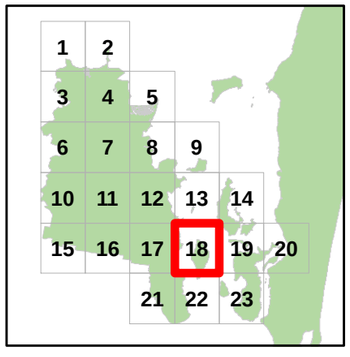
- 1
- 2
- 3
- 5
- 9-10
- 11
- 12
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°21'E 153°22'E 153°23'E 153°24'E

27°38'S

27°39'S

27°40'S

MACLEAY ISLAND

LAMB ISLAND

KARRAGARRA ISLAND

RUSSELL ISLAND

Notes:

Appendix 6

Map 19 of 23

Title: **Revised Regional Ecosystem Mapping - Regrowth Vegetation**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Revised RE Regrowth:

LAND ZONE

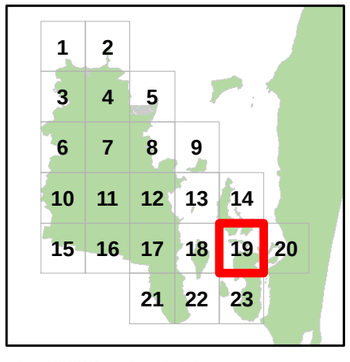
- 1
- 2
- 3
- 5
- 9-10
- 11
- 12
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°24'E
153°25'E
153°26'E
27°38'S
27°39'S
27°40'S

LAMB ISLAND

RUSSELL ISLAND

Notes:

Appendix 6

Map 20 of 23

Title: **Revised Regional Ecosystem Mapping - Regrowth Vegetation**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Revised RE Regrowth:

LAND ZONE

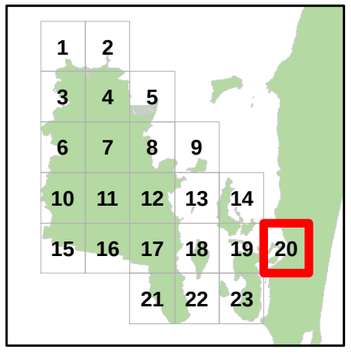
- 1
- 2
- 3
- 5
- 9-10
- 11
- 12
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°16'E 153°17'E 153°18'E

27°40'S

27°41'S

27°42'S

REDLAND BAY

SERPENTINE CREEK ROAD

LONGLAND ROAD

LOGAN RIVER

Notes:

Appendix 6

Map 21 of 23

Title: **Revised Regional Ecosystem Mapping - Regrowth Vegetation**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Revised RE Regrowth:

LAND ZONE

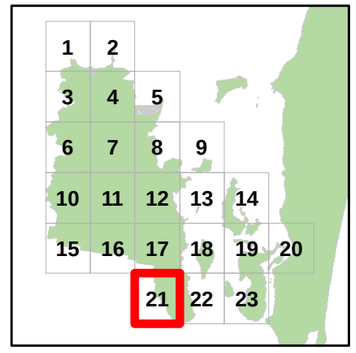
- 1
- 2
- 3
- 5
- 9-10
- 11
- 12
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009)
supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°18'E 153°19'E 153°20'E 153°21'E

27°40'S

27°41'S

27°42'S

SERPENTINE CREEK ROAD

REDLAND BAY

LOGAN RIVER

Appendix 6

Map 22 of 23

Title: **Revised Regional Ecosystem Mapping - Regrowth Vegetation**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Revised RE Regrowth:

LAND ZONE

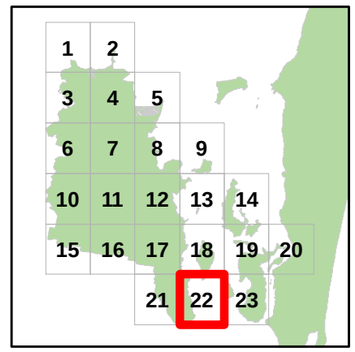
- 1
- 2
- 3
- 5
- 9-10
- 11
- 12
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

Appendix 6

Map 23 of 23

Title: **Revised Regional Ecosystem Mapping - Regrowth Vegetation**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Revised RE Regrowth:

LAND ZONE

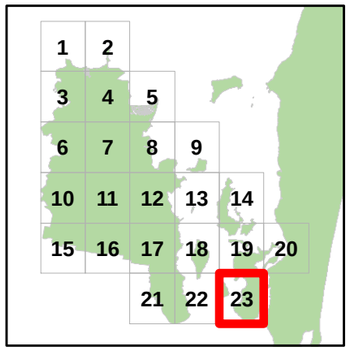
- 1
- 2
- 3
- 5
- 9-10
- 11
- 12
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 30/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

APPENDIX 7
MAP SERIES: NON-RE MAPPING

Notes:

Appendix 7
Map 1 of 23

Title: **Non-Regional Ecosystem Habitat Mapping**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Non-RE Habitat type:

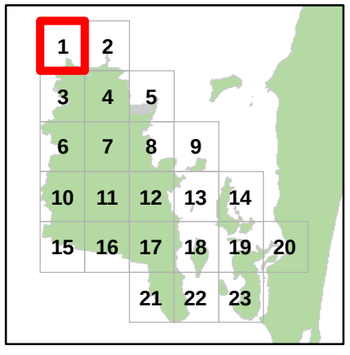
- Beach
- Intertidal flat
- Plantation
- Urban trees
- Waterbody
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 31/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°13'E
153°14'E
153°15'E
153°16'E
27°27'S
27°28'S
27°29'S

WELLINGTON POINT
BIRKDALE
THORNESIDE

Notes:

Document Location: \\BAAM-SERVER\baamdata\BAAM\Operations\BAAM Jobs\Active BAAM Jobs\0015-060 NEDS Phase 2\GIS\MXDs\ReportFigures\Appendix_MapSeries\Appendix 7 Non-RE Habitat Mapping.mxdDate: 30/05/2013 2:06:52 PM

Appendix 7

Map 2 of 23

Title: **Non-Regional Ecosystem Habitat Mapping**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Non-RE Habitat type:

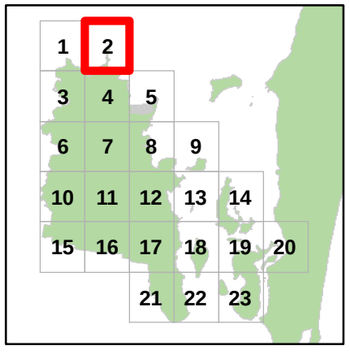
- Beach
- Intertidal flat
- Plantation
- Urban trees
- Waterbody
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 31/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°10'E 153°11'E 153°12'E 153°13'E

27°30'S

27°31'S

THORNESIDE

RICKERTT ROAD

THORNESIDE ROAD

MOOROONDU ROAD

QUARRY ROAD

BIRKDALE

BARRON ROAD

RANDALL ROAD

BAILEY ROAD

BLUEBELL STREET

ABELIA STREET

ALEXANDRA HILLS

CAPALABA

MORETON BAY ROAD

REDLAND BAY ROAD

CROTONA ROAD

CROTONA ROAD EAST

CUMBERLAND DRIV

Notes:

153°10'E 153°11'E 153°12'E 153°13'E

Document Location: \\BAAM-SERVER\baamdata\BAAM\Operations\BAAM Jobs\Active BAAM Jobs\0015-060 NEDS Phase 2\GIS\MXDs\ReportFigures\Appendix_MapSeries\Appendix 7 Non-RE Habitat Mapping.mxdDate: 30/05/2013 2:06:52 PM

Appendix 7

Map 3 of 23

Title: **Non-Regional Ecosystem Habitat Mapping**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Non-RE Habitat type:

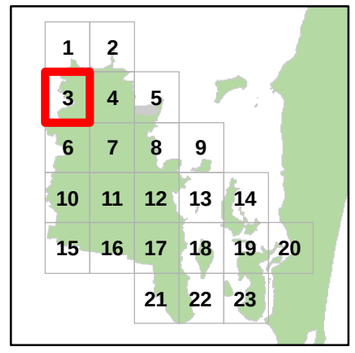
- Beach
- Intertidal flat
- Plantation
- Urban trees
- Waterbody
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 31/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°13'E 153°14'E 153°15'E 153°16'E

27°30'S

27°31'S

THORNESIDE
QUARRY ROAD
BADGEN ROAD
HARDY ROAD
MARLBOROUGH ROAD
BIRKDALE
WELLINGTON POINT
BARRON ROAD
BAILEY ROAD
RANDALL ROAD
BLUEBELL STREET
ABELIA STREET
WELLINGTON STREET
ORMISTON
ALEXANDRA HILLS
CAMBRIDGE DRIVE
CROTON AROAD EAST
CUMBERLAND DRIVE
CLEVELAND
RUSSELL STREET

153°13'E 153°14'E 153°15'E 153°16'E

Document Location: \\BAAM-SERVER\baamdata\BAAM\Operations\BAAM Jobs\Active BAAM Jobs\0015-060 NEDS Phase 2\GIS\MXDs\ReportFigures\Appendix_MapSeries\Appendix 7 Non-RE Habitat Mapping.mxdDate: 30/05/2013 2:06:52 PM

Appendix 7

Map 4 of 23

Title: **Non-Regional Ecosystem Habitat Mapping**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Non-RE Habitat type:

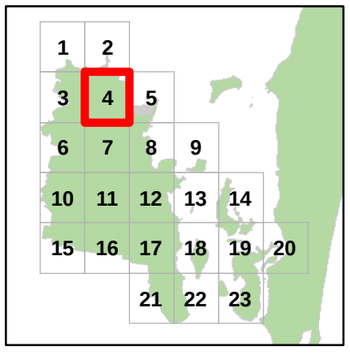
- Beach
- Intertidal flat
- Plantation
- Urban trees
- Waterbody
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

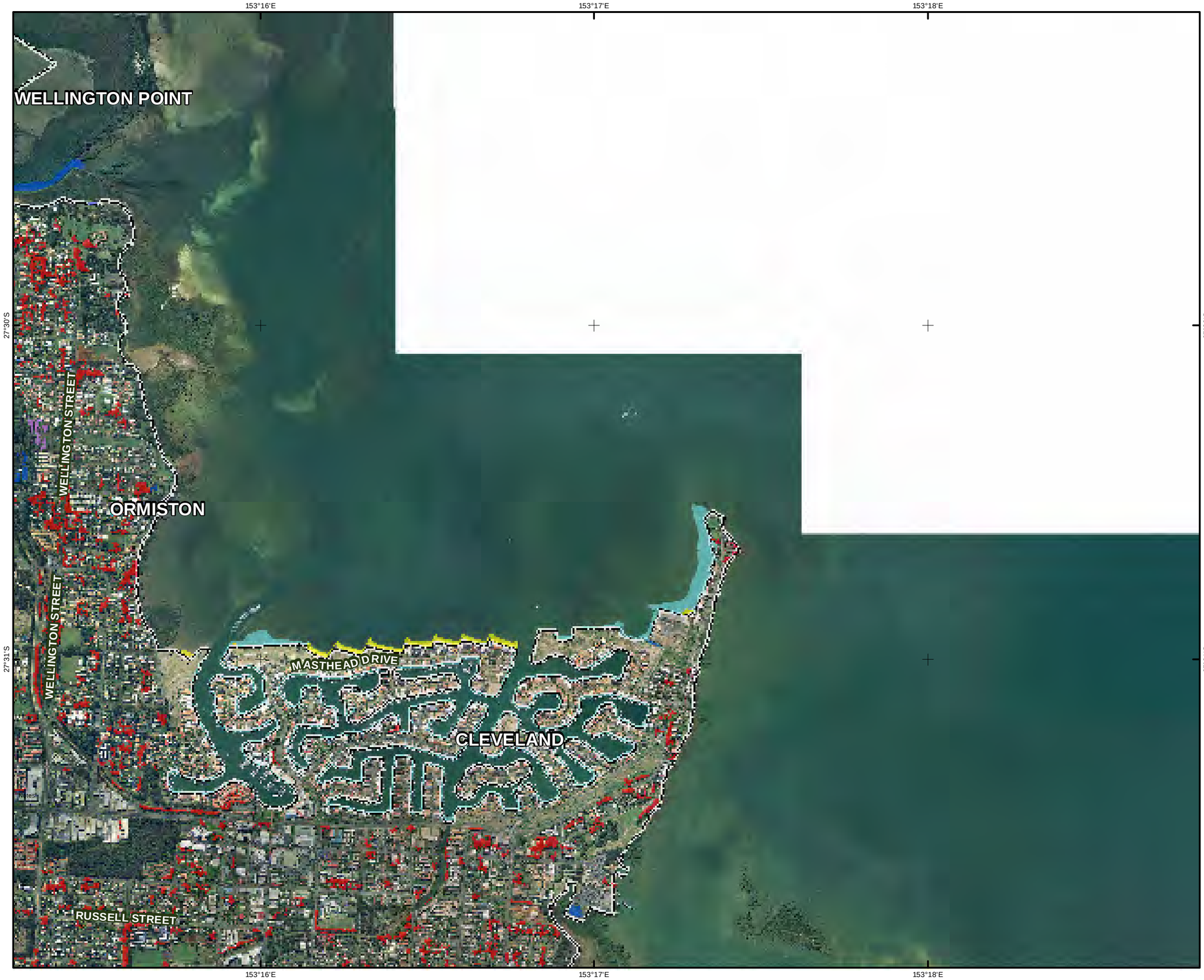
1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 31/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS



Appendix 7

Map 5 of 23

Title: **Non-Regional Ecosystem Habitat Mapping**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Non-RE Habitat type:

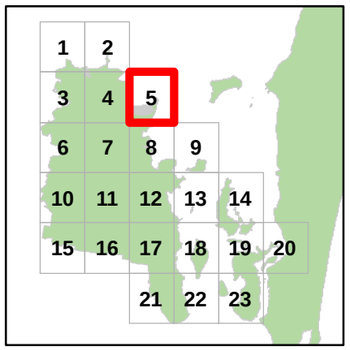
- Beach
- Intertidal flat
- Plantation
- Urban trees
- Waterbody
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 31/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°10'E 153°11'E 153°12'E 153°13'E

27°32'S 27°33'S 27°34'S

SCHOOL ROAD
ALEXANDRA HILLS
WENTWORTH DRIVE
MACQUARIE STREET
CALLAGHAN WAY
REDLAND BAY ROAD
CAPALABA
FROST STREET
MOUNT COTTON ROAD
DUNCAN ROAD
SHELDON
MOUNT COTTON ROAD

Notes:

153°10'E 153°11'E 153°12'E 153°13'E

Document Location: \\BAAM-SERVER\baamdata\BAAM\Operations\BAAM Jobs\Active BAAM Jobs\0015-060 NEDS Phase 2\GIS\MXDs\ReportFigures\Appendix_MapSeries\Appendix 7 Non-RE Habitat Mapping.mxdDate: 30/05/2013 2:06:52 PM

Appendix 7

Map 6 of 23

Title: **Non-Regional Ecosystem Habitat Mapping**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Non-RE Habitat type:

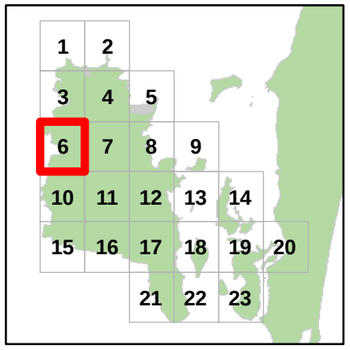
- Beach
- Intertidal flat
- Plantation
- Urban trees
- Waterbody
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 31/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°13'E 153°14'E 153°15'E 153°16'E

27°32'S 27°33'S 27°34'S

CUMBERLAND DRIVE
RUSSELL STREET
SMITH STREET
LONG STREET
WELLINGTON STREET
BAY STREET
ALEXANDRA HILLS
ALEXANDRA CIRCUIT
REDLAND BAY ROAD
CLEVELAND
CAPALABA
THORNLANDS
ZIEGENFUSZ ROAD
PANORAMA DRIVE
BOUNDARY ROAD
DUNCAN ROAD
MOUNT COTTON ROAD
SHELDON
MOUNT COTTON ROAD
WOODLANDS DRIVE

Appendix 7
Map 7 of 23

Title: Non-Regional Ecosystem Habitat Mapping

Project: NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers

Client: Redland City Council

LEGEND

Non-RE Habitat type:

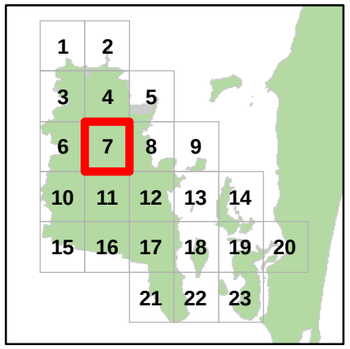
- Beach
- Intertidal flat
- Plantation
- Urban trees
- Waterbody
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 31/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°16'E 153°17'E 153°18'E

27°32'S 27°33'S 27°34'S

RUSSELL STREET
WELLINGTON STREET
SMITH STREET
LONG STREET
BAY STREET
CLEVELAND
PANORAMA DRIVE
THORNLANDS
ZIEGENFUSZ ROAD
DOULL PLACE
BOUNDARY ROAD
VICTORIA POINT
COOCHIEMUDLO ISLAND

Appendix 7
Map 8 of 23

Title: Non-Regional Ecosystem Habitat Mapping

Project: NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers

Client: Redland City Council

LEGEND

Non-RE Habitat type:

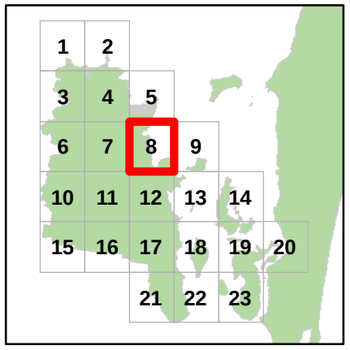
- Beach
- Intertidal flat
- Plantation
- Urban trees
- Waterbody
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 31/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°18'E
153°19'E
153°20'E
153°21'E
27°32'S
27°33'S
27°34'S

VICTORIA POINT
COOCHIEMUDLO ISLAND
MACLEAY ISLAND

Notes:

Appendix 7
Map 9 of 23

Title: **Non-Regional Ecosystem Habitat Mapping**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Non-RE Habitat type:

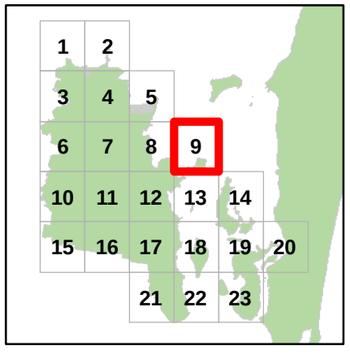
- Beach
- Intertidal flat
- Plantation
- Urban trees
- Waterbody
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 31/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°10'E 153°11'E 153°12'E 153°13'E

27°35'S 27°36'S 27°37'S

SHELDON

MOUNT COTTON ROAD

FORD ROAD

MOUNT COTTON

Notes:

153°10'E 153°11'E 153°12'E 153°13'E

Document Location: \\BAAM-SERVER\baamdata\BAAM\Operations\BAAM Jobs\Active BAAM Jobs\0015-060 NEDS Phase 2\GIS\MXDs\ReportFigures\Appendix_MapSeries\Appendix 7 Non-RE Habitat Mapping.mxdDate: 30/05/2013 2:06:52 PM

Appendix 7

Map 10 of 23

Title: **Non-Regional Ecosystem Habitat Mapping**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Non-RE Habitat type:

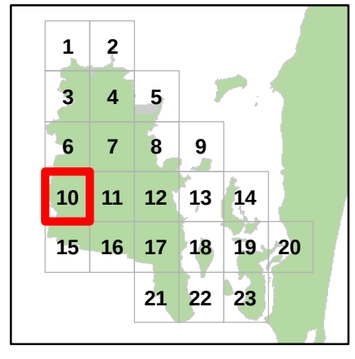
- Beach
- Intertidal flat
- Plantation
- Urban trees
- Waterbody
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 31/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°13'E 153°14'E 153°15'E 153°16'E

27°35'S

27°36'S

27°37'S

SHELDON

THORNLANDS

WOODLANDS DRIVE

VICTORIA POINT

MOUNT COTTON

MOUNT COTTON ROAD

REDLAND BAY

153°13'E 153°14'E 153°15'E 153°16'E

Document Location: \\BAAM-SERVER\baamdata\BAAM\Operations\BAAM Jobs\Active BAAM Jobs\0015-060 NEDS Phase 2\GIS\MXDs\ReportFigures\Appendix_MapSeries\Appendix 7 Non-RE Habitat Mapping.mxdDate: 30/05/2013 2:06:52 PM

Appendix 7

Map 11 of 23

Title: **Non-Regional Ecosystem Habitat Mapping**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Non-RE Habitat type:

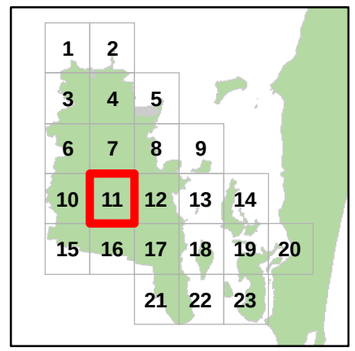
- Beach
- Intertidal flat
- Plantation
- Urban trees
- Waterbody
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 31/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

Appendix 7

Map 12 of 23

Title: **Non-Regional Ecosystem Habitat Mapping**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Non-RE Habitat type:

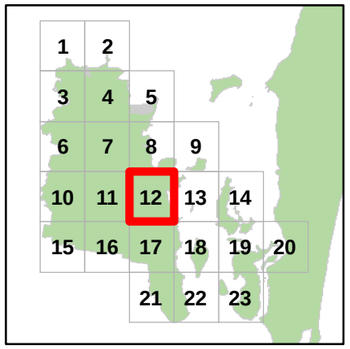
- Beach
- Intertidal flat
- Plantation
- Urban trees
- Waterbody
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 31/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

Appendix 7

Map 13 of 23

Title: **Non-Regional Ecosystem Habitat Mapping**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Non-RE Habitat type:

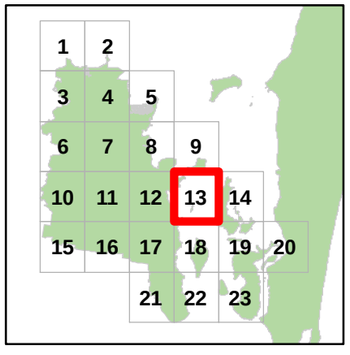
- Beach
- Intertidal flat
- Plantation
- Urban trees
- Waterbody
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 31/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°21'E 153°22'E 153°23'E 153°24'E

27°35'S 27°36'S 27°37'S

MACLEAY ISLAND

LAMB ISLAND

Notes:

153°21'E 153°22'E 153°23'E 153°24'E

Document Location: \\BAAM-SERVER\baamdata\BAAM\Operations\BAAM Jobs\Active BAAM Jobs\0015-060 NEDS Phase 2\GIS\MXDs\ReportFigures\Appendix_MapSeries\Appendix 7 Non-RE Habitat Mapping.mxdDate: 30/05/2013 2:06:52 PM

Appendix 7

Map 14 of 23

Title: **Non-Regional Ecosystem Habitat Mapping**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Non-RE Habitat type:

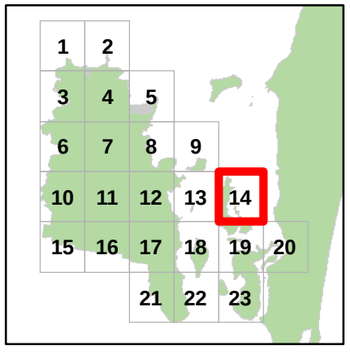
- Beach
- Intertidal flat
- Plantation
- Urban trees
- Waterbody
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 31/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°10'E 153°11'E 153°12'E 153°13'E

27°38'S

MOUNT COTTON

27°39'S

27°40'S

Notes:

Appendix 7
Map 15 of 23

Title: **Non-Regional Ecosystem Habitat Mapping**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Non-RE Habitat type:

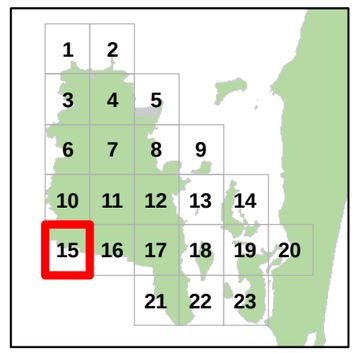
- Beach
- Intertidal flat
- Plantation
- Urban trees
- Waterbody
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 31/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°13'E 153°14'E 153°15'E 153°16'E

27°38'S

27°39'S

27°40'S

MOUNT COTTON

MOUNT COTTON ROAD

REDLAND BAY

Notes:

Appendix 7

Map 16 of 23

Title: **Non-Regional Ecosystem Habitat Mapping**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Non-RE Habitat type:

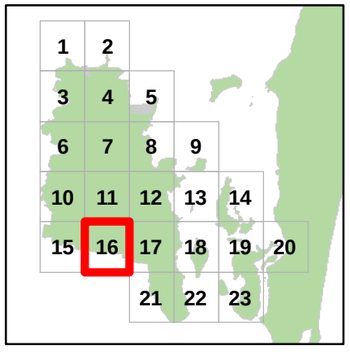
- Beach
- Intertidal flat
- Plantation
- Urban trees
- Waterbody
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 31/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°16'E 153°17'E 153°18'E

27°38'S

27°39'S

27°40'S

MOUNT COTTON

REDLAND BAY

CYPRESS STREET

BANKSWOOD DRIVE

CLEVELAND REDLAND BAY ROAD

SERPENTINE CREEK ROAD

Appendix 7
Map 17 of 23

Title: **Non-Regional Ecosystem Habitat Mapping**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Non-RE Habitat type:

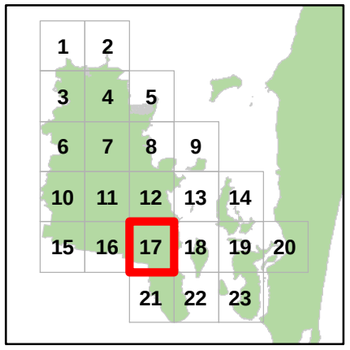
- Beach
- Intertidal flat
- Plantation
- Urban trees
- Waterbody
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 31/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°18'E 153°19'E 153°20'E 153°21'E

27°38'S

27°39'S

27°40'S

MACLEAY ISLAND

KARRAGARRA ISLAND

REDLAND BAY

BANKSWOOD DRIVE

SERPENTINE CREEK ROAD

Wetland

153°18'E 153°19'E 153°20'E 153°21'E

Document Location: \\BAAM-SERVER\baamdata\BAAM\Operations\BAAM Jobs\Active BAAM Jobs\0015-060 NEDS Phase 2\GIS\MXDs\ReportFigures\Appendix_MapSeries\Appendix 7 Non-RE Habitat Mapping.mxdDate: 30/05/2013 2:06:52 PM

Appendix 7

Map 18 of 23

Title: **Non-Regional Ecosystem Habitat Mapping**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Non-RE Habitat type:

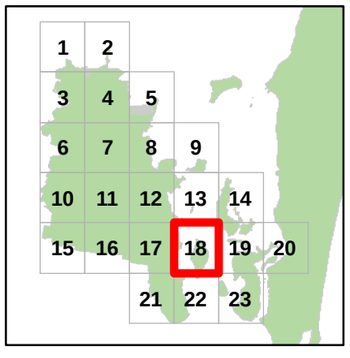
- Beach
- Intertidal flat
- Plantation
- Urban trees
- Waterbody
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 31/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°21'E 153°22'E 153°23'E 153°24'E

27°38'S

27°39'S

27°40'S

MACLEAY ISLAND

LAMB ISLAND

KARRAGARRA ISLAND

RUSSELL ISLAND

Notes:

Document Location: \\BAAM-SERVER\baamdata\BAAM\Operations\BAAM Jobs\Active BAAM Jobs\0015-060 NEDS Phase 2\GIS\MXDs\ReportFigures\Appendix_MapSeries\Appendix 7 Non-RE Habitat Mapping.mxdDate: 30/05/2013 2:06:52 PM

Appendix 7

Map 19 of 23

Title: **Non-Regional Ecosystem Habitat Mapping**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Non-RE Habitat type:

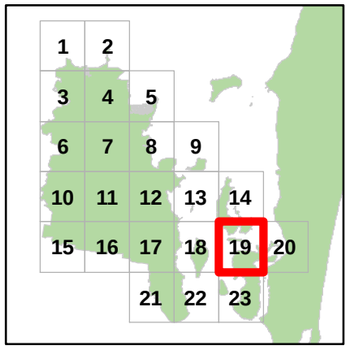
- Beach
- Intertidal flat
- Plantation
- Urban trees
- Waterbody
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 31/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°24'E 153°25'E 153°26'E

27°38'S

27°39'S

27°40'S

LAMB ISLAND

RUSSELL ISLAND

Notes:

Document Location: \\BAAM-SERVER\baamdata\BAAM\Operations\BAAM Jobs\Active BAAM Jobs\0015-060 NEDS Phase 2\GIS\MXDs\ReportFigures\Appendix_MapSeries\Appendix 7 Non-RE Habitat Mapping.mxdDate: 30/05/2013 2:06:52 PM

Appendix 7

Map 20 of 23

Title: **Non-Regional Ecosystem Habitat Mapping**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Non-RE Habitat type:

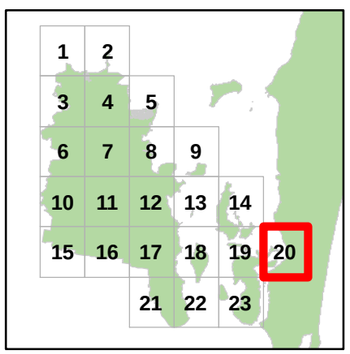
- Beach
- Intertidal flat
- Plantation
- Urban trees
- Waterbody
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009)
supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 31/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

Notes:

Appendix 7

Map 21 of 23

Title: **Non-Regional Ecosystem Habitat Mapping**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Non-RE Habitat type:

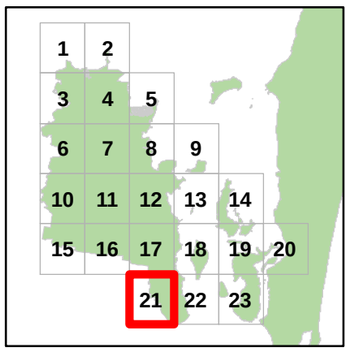
- Beach
- Intertidal flat
- Plantation
- Urban trees
- Waterbody
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 31/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°18'E 153°19'E 153°20'E 153°21'E

27°40'S

27°41'S

27°42'S

SERPENTINE CREEK ROAD

REDLAND BAY

LOGAN RIVER

Appendix 7
Map 22 of 23

Title: Non-Regional Ecosystem Habitat Mapping

Project: NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers

Client: Redland City Council

LEGEND

Non-RE Habitat type:

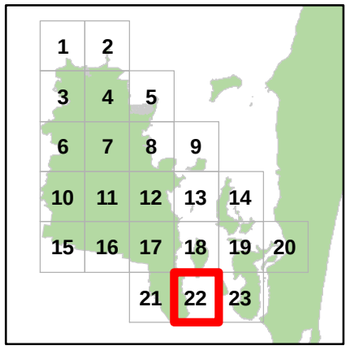
- Beach
- Intertidal flat
- Plantation
- Urban trees
- Waterbody
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 31/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°21'E 153°22'E 153°23'E 153°24'E

27°40'S

27°41'S

27°42'S

RUSSELL ISLAND

Notes:

Document Location: \\BAAM-SERVER\baamdata\BAAM\Operations\BAAM Jobs\Active BAAM Jobs\0015-060 NEDS Phase 2\GIS\MXDs\ReportFigures\Appendix_MapSeries\Appendix 7 Non-RE Habitat Mapping.mxdDate: 30/05/2013 2:06:52 PM

Appendix 7

Map 23 of 23

Title: **Non-Regional Ecosystem Habitat Mapping**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Non-RE Habitat type:

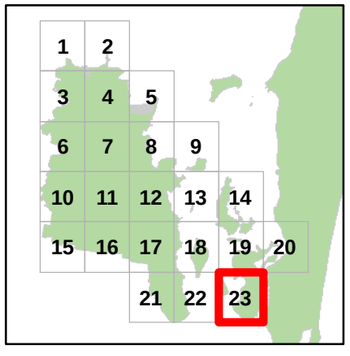
- Beach
- Intertidal flat
- Plantation
- Urban trees
- Waterbody
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 31/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

APPENDIX 8
MAP SERIES: SPECIES HABITAT MAPPING

153°10'E
153°11'E
153°12'E
153°13'E
27°27'S
27°28'S
27°29'S

THORNESIDE
BIRKDALE
THORNESIDE ROAD
MOOROONDU ROAD

Notes:

Appendix 8
Map 1 of 23

Title:
Species Habitat Mapping

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Species Habitat Score:

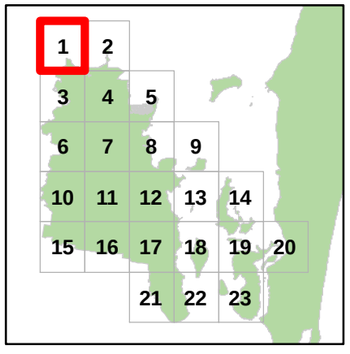
- 0 - 9
- 10 - 47
- 48 - 92
- 93 - 114
- 115 - 141
- 142 - 168
- 169 - 195
- 196 - 213
- 214 - 228
- 229 - 247
- 248 - 286
- 287 - 305
- 306 - 320
- 321 - 340
- 341 - 368
- 369 - 392
- 393 - 413
- 414 - 449
- 450 - 533
- 534 - 699
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 31/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°13'E
153°14'E
153°15'E
153°16'E
27°27'S
27°28'S
27°29'S

WELLINGTON POINT
BIRKDALE
THORNESIDE

Notes:

Document Location: \\BAAM-SERVER\baamdata\BAAM\Operations\BAAM Jobs\Active BAAM Jobs\0015-060 NEDS Phase 2\GIS\MXDs\ReportFigures\Appendix_MapSeries\Appendix 8 Species Habitat Mapping.mxdDate: 31/05/2013 10:33:46 AM

Appendix 8
Map 2 of 23

Title:
Species Habitat Mapping

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Species Habitat Score:

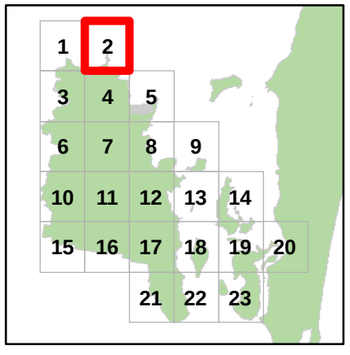
- 0 - 9
- 10 - 47
- 48 - 92
- 93 - 114
- 115 - 141
- 142 - 168
- 169 - 195
- 196 - 213
- 214 - 228
- 229 - 247
- 248 - 286
- 287 - 305
- 306 - 320
- 321 - 340
- 341 - 368
- 369 - 392
- 393 - 413
- 414 - 449
- 450 - 533
- 534 - 699
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 31/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°10'E
153°11'E
153°12'E
153°13'E
27°30'S
27°31'S

THORNESIDE
RICKERTT ROAD
THORNESIDE ROAD
MOORROONDU ROAD
QUARRY ROAD
BIRKDALE
BAILEY ROAD
BARRON ROAD
RANDALL ROAD
BLUEBELL STREET
ABELIA STREET
ALEXANDRA HILLS
CAPALABA
MORETON BAY ROAD
REDLAND BAY ROAD
CROTONA ROAD
CROTONA ROAD EAST
CUMBERLAND DRIV

Notes:

Document Location: \\BAAM-SERVER\baamdata\BAAM\Operations\BAAM Jobs\Active BAAM Jobs\0015-060 NEDS Phase 2\GIS\MXDs\ReportFigures\Appendix_MapSeries\Appendix 8 Species Habitat Mapping.mxdDate: 31/05/2013 10:33:46 AM

Appendix 8
Map 3 of 23

Title:
Species Habitat Mapping

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Species Habitat Score:

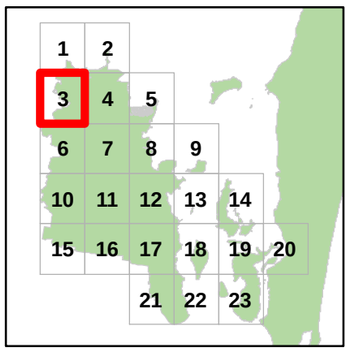
- 0 - 9
- 10 - 47
- 48 - 92
- 93 - 114
- 115 - 141
- 142 - 168
- 169 - 195
- 196 - 213
- 214 - 228
- 229 - 247
- 248 - 286
- 287 - 305
- 306 - 320
- 321 - 340
- 341 - 368
- 369 - 392
- 393 - 413
- 414 - 449
- 450 - 533
- 534 - 699
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 31/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°13'E 153°14'E 153°15'E 153°16'E

27°30'S

27°31'S

THORNESIDE
QUARRY ROAD
BADGEN ROAD
HARDY ROAD
MARLBOROUGH ROAD
BIRKDALE
WELLINGTON POINT
BARRON ROAD
BAILEY ROAD
RANDALL ROAD
WELLINGTON STREET
ORMISTON
BLUEBELL STREET
ABELIA STREET
ALEXANDRA HILLS
CAMBRIDGE DRIVE
CROTON ROAD EAST
CUMBERLAND DRIVE
CLEVELAND
RUSSELL STREET

153°13'E 153°14'E 153°15'E 153°16'E

Document Location: \\BAAM-SERVER\baamdata\BAAM\Operations\BAAM Jobs\Active BAAM Jobs\0015-060 NEDS Phase 2\GIS\MXDs\ReportFigures\Appendix_MapSeries\Appendix 8 Species Habitat Mapping.mxdDate: 31/05/2013 10:33:46 AM

Appendix 8
Map 4 of 23

Title: **Species Habitat Mapping**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Species Habitat Score:

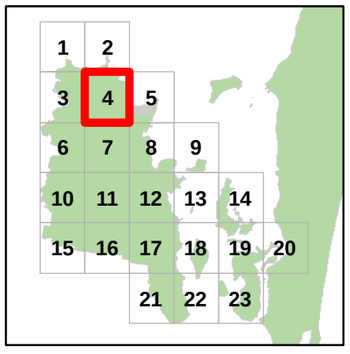
0 - 9	248 - 286
10 - 47	287 - 305
48 - 92	306 - 320
93 - 114	321 - 340
115 - 141	341 - 368
142 - 168	369 - 392
169 - 195	393 - 413
196 - 213	414 - 449
214 - 228	450 - 533
229 - 247	534 - 699
	RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

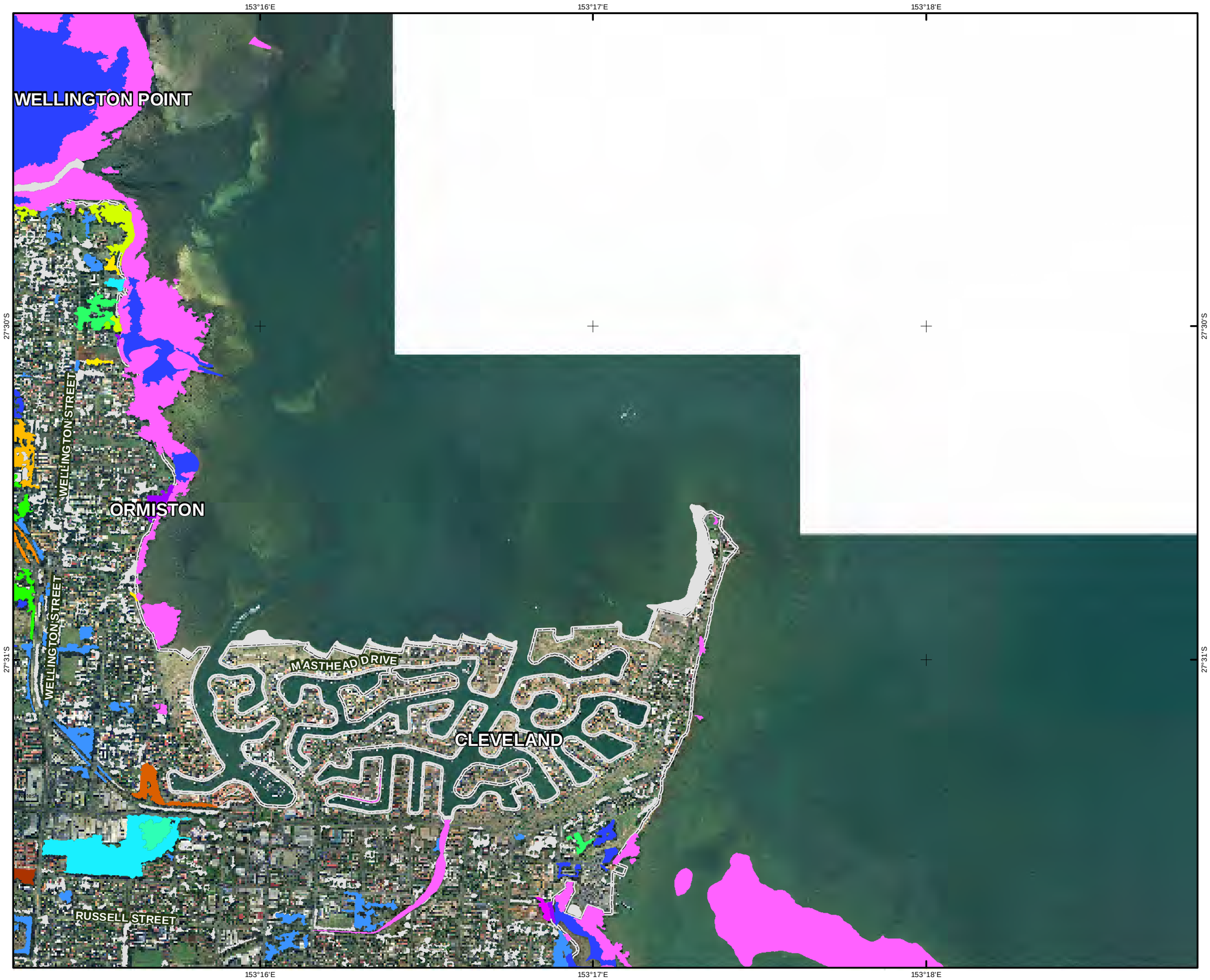
1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 31/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS



Appendix 8

Map 5 of 23

Title:

Species Habitat Mapping

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Species Habitat Score:

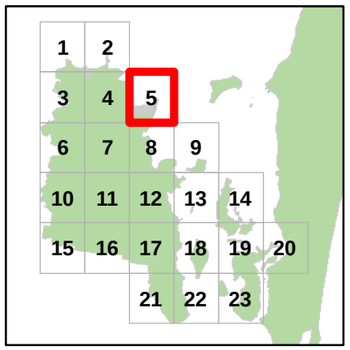
- 0 - 9
- 10 - 47
- 48 - 92
- 93 - 114
- 115 - 141
- 142 - 168
- 169 - 195
- 196 - 213
- 214 - 228
- 229 - 247
- 248 - 286
- 287 - 305
- 306 - 320
- 321 - 340
- 341 - 368
- 369 - 392
- 393 - 413
- 414 - 449
- 450 - 533
- 534 - 699
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 31/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°10'E 153°11'E 153°12'E 153°13'E

27°32'S 27°33'S 27°34'S

SCHOOL ROAD
ALEXANDRA HILLS
WENTWORTH DRIVE
MACQUARIE STREET
CALLAGHAN WAY
REDLAND BAY ROAD
CAPALABA
FROST STREET
MOUNT COTTON ROAD
DUNCAN ROAD
SHELDON

Notes:

153°10'E 153°11'E 153°12'E 153°13'E

Document Location: \\BAAM-SERVER\baamdata\BAAM\Operations\BAAM Jobs\Active BAAM Jobs\0015-060 NEDS Phase 2\GIS\MXDs\ReportFigures\Appendix_MapSeries\Appendix 8 Species Habitat Mapping.mxdDate: 31/05/2013 10:33:46 AM

Appendix 8

Map 6 of 23

Title: **Species Habitat Mapping**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Species Habitat Score:

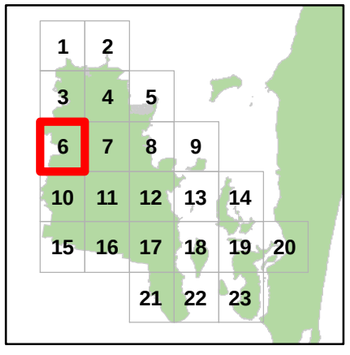
0 - 9	248 - 286
10 - 47	287 - 305
48 - 92	306 - 320
93 - 114	321 - 340
115 - 141	341 - 368
142 - 168	369 - 392
169 - 195	393 - 413
196 - 213	414 - 449
214 - 228	450 - 533
229 - 247	534 - 699
	RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 31/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°13'E 153°14'E 153°15'E 153°16'E

27°32'S 27°33'S 27°34'S

CUMBERLAND DRIVE
RUSSELL STREET
SMITH STREET
LONG STREET
WELLINGTON STREET
BAY STREET
ALEXANDRA HILLS
ALEXANDRA CIRCUIT
REDLAND BAY ROAD
CLEVELAND
CAPALABA
THORNLANDS
BOUNDARY ROAD
DUNCAN ROAD
MOUNT COTTON ROAD
PANORAMA DRIVE
ZIEGENFUSZ ROAD
WOODLANDS DRIVE
SHELDON
MOUNT COTTON ROAD

Notes:

153°13'E 153°14'E 153°15'E 153°16'E

Document Location: \\BAAM-SERVER\baamdata\BAAM\Operations\BAAM Jobs\Active BAAM Jobs\0015-060 NEDS Phase 2\GIS\MXDs\ReportFigures\Appendix_MapSeries\Appendix 8 Species Habitat Mapping.mxdDate: 31/05/2013 10:33:46 AM

Appendix 8

Map 7 of 23

Title: **Species Habitat Mapping**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Species Habitat Score:

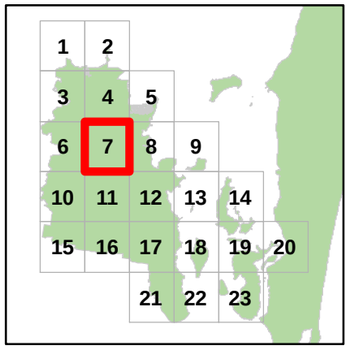
0 - 9	248 - 286
10 - 47	287 - 305
48 - 92	306 - 320
93 - 114	321 - 340
115 - 141	341 - 368
142 - 168	369 - 392
169 - 195	393 - 413
196 - 213	414 - 449
214 - 228	450 - 533
229 - 247	534 - 699
	RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 31/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°16'E 153°17'E 153°18'E

27°32'S 27°33'S 27°34'S

RUSSELL STREET
WELLINGTON STREET
SMITH STREET
LONG STREET
BAY STREET
CLEVELAND
PANORAMA DRIVE
THORNLANDS
ZIEGENFUSZ ROAD
DOULL PLACE
BOUNDARY ROAD
VICTORIA POINT
COOCHIEMUDLO ISLAND

Appendix 8
Map 8 of 23

Title: **Species Habitat Mapping**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Species Habitat Score:

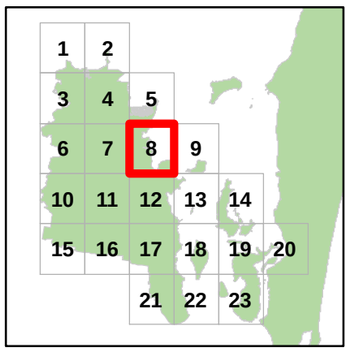
0 - 9	248 - 286
10 - 47	287 - 305
48 - 92	306 - 320
93 - 114	321 - 340
115 - 141	341 - 368
142 - 168	369 - 392
169 - 195	393 - 413
196 - 213	414 - 449
214 - 228	450 - 533
229 - 247	534 - 699
	RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 31/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°18'E
153°19'E
153°20'E
153°21'E
27°32'S
27°33'S
27°34'S

VICTORIA POINT
COOCHIEMUDLO ISLAND
MACLEAY ISLAND

Notes:

Appendix 8
Map 9 of 23

Title:
Species Habitat Mapping

Project:
NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers

Client:
Redland City Council

LEGEND

Species Habitat Score:

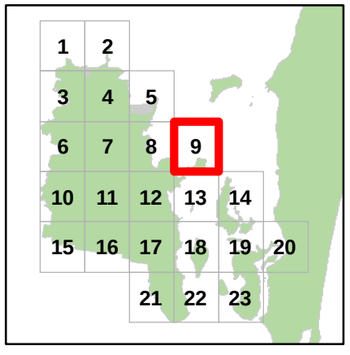
- 0 - 9
- 10 - 47
- 48 - 92
- 93 - 114
- 115 - 141
- 142 - 168
- 169 - 195
- 196 - 213
- 214 - 228
- 229 - 247
- 248 - 286
- 287 - 305
- 306 - 320
- 321 - 340
- 341 - 368
- 369 - 392
- 393 - 413
- 414 - 449
- 450 - 533
- 534 - 699
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 31/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°10'E 153°11'E 153°12'E 153°13'E

27°35'S

27°36'S

27°37'S

SHELDON

MOUNT COTTON ROAD

FORD ROAD

MOUNT COTTON

Notes

Appendix 8
Map 10 of 23

Title: **Species Habitat Mapping**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Species Habitat Score:

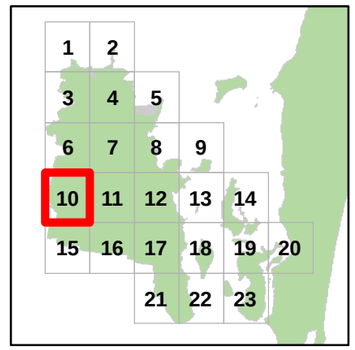
- 0 - 9
- 10 - 47
- 48 - 92
- 93 - 114
- 115 - 141
- 142 - 168
- 169 - 195
- 196 - 213
- 214 - 228
- 229 - 247
- 248 - 286
- 287 - 305
- 306 - 320
- 321 - 340
- 341 - 368
- 369 - 392
- 393 - 413
- 414 - 449
- 450 - 533
- 534 - 699
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

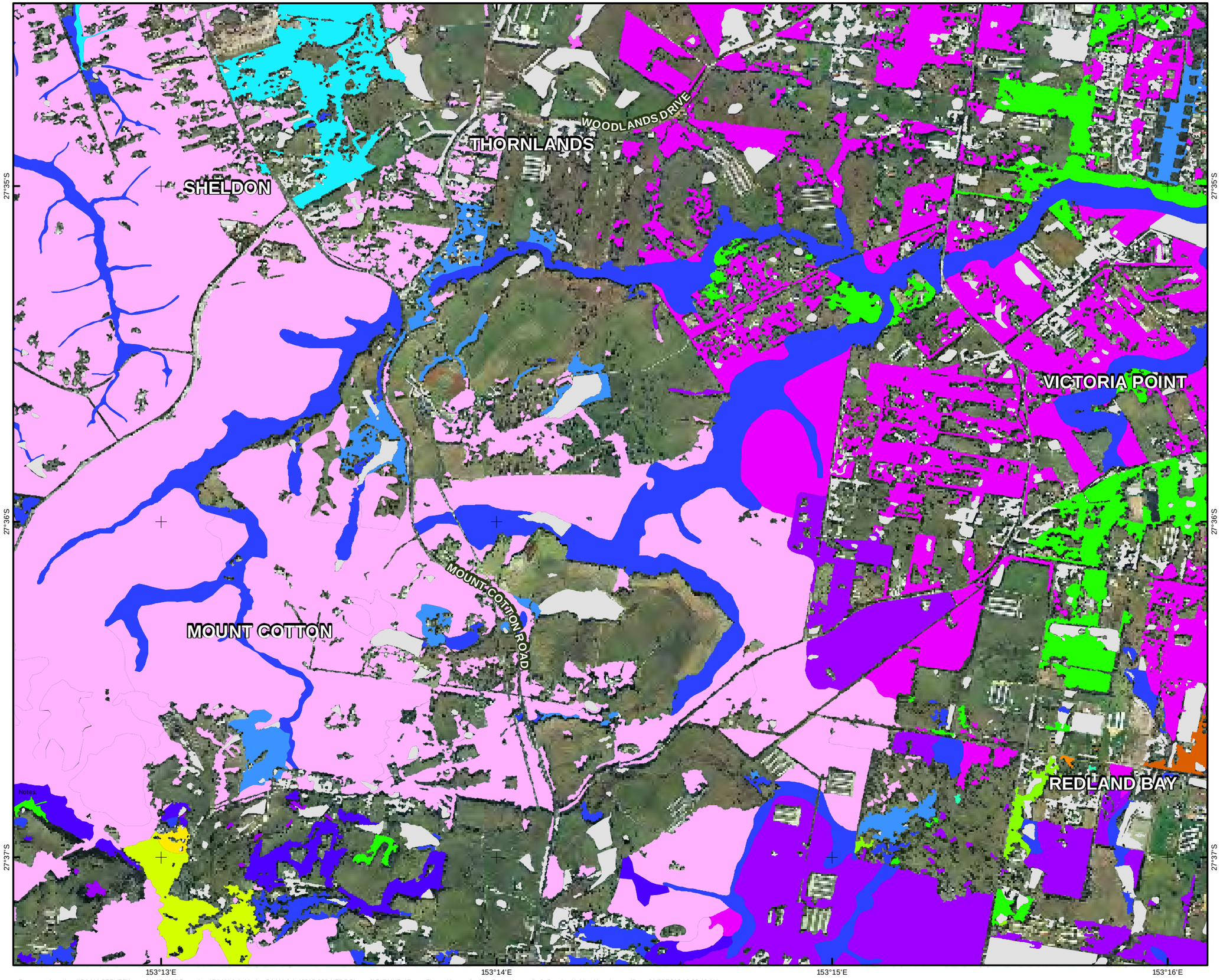
1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 31/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS



Appendix 8

Map 11 of 23

Title: **Species Habitat Mapping**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Species Habitat Score:

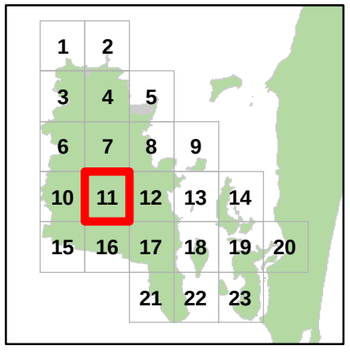
0 - 9	248 - 286
10 - 47	287 - 305
48 - 92	306 - 320
93 - 114	321 - 340
115 - 141	341 - 368
142 - 168	369 - 392
169 - 195	393 - 413
196 - 213	414 - 449
214 - 228	450 - 533
229 - 247	534 - 699
	RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 31/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°16'E 153°17'E 153°18'E

27°35'S

27°36'S

27°37'S

THORNLANDS

VICTORIA POINT

MOUNT COTTON

REDLAND BAY

COOCHIEMUDLO ISLAND

BOUNDARY ROAD

SCHOOL ROAD

LINK ROAD

SYCAMORE PARADE

REDLAND BAY ROAD

GORDON ROAD

CLEVELAND REDLAND BAY ROAD

Appendix 8
Map 12 of 23

Title: **Species Habitat Mapping**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Species Habitat Score:

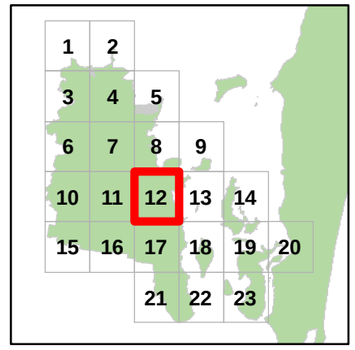
0 - 9	248 - 286
10 - 47	287 - 305
48 - 92	306 - 320
93 - 114	321 - 340
115 - 141	341 - 368
142 - 168	369 - 392
169 - 195	393 - 413
196 - 213	414 - 449
214 - 228	450 - 533
229 - 247	534 - 699
	RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 31/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°18'E 153°19'E 153°20'E 153°21'E

27°35'S

27°36'S

27°37'S

COOCHIEMUDLO ISLAND

VICTORIA POINT

MACLEAY ISLAND

REDLAND BAY

Appendix 8
Map 13 of 23

Title:

Species Habitat Mapping

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Species Habitat Score:

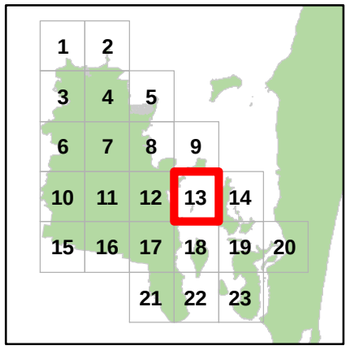
- 0 - 9
- 10 - 47
- 48 - 92
- 93 - 114
- 115 - 141
- 142 - 168
- 169 - 195
- 196 - 213
- 214 - 228
- 229 - 247
- 248 - 286
- 287 - 305
- 306 - 320
- 321 - 340
- 341 - 368
- 369 - 392
- 393 - 413
- 414 - 449
- 450 - 533
- 534 - 699
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 31/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°21'E 153°22'E 153°23'E 153°24'E

27°35'S 27°36'S 27°37'S

MACLEAY ISLAND

LAMB ISLAND

Notes:

153°21'E 153°22'E 153°23'E 153°24'E

Document Location: \\BAAM-SERVER\baamdata\BAAM\Operations\BAAM Jobs\Active BAAM Jobs\0015-060 NEDS Phase 2\GIS\MXDs\ReportFigures\Appendix_MapSeries\Appendix 8 Species Habitat Mapping.mxdDate: 31/05/2013 10:33:46 AM

Appendix 8
Map 14 of 23

Title: **Species Habitat Mapping**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Species Habitat Score:

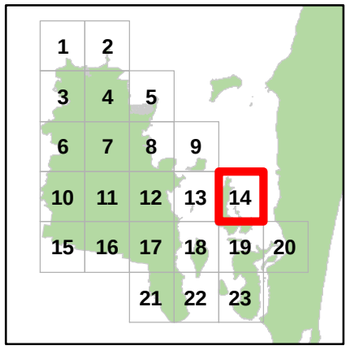
- 0 - 9
- 10 - 47
- 48 - 92
- 93 - 114
- 115 - 141
- 142 - 168
- 169 - 195
- 196 - 213
- 214 - 228
- 229 - 247
- 248 - 286
- 287 - 305
- 306 - 320
- 321 - 340
- 341 - 368
- 369 - 392
- 393 - 413
- 414 - 449
- 450 - 533
- 534 - 699
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 31/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°10'E 153°11'E 153°12'E 153°13'E

27°38'S

27°39'S

27°40'S

MOUNT COTTON

Notes:

Appendix 8
Map 15 of 23

Title:

Species Habitat Mapping

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Species Habitat Score:

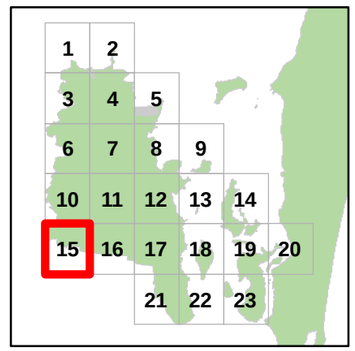
- 0 - 9
- 10 - 47
- 48 - 92
- 93 - 114
- 115 - 141
- 142 - 168
- 169 - 195
- 196 - 213
- 214 - 228
- 229 - 247
- 248 - 286
- 287 - 305
- 306 - 320
- 321 - 340
- 341 - 368
- 369 - 392
- 393 - 413
- 414 - 449
- 450 - 533
- 534 - 699
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

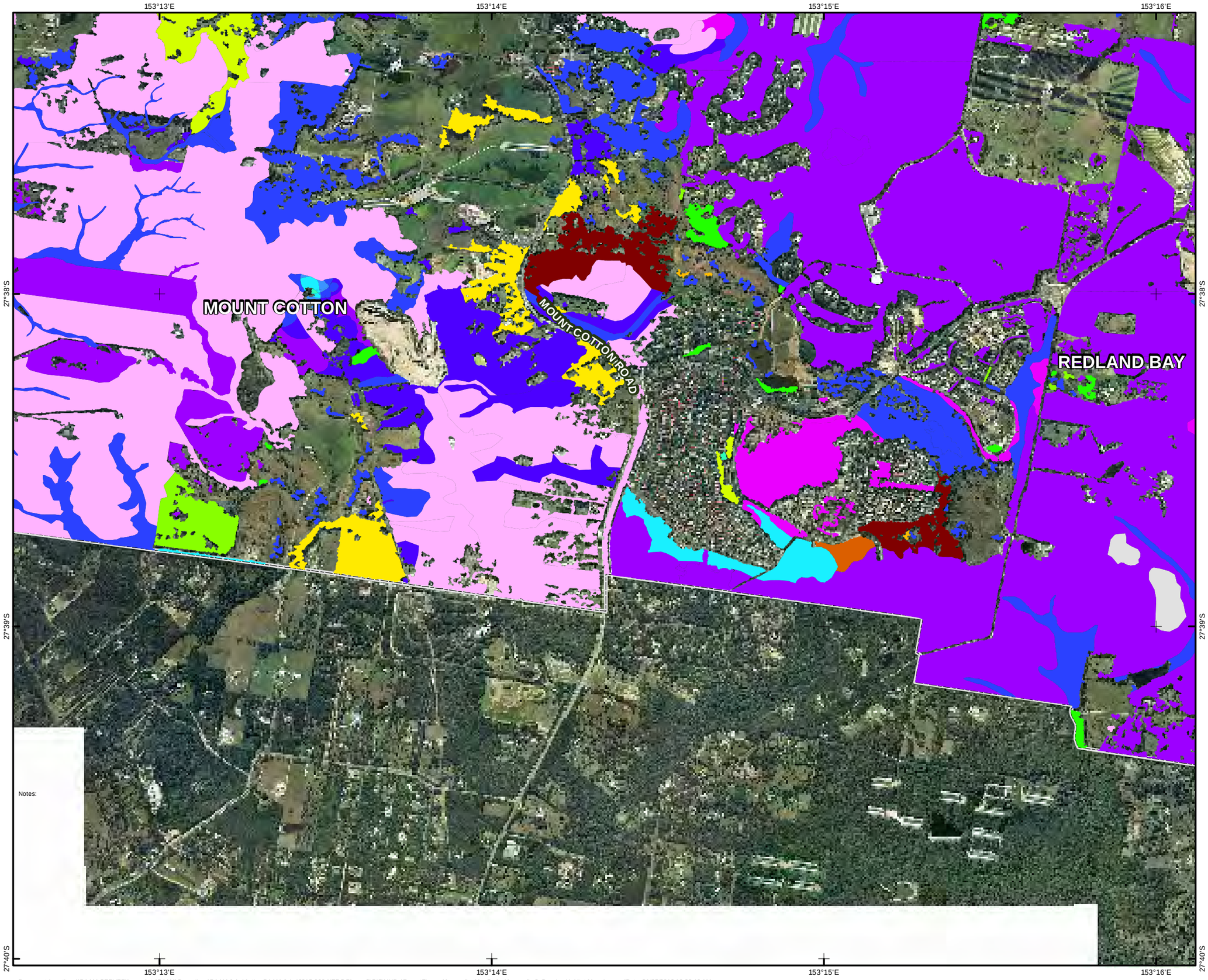
1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 31/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS



Appendix 8
Map 16 of 23

Title: **Species Habitat Mapping**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Species Habitat Score:

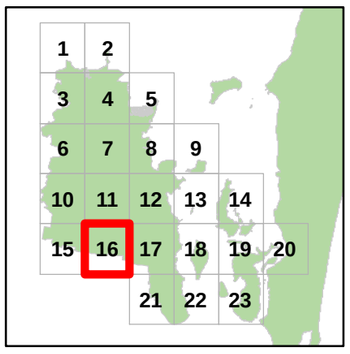
- 0 - 9
- 10 - 47
- 48 - 92
- 93 - 114
- 115 - 141
- 142 - 168
- 169 - 195
- 196 - 213
- 214 - 228
- 229 - 247
- 248 - 286
- 287 - 305
- 306 - 320
- 321 - 340
- 341 - 368
- 369 - 392
- 393 - 413
- 414 - 449
- 450 - 533
- 534 - 699
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

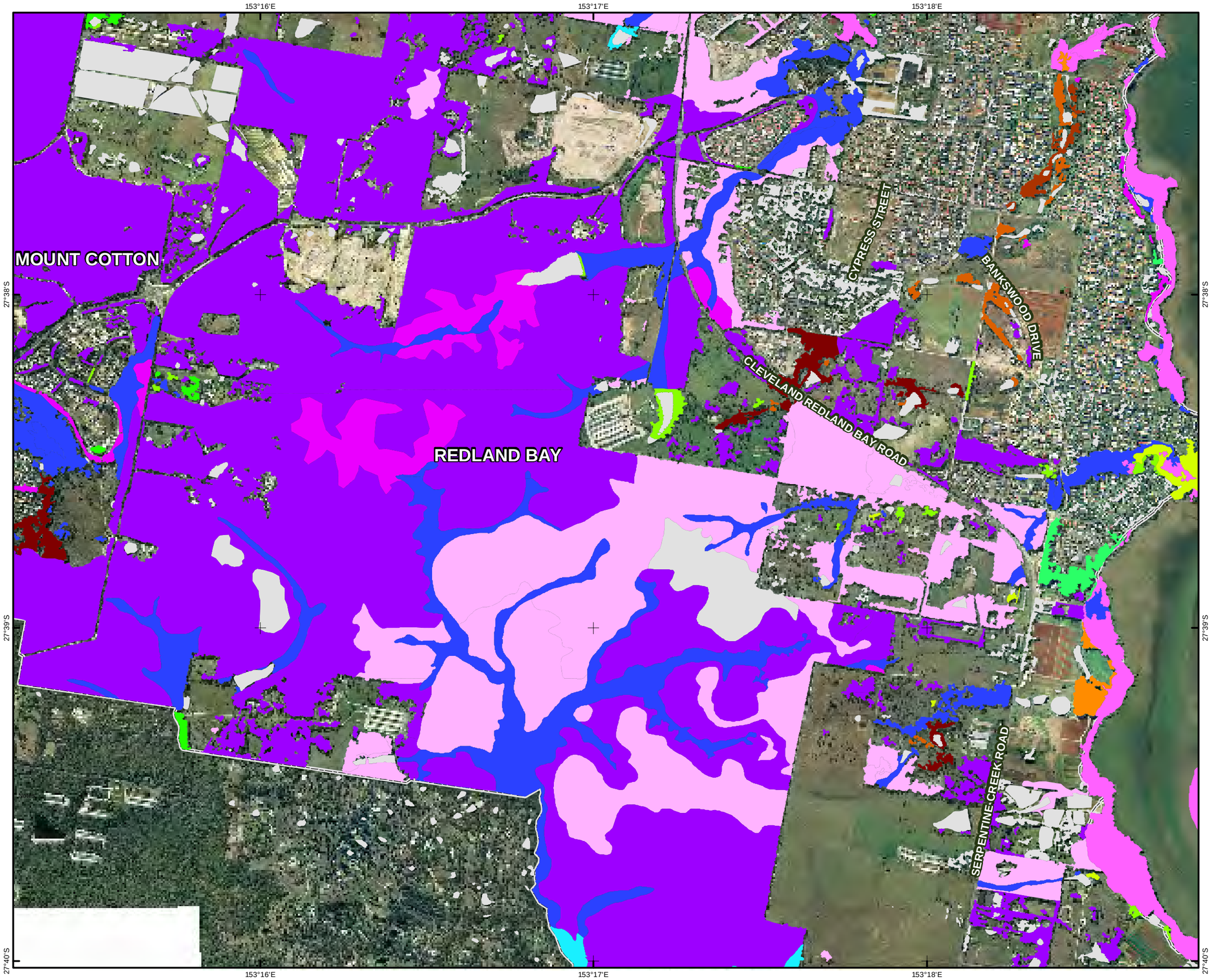
1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 31/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS



Appendix 8

Map 17 of 23

Title: **Species Habitat Mapping**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Species Habitat Score:

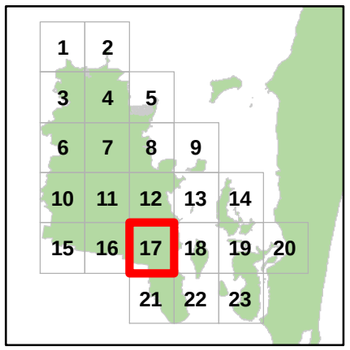
- 0 - 9
- 10 - 47
- 48 - 92
- 93 - 114
- 115 - 141
- 142 - 168
- 169 - 195
- 196 - 213
- 214 - 228
- 229 - 247
- 248 - 286
- 287 - 305
- 306 - 320
- 321 - 340
- 341 - 368
- 369 - 392
- 393 - 413
- 414 - 449
- 450 - 533
- 534 - 699
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

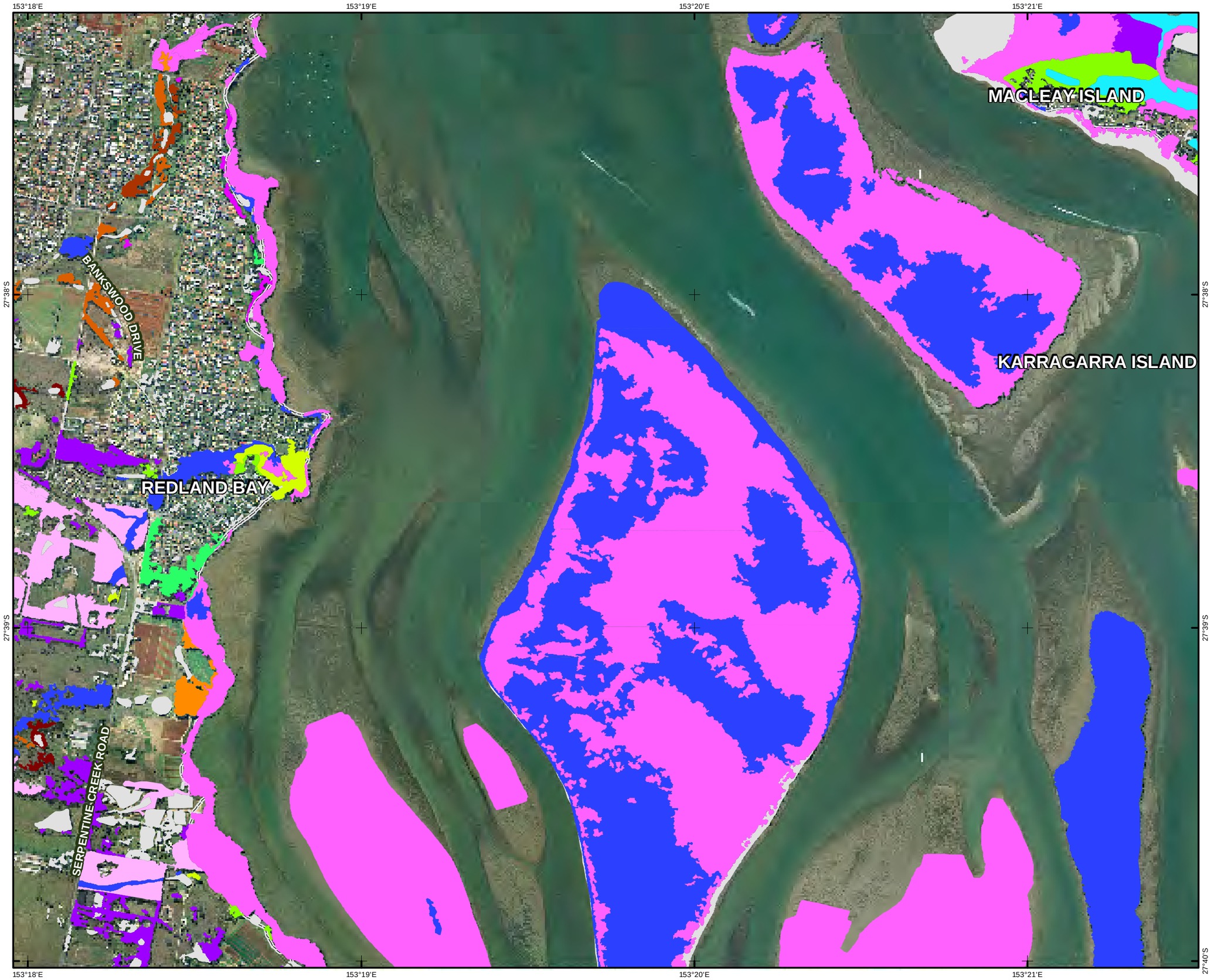
1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 31/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS



Appendix 8
Map 18 of 23

Title: **Species Habitat Mapping**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Species Habitat Score:

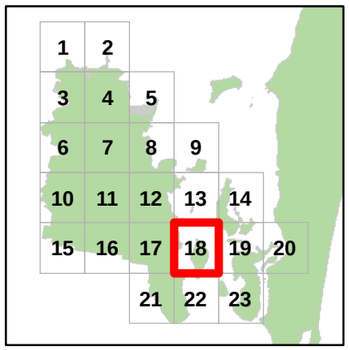
- 0 - 9
- 10 - 47
- 48 - 92
- 93 - 114
- 115 - 141
- 142 - 168
- 169 - 195
- 196 - 213
- 214 - 228
- 229 - 247
- 248 - 286
- 287 - 305
- 306 - 320
- 321 - 340
- 341 - 368
- 369 - 392
- 393 - 413
- 414 - 449
- 450 - 533
- 534 - 699
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 31/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°21'E 153°22'E 153°23'E 153°24'E

27°38'S

27°39'S

27°40'S

MACLEAY ISLAND

LAMB ISLAND

KARRAGARRA ISLAND

RUSSELL ISLAND

Notes:

Document Location: \\BAAM-SERVER\baamdata\BAAM\Operations\BAAM Jobs\Active BAAM Jobs\0015-060 NEDS Phase 2\GIS\MXDs\ReportFigures\Appendix_MapSeries\Appendix 8 Species Habitat Mapping.mxdDate: 31/05/2013 10:33:46 AM

Appendix 8

Map 19 of 23

Title: **Species Habitat Mapping**

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Species Habitat Score:

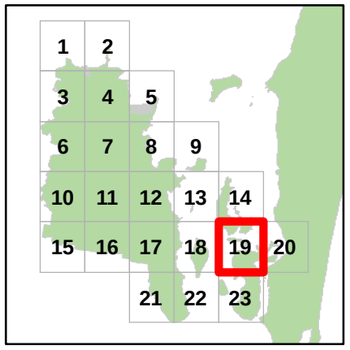
- 0 - 9
- 10 - 47
- 48 - 92
- 93 - 114
- 115 - 141
- 142 - 168
- 169 - 195
- 196 - 213
- 214 - 228
- 229 - 247
- 248 - 286
- 287 - 305
- 306 - 320
- 321 - 340
- 341 - 368
- 369 - 392
- 393 - 413
- 414 - 449
- 450 - 533
- 534 - 699
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009)
supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 31/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°24'E
153°25'E
153°26'E
27°38'S
27°39'S
27°40'S

LAMB ISLAND

RUSSELL ISLAND

Notes:

Document Location: \\BAAM-SERVER\baamdata\BAAM\Operations\BAAM Jobs\Active BAAM Jobs\0015-060 NEDS Phase 2\GIS\MXDs\ReportFigures\Appendix_MapSeries\Appendix 8 Species Habitat Mapping.mxdDate: 31/05/2013 10:33:46 AM

Appendix 8
Map 20 of 23

Title:
Species Habitat Mapping

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Species Habitat Score:

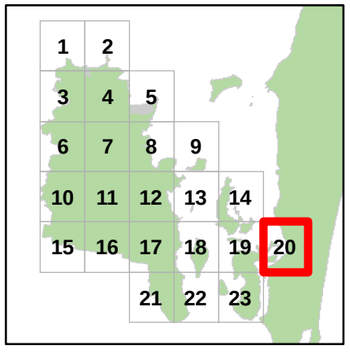
- 0 - 9
- 10 - 47
- 48 - 92
- 93 - 114
- 115 - 141
- 142 - 168
- 169 - 195
- 196 - 213
- 214 - 228
- 229 - 247
- 248 - 286
- 287 - 305
- 306 - 320
- 321 - 340
- 341 - 368
- 369 - 392
- 393 - 413
- 414 - 449
- 450 - 533
- 534 - 699
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 31/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°16'E 153°17'E 153°18'E

27°40'S 27°41'S 27°42'S

REDLAND BAY

SERPENTINE CREEK ROAD

LONGLAND ROAD

LOGAN RIVER

Notes:

Document Location: \\BAAM-SERVER\baamdata\BAAM\Operations\BAAM Jobs\Active BAAM Jobs\0015-060 NEDS Phase 2\GIS\MXDs\ReportFigures\Appendix_MapSeries\Appendix 8_Species Habitat Mapping.mxdDate: 31/05/2013 10:33:46 AM

Appendix 8
Map 21 of 23

Title:

Species Habitat Mapping

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Species Habitat Score:

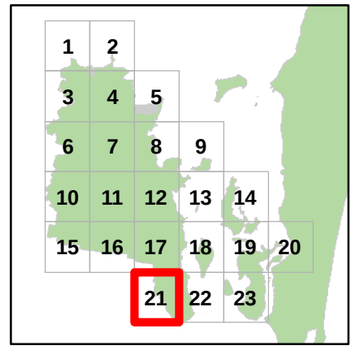
0 - 9	248 - 286
10 - 47	287 - 305
48 - 92	306 - 320
93 - 114	321 - 340
115 - 141	341 - 368
142 - 168	369 - 392
169 - 195	393 - 413
196 - 213	414 - 449
214 - 228	450 - 533
229 - 247	534 - 699
	RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009) supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 31/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°18'E 153°19'E 153°20'E 153°21'E

27°40'S

27°41'S

27°42'S

SERPENTINE CREEK ROAD

REDLAND BAY

LOGAN RIVER

Notes:

Appendix 8
Map 22 of 23

Title:

Species Habitat Mapping

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Species Habitat Score:

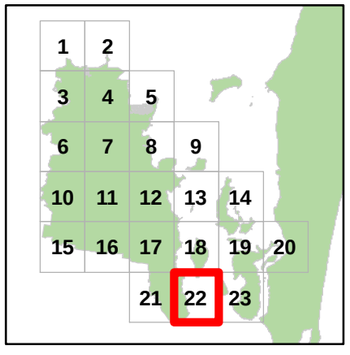
0 - 9	248 - 286
10 - 47	287 - 305
48 - 92	306 - 320
93 - 114	321 - 340
115 - 141	341 - 368
142 - 168	369 - 392
169 - 195	393 - 413
196 - 213	414 - 449
214 - 228	450 - 533
229 - 247	534 - 699
	RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009)
supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 31/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

153°21'E 153°22'E 153°23'E 153°24'E

27°40'S

27°41'S

27°42'S

RUSSELL ISLAND

Notes:

153°21'E 153°22'E 153°23'E 153°24'E

Document Location: \\BAAM-SERVER\baamdata\BAAM\Operations\BAAM Jobs\Active BAAM Jobs\0015-060 NEDS Phase 2\GIS\MXDs\ReportFigures\Appendix_MapSeries\Appendix 8 Species Habitat Mapping.mxdDate: 31/05/2013 10:33:46 AM

Appendix 8

Map 23 of 23

Title:

Species Habitat Mapping

Project: **NEDS Phase 2: Creation, revision and enhancement of vegetation and habitat spatial data layers**

Client: **Redland City Council**

LEGEND

Species Habitat Score:

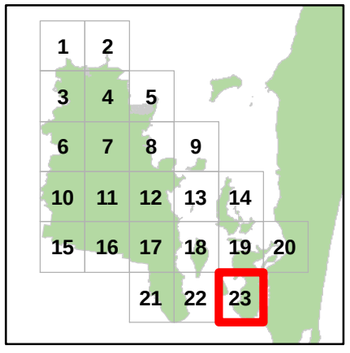
- 0 - 9
- 10 - 47
- 48 - 92
- 93 - 114
- 115 - 141
- 142 - 168
- 169 - 195
- 196 - 213
- 214 - 228
- 229 - 247
- 248 - 286
- 287 - 305
- 306 - 320
- 321 - 340
- 341 - 368
- 369 - 392
- 393 - 413
- 414 - 449
- 450 - 533
- 534 - 699
- RCC Boundary

Notes:
Vegetation generated from LiDAR data (2009)
supplied by Redland City Council
Imagery Sourced from RCC
NSI is still being processed and therefore incomplete.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:20,000 at A3

0 100 200 400 600 800 Meters



Date: 31/05/2013 Drawn By: MG Reviewed by: CS

BAAM ECOLOGICAL CONSULTANTS

This page has been intentionally left blank for double sided printing purposes

BAAM

ECOLOGICAL CONSULTANTS